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Energy

Protection of the environment

Biotechnology

STAND FOR PRESSURE TESTING OF ELECTRICAL EQUIPMENT WITH ENCAPSULATION AND INTRINSIC SAFETY TYPES OF PROTECTION

A

Patent/project number: A 2023 00622

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The invention relates to the design, development, and testing of a fully operational stand intended for pressure testing. The tests are required by SR EN 60079 – 11:2012 for intrinsic safety 'i' type of protection, and SR EN 60079 – 18:2015 for encapsulation 'm' type of protection, of equipment intended for use in explosive atmospheres. The pressure testing stand for equipment with intrinsic safety 'i' or encapsulation 'm' type of protection, intended for use in explosive atmospheres, according to the invention, consists of a set of elements: compressed air cylinder; two-stage pressure regulator; precision pressure reducer; relative pressure transducer; rotameter; quick couplings for connecting the tested equipment; clamp meter; power supply; data acquisition system with multifunctional module; computer system and digital timer.

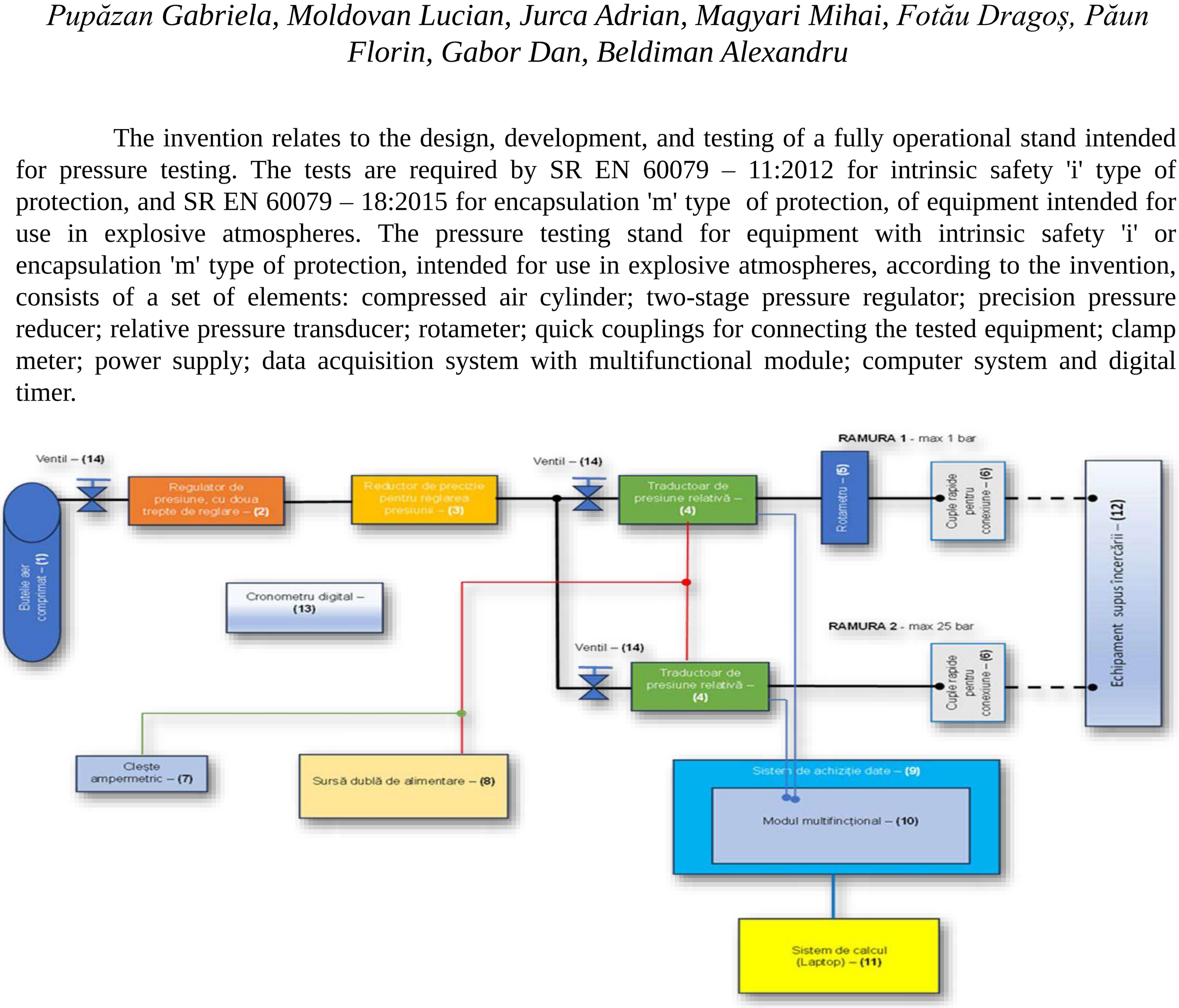

Fig. 1. Block diagram of the stand for pressure testing of electrical equipment with encapsulation and intrinsic safety protection type

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METHOD FOR REDUCING METHANE CONTENT FROM COAL SEAMS

A

Patent/project number: A 2024 00433

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The method of reducing the methane content in coal seams is based on a method of reducing the methane content in coal seams by performing mining works in thick horizontal or low-incline layers, horizontal, vertical and inclined niches and drillings that penetrate the coal seam and the roof rocks for the drainage and capture of methane gas confined in the layer and rock.

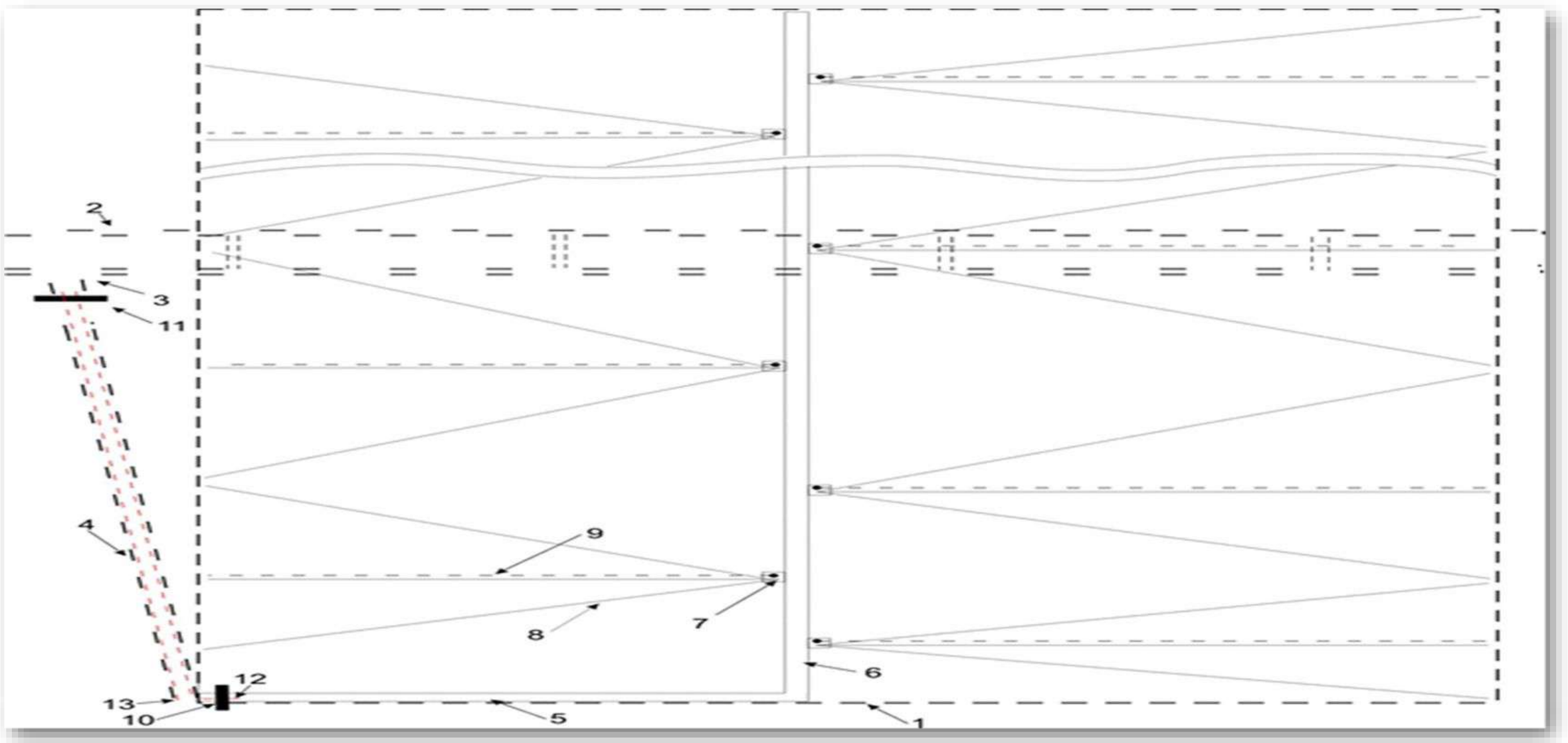
For this, a panel is chosen that is to be exploited in perspective, a connecting gallery is executed from the main conjugate directional gallery, the execution of an inclined plane from the connecting gallery that is oriented towards the upper part of the layer and at the panel limit.

The execution of a directional gallery under the roof up to half of the panel from the inclined plane, the execution of a transverse gallery under the roof up to the panel limit from the directional gallery under the roof.

The execution of several drilling niches made in a checkerboard pattern on both sides of the transverse gallery under the roof, the execution of several horizontal, vertical and inclined drillings from each niche, the creation of an isolation construction at the level of the directional gallery under the roof near the inclined plane.

The installation of a collector pipe that crosses the isolation construction and that will follow the alignment of the inclined plane up to the connecting gallery, the execution of an isolation construction at the level of the connecting gallery, the installation of a collector pipe on the alignment of the inclined plane and that crosses the construction isolation from the connecting gallery.

The two collector pipes are coupled, auxiliary measurement, isolation and control devices are mounted on the two collector pipes, the two collector pipes are connected to the transport system by means of coupling elements, the transport system is connected to the central degassing system network and finally the degassing process of the coal seam is started.



The system of mining works and drilling specific to the method of reducing the methane content in coal seams – horizontal view.

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STAND FOR DETERMINING THE SELF-IGNITION TEMPERATURE Ti OF FLAMMABLE LIQUIDS WITH HIGH VISCOSITY

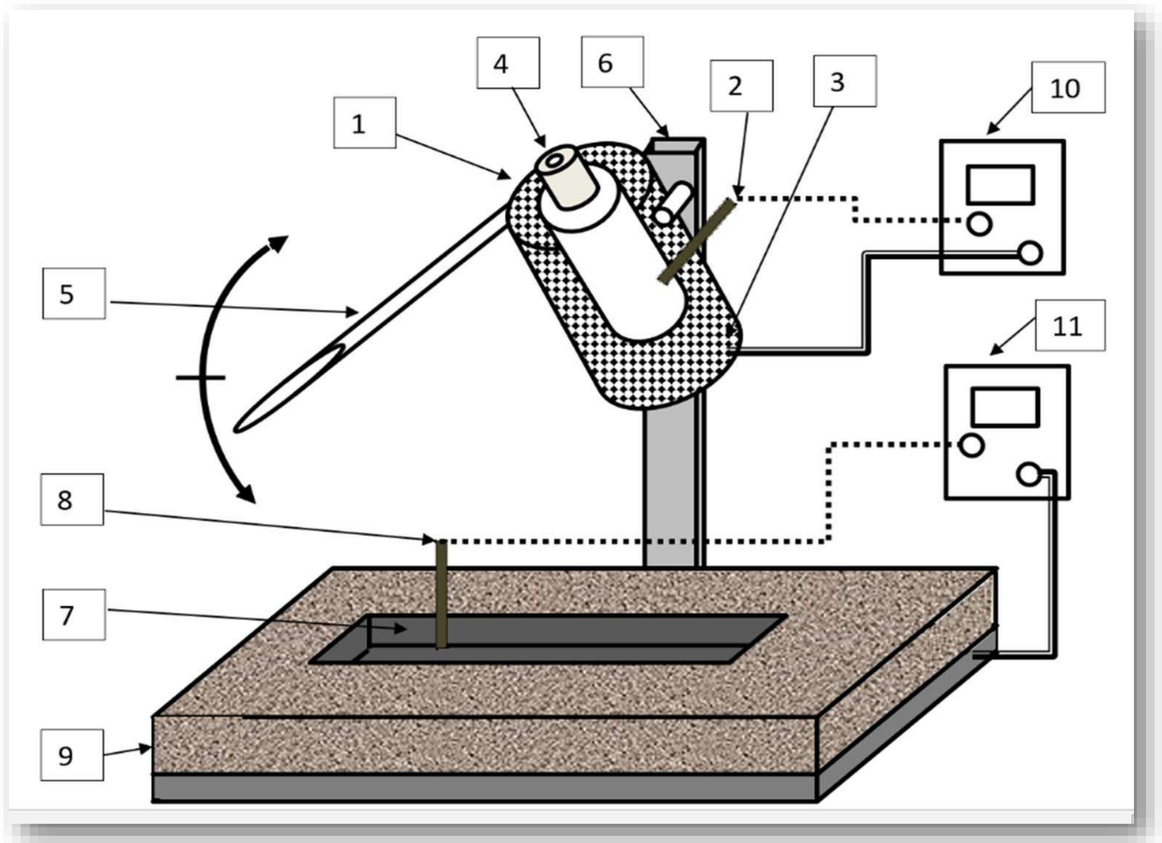
Patent number: 134264/2024

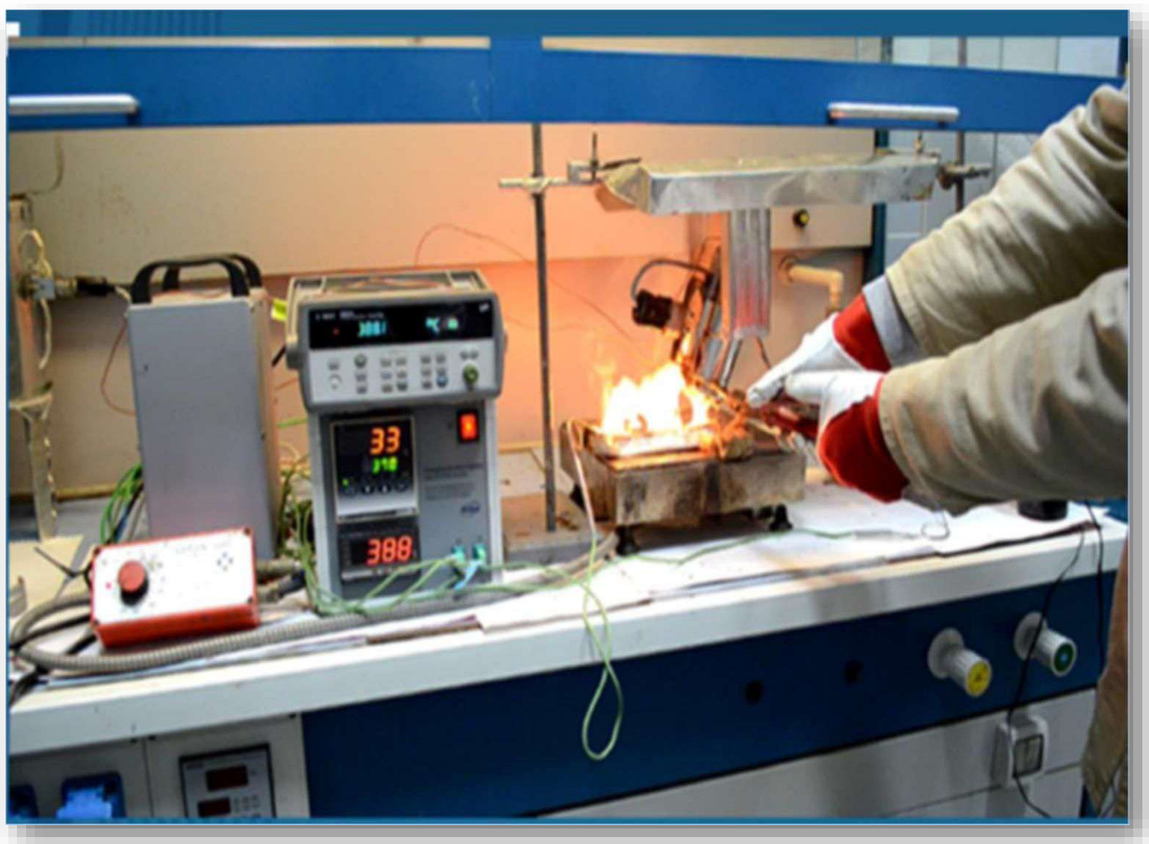
Author/s: *Emilian Ghicioi, George Artur Găman, Gheorghe Daniel Pupăzan, Angelica-Nicoleta Găman, Nicolae Ioan Vlasin, Vlad Mihai Păsculescu, Cristian Nicolescu, Robert Laszlo, Constantin Sorin Burian, Florin Manea, Gheorghe-Daniel Florea, Vasilica Irina Nălboc, Andrei Szollosi-Moța, Marius Cornel Șuvar, Edward-Jan Gheorghiosu, Attila Kovacs, Alexandru Florin Simion, Marius Simion Morar*

The stand for determining the autoignition temperature Ti of flammable liquids with high viscosity, which at ambient temperature are in solid phase (have a freezing point above +60 degrees Celsius), according to the invention, consists of an assembly composed of a thermostated melting vessel [1] provided with a temperature probe [2], with a thermal chamber [3] adjustable in the range from +60 to +500 degrees Celsius, a lid with a central nozzle [4] with a diameter of 1 mm, a tilting device [5], mounted on the lifting device [6] at a height of 200 mm above the metal collecting trough [7], with a homogeneous temperature, provided with a measuring probe [8], immersed in a sand bath [9] with a temperature settable between +150 and +800 degrees Celsius.

The stand allows the liquid phase to gravitationally reach the metal collector after the melting stage by controlled tilting of the container, monitoring the ignition or not of the mixture of air and pre-heated liquid vapors in direct contact with the hot surface of the trough, and setting the auto-ignition temperature Ti (the lowest temperature at which auto-ignition occurs) for a wide range between +150 and +800 degrees Celsius.

The invention provides the material basis for knowing the self-ignition temperature Ti of highly flammable liquids, which are in solid form at ambient temperatures, allowing the establishment of maximum safe process temperatures, which provide explosion/fire protection for industrial activities where flammable liquids are processed, either as primary or intermediate products, obtained in the distillation processes of residues resulting from the refining of crude oil.





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HYBRID SOLAR SYSTEM WITH AUTOMATIC ADJUSTMENT

Patent Application No. A 2024 00254

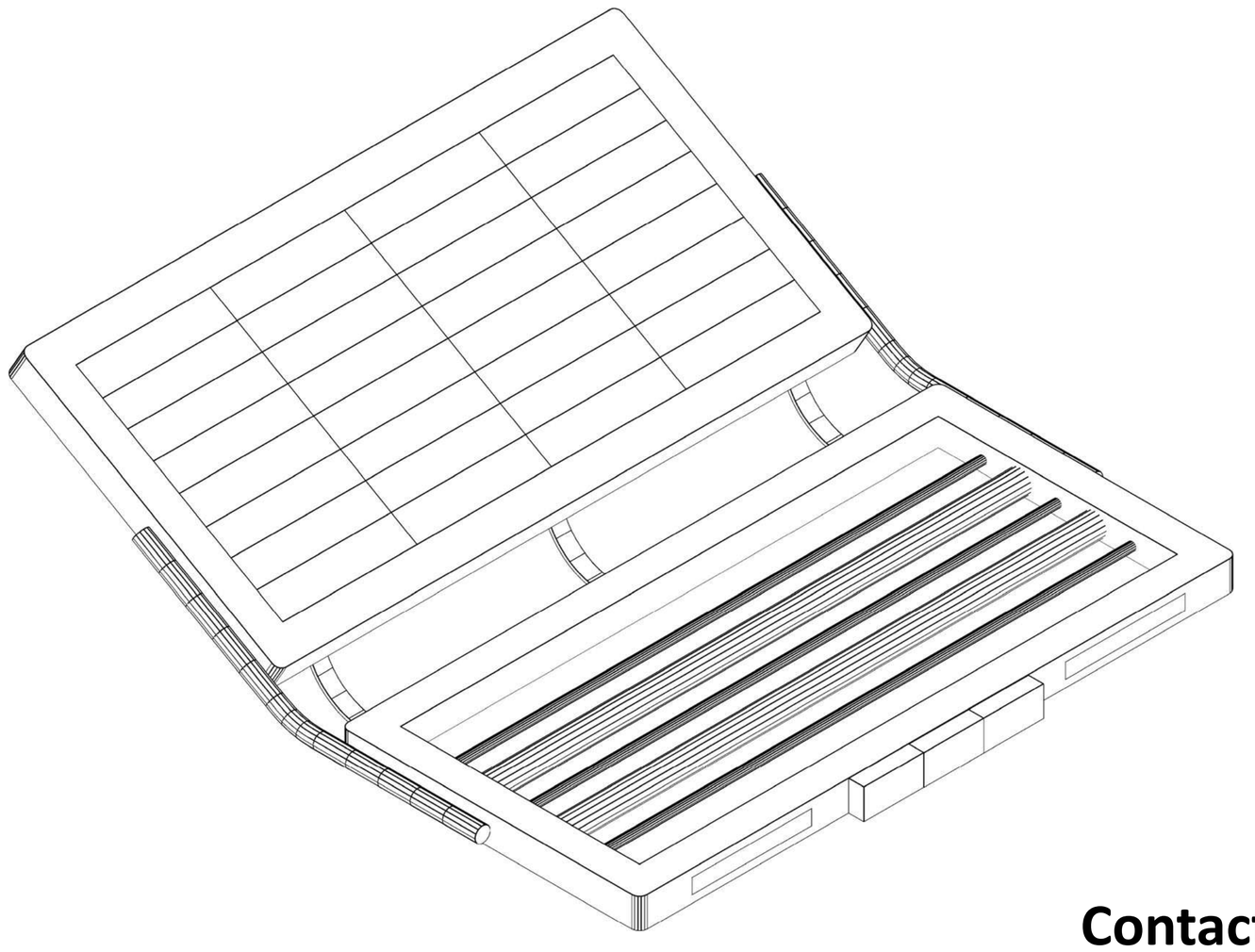
Visarion-Cătălin IFRIM, Ciprian BEJENAR, Constantin UNGUREANU,
Laurențiu-Dan MILICI, Pavel ATĂNĂSOAE

A

Hybrid solar system with automatic adjustment, according to the invention, features an assembly consisting of solar panels intended for the production of electricity and heat, joined through thermo-mechanical actuators and elastic parts, which is why, the system supports the adaptive modification of the shape and operating regime, without external intervention, so that, in summer the production of electrical energy is facilitated, in winter the production of thermal energy is facilitated, and in spring and autumn it allows the simultaneous production of electricity and heat.

Advantages:

1. The system introduces new possibilities for the hybrid production of electricity and/or heat, respectively, for adjusting the operating regime of solar systems, due to the nature of its dynamic construction;
2. The system covers the various needs of supplying electricity and/or heating, through its constructive form, because it alternately exploits the solar panels intended for the production of electrical energy;
3. The system avoids overheating of solar panels intended for the production of thermal energy, because it is driven automatically, and the control process is autonomous, which does not require additional energy;
4. The system features actuation elements that do not require special maintenance.



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SUN TRACKING SYSTEM

Patent No. RO133100B1, 2022

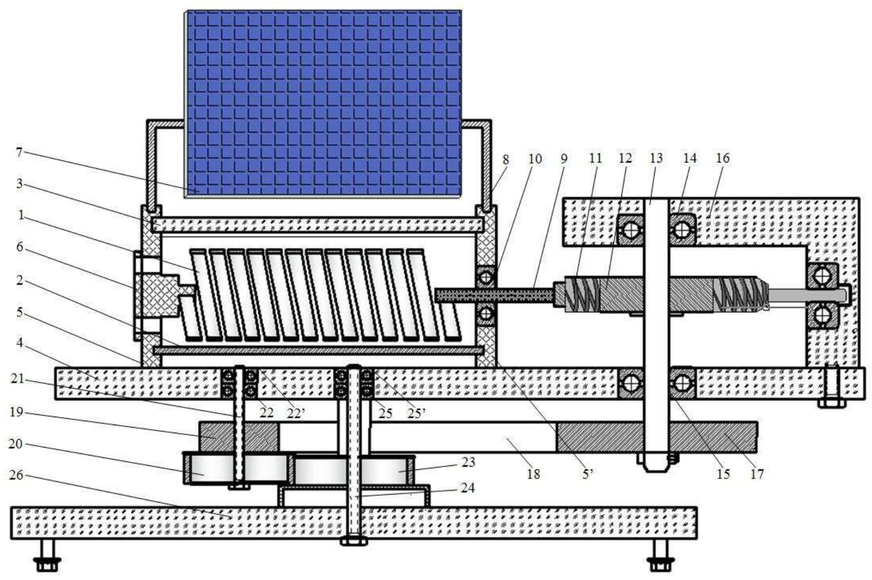
NIŢAN Ilie, POIENAR Mihaela, MILICI Rodica-Mariana,
IRIMIA Daniela, BOBRIC Crenguța-Elena, OLARIU Elena-Daniela, RAȚĂ Gabriela,
PRODAN Cristina, UNGUREANU Constantin,
ROMANESCU Adrian, PENTIUC Radu-Dumitru

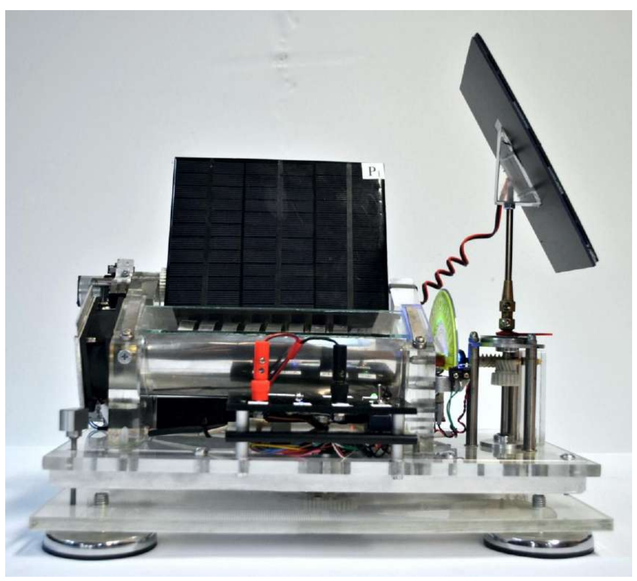
A

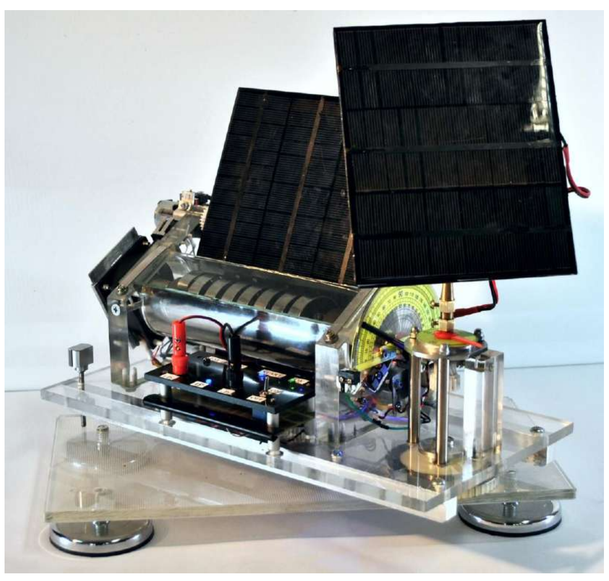
The Sun tracking system consists of a thermo-bimetallic strip modeled after a helical cylindrical path and placed inside a parabolic concentrator, closed at the top by means of a glass cap. The thermo-bimetallic strip, under the action of solar heat produces an angular displacement at the free end which is fixed by a shaft which controls a snail-worm wheel fixed to another shaft. For exhausting the hot air inside the concentrator a shutter type element was used to cool the thermo-bimetallic strip.

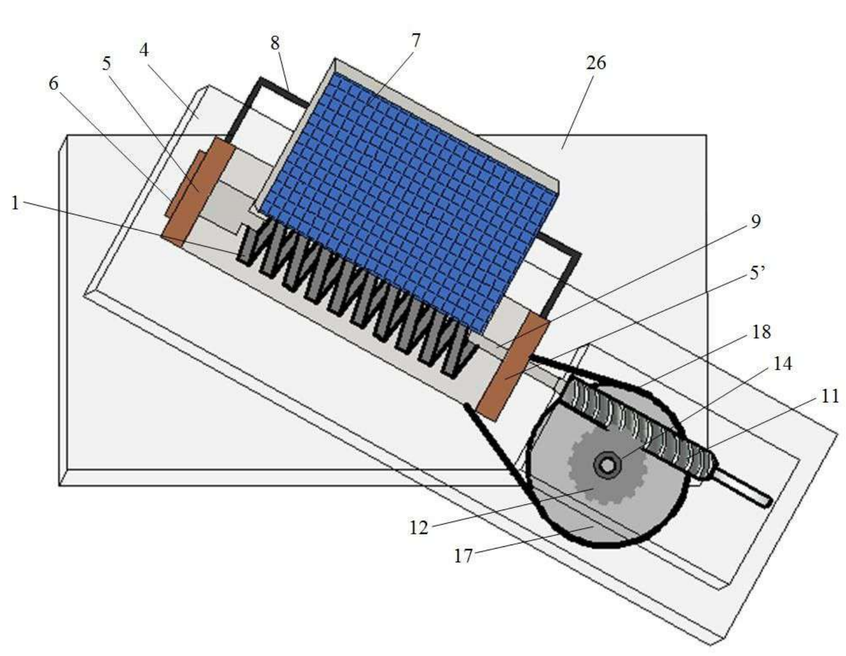
Advantages:

- ❑ high efficiency of the helio-thermo-mechanical conversion;
- ❑ offers the possibility of simultaneous orientation of the PV panel and actuator after the Sun path.









SUN TRACKING SYSTEM - laboratory prototype - 1 – thermo-bimetallic strip; 2 - parabolic concentrator; 3 - glass cap; 4 - mobile support of the actuator; 6 - shutter type element; 7 - PV panel; 9 - main shaft; 11, 12 - snail-worm wheel; 13 - PV panel shaft; 17, 19 - transmission wheel; 18 - transmission belt; 20, 23 - cogwheels;

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METHOD AND SYSTEM FOR INCREASING HEATING POWER

Patent Application No. A 2025 00092

Ciprian BEJENAR, Marian BEJENAR, Andrei-Dumitru NAȘCU,
Daniel HRIȚCAN, Vasile-Eusebiu TOADER, Laurențiu-Dan MILICI

A

Method and system for increasing heating power, according to the invention, features a strategy and a digital command/control path, of the direct current passed through non-ideal heating elements, of the resistive-inductive (RL) type, based on a pulse modulation technique, to modify the effective value of the electric current without varying the amplitude of the electric voltage, which improves the regulation linearity of the systems that implement it.

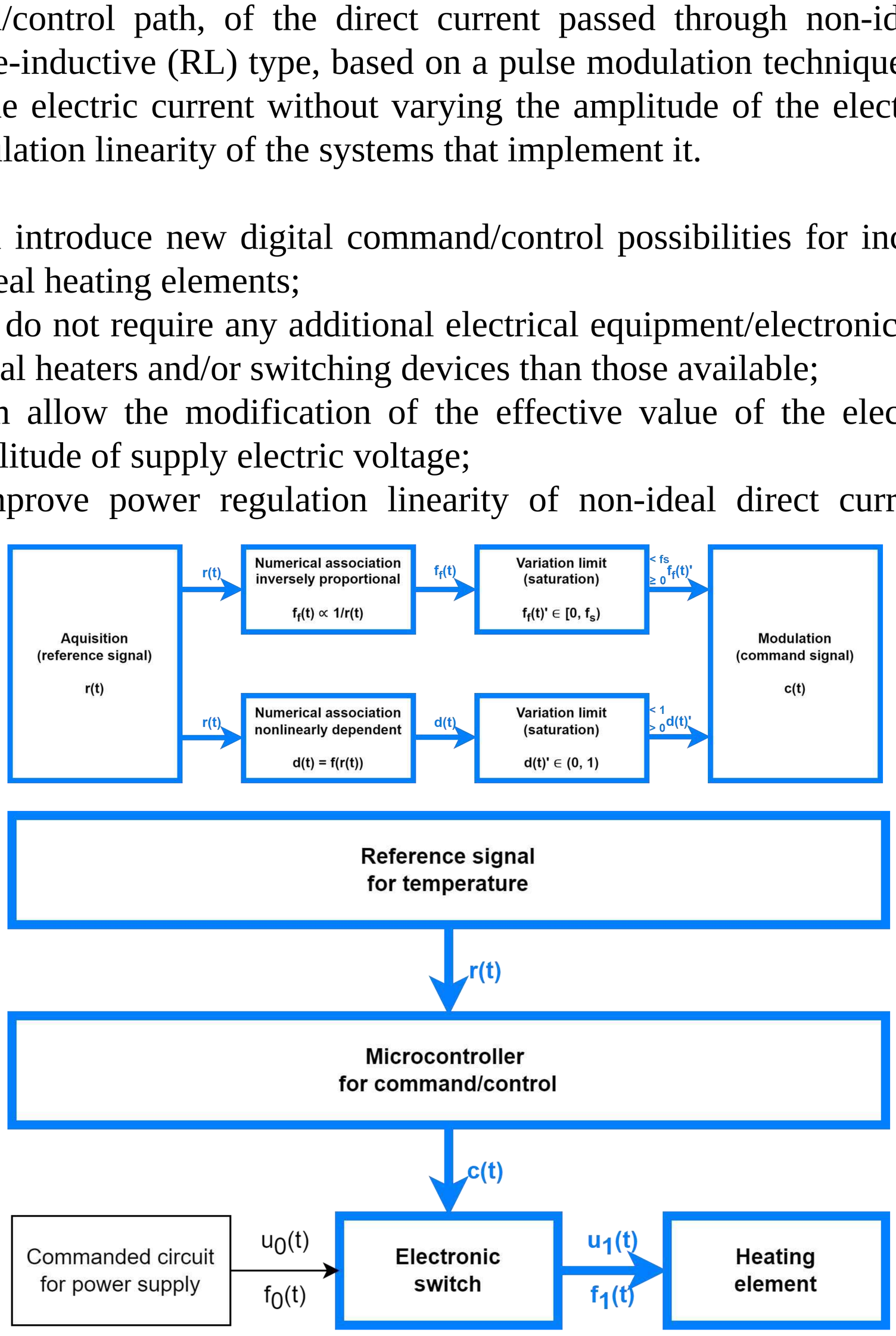
Advantages:

The method and system introduce new digital command/control possibilities for increasing the heating power of non-ideal heating elements;

The method and system do not require any additional electrical equipment/electronic conversion devices, or other electrical heaters and/or switching devices than those available;

The method and system allow the modification of the effective value of the electric current without varying the amplitude of supply electric voltage;

Method and system improve power regulation linearity of non-ideal direct current electric heaters.



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PROMOTING LONG-TERM ACTION AND SUSTAINABLE TECHNIQUES FOR INHIBITING CONTAMINATION WITH PLASTIC IN FRESHWATER ECOSYSTEM FROM CROSSBORDER AREA RO-RM (PLASTICWISE)

Aurora MATEI[1], Elena ZUBCOV[2], Andrei Victor SANDU[1], Ioana Corina MOGA[1] , Ioan Gabriel SANDU[1]

1 - Association for Ecology and Sustainable Development

2 - Public Association Society of Ecototoxicologists of Republic of Moldova

ABSTRACT

The *PlasticWise* project aims to assess macro and microplastic pollution in the Prut River through joint Romanian–Moldovan research and community engagement. It includes biodiversity monitoring, microplastic analysis in fish and aquatic environments, and dissemination of results to public authorities.

The project also features a cross-border awareness campaign promoting ecological tourism and citizen participation in environmental protection.

KEYWORDS

Microplastic pollution
Prut River
Awareness campaign
Environmental protection
Citizen involvement

CONTACT

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INTRODUCTION

- The project addresses the growing environmental threat of plastic pollution in the Prut River basin by combining scientific research with public awareness actions across Romania and the Republic of Moldova. The project also promotes citizen engagement and educational outreach, fostering a culture of environmental responsibility and sustainable waste management practices.
- Through collaborative field and laboratory investigations, the initiative will assess the extent of microplastic contamination in fish, water, and sediments, while also studying associated microorganisms.
- The project seeks to bridge existing data gaps in freshwater ecosystem monitoring.

METHODS

1. Ichthyofauna Biodiversity Monitoring

- Field inventory of non-endangered fish species.
- Laboratory dissection and KOH digestion of gastrointestinal tracts.
- Quantitative and qualitative analysis of microplastics in fish.

2. Water and Sediment Sampling

- Collection and filtration of water and sediment. Samples will be processed under controlled laboratory conditions to prevent secondary contamination.
- FTIR spectroscopy and fluorescence microscopy for microplastic identification

RESULTS

- Monitoring of ichthyofauna biodiversity, along with the collection and analysis of macro- and microplastic particles from the river.
- Modern research methods applied during the biodiversity survey. Fish specimens from non-endangered species will be collected and brought to the laboratory, where KOH digestion of the gastrointestinal tract will be carried out to evaluate the level of microplastic contamination.
- A new contribution to the estimation and preservation of fish diversity within the ecosystems of the Prut River basin, including in UNESCO-protected wetlands.

Figure 1. PlasticWise reprezentation

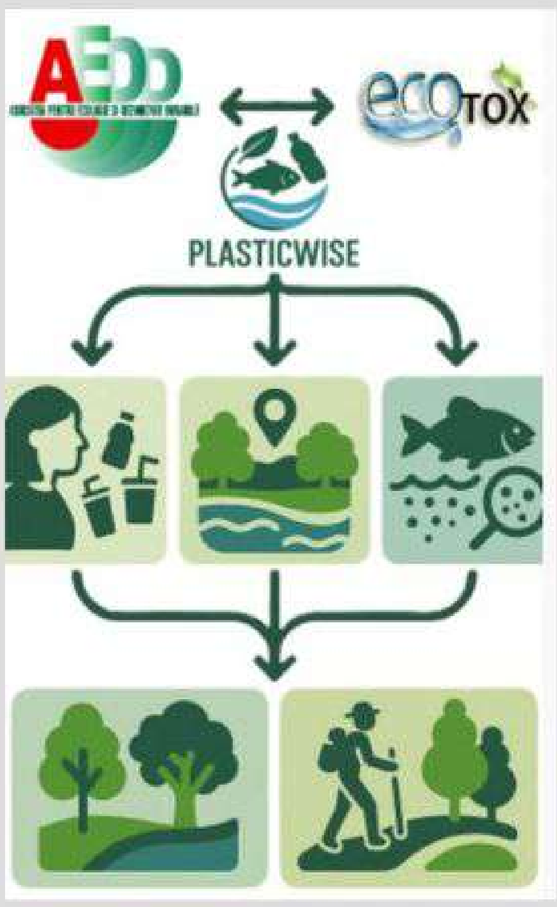
- In parallel, an extensive awareness campaign will promote sustainable behavior and ecological tourism in protected wetland areas.
- The results will support evidence-based environmental policies and strengthen cooperation between research institutions and local communities.

3. Pathogen Analysis

- Sampling of bacteria colonizing microplastics.
- Evaluation of microbial diversity and antibiotic resistance.
- MALDI-TOF spectrometry for taxonomical identification.

MATERIALS

- Fish specimens (from non-endangered species)
- Water samples (from Prut River)
- Sediment samples
- Filtration systems (for water and sediment)
- Potassium hydroxide (KOH) (for gastrointestinal tract digestion)
- Microplastic particle filters
- FTIR spectrometer
- Fluorescence microscope
- MALDI-TOF spectrometer (for microbial identification)
- Microbiological media and reagents Other laboratory devices
- IT devices



CONCLUSIONS

- The implementation of joint dissemination activities on both sides of the Prut River, aimed at informing public institutions responsible for developing environmental protection strategies and regulations.
- Promotion of eco-tourism in the Prut river cross-border area, supported by visual materials such as videos, leaflets, and maps.
- A joint cross-border strategy for monitoring freshwater plastic contamination in the Prut River protected areas, developed through expert input and public participation.
- Improved institutional and technical capacity for assessing plastic waste, based on legal, logistic, and community engagement frameworks.

PROJECT INFORMATION

Project Number: ROMD00401
Funding Authority: Ministry of Development, Public Works and Administration
Programme: Interreg VI-A NEXT Romania–Republic of Moldova 2021–2027

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Mašina za reciklažu boca - Razvoj sistema za proizvodnju 3D filamenata od recikliranog plastike sa ekološkim fokusom
BOTTLE RECYCLING MACHINE – DEVELOPMENT OF A SYSTEM FOR THE PRODUCTION OF 3D FILAMENTS FROM RECYCLED PLASTIC WITH AN ECOLOGICAL FOCUS

Autors: Pavle Trnić, Dragan Dobrijević / Elektrotehnička škola „Nikola Tesla" Banja Luka / Savez inovatora Republike Srpske / Republic of Srpska - Bosnia and Herzegovina
Mentor: Dušan Tubić

A

SR/ OD OTPADA DO PONOVNE UPOTREBE - FILAMENT ZA 3D ŠTAMPANJE

U današnjem svijetu, proizvodnja je svuda oko nas i, blago rečeno, značajno zagađuje našu planetu. Velika većina plastičnog otpada završava u rijekama i okeanima, posebno plastične boce koje su razbacane svuda i čekaju razgradnju. Pravedno je reći da su ljudi postali veoma nepažljivi prema svojoj okolini i planeti uopšte.

Postoje brojni proizvodni procesi od kojih su neki „subtraktivna proizvodnja". Ove metode koriste CNC mašine kao što su CNC glodalice, CNC tokari i CNC rezne mašine, a sve one koriste određenu količinu materijala i kroz poseban skup uputstava, koji su sadržani u takozvanom „G-kodu", skidaju dati materijal, npr. aluminijsku blok, koristeći rotacione glodalice, bušilice i tokarske alate. Ovo su jedne od najviše korištenih mašina na svijetu, međutim, čak i najmanje greške mogu puno koštati jer se materijal ne može dodati. Ovdje ulazi 3D štampanje, potpuno suprotan proces. U suprotnosti tradicionalnim oduzimajućim metodama, 3D štampanje se zasniva na aditivnoj tehnologiji gdje se fizički objekat stvara sloj po sloj. Za razliku od obrade i lijevanja, ovaj proces samo dodaje ono što je potrebno i gdje je potrebno, što drastično mijenja način na koji se stvari dizajniraju i proizvode.

3D štampanje uključuje dizajnirani 3D model (CAD datoteka: .stl, .3mf, .stp...) i „slicing". Slicer je program koji pretvara modele u tanke horizontalne slojeve, putanje alata i prethodno spomenuti G-kod. Postoji mnogo programa za rezanje, a neki od njih su PrusaSlic3r, Cura, OrcaSlicer. Additivna tehnologija je podijeljena u nekoliko grupa: FDM (Modeliranje fuzioniranjem depozita), SLA (Stereolitografija), SLS (Selektivno lasersko sinterovanje). Metoda FDM koristi filament pri štampanju. To je tanka plastična žica, obično prečnika 1,75 mm ili 2,85 mm, namotana na kolut koji obično teži 1 kg. Štampač topi ovaj filament prema uputama i stvara objekat. Postoje različite vrste filamenata, a neki od najpoznatijih su PLA, PET, PETG, ABS, TPU, ASA i najlon. PLA je biološki bazirani poliester, lako se štampa i izgleda dobro, ali ima nedostatke kao što su krhkost i pucanje pod stresom, te nije pogodan za mehaničke ili strukturne dijelove. U poređenju sa PLA-om, koji je teško pronaći u industriji, PET (polietilen tereftalat) je materijal koji se koristi za pakovanje hrane, poliester i, što je najvažnije, plastične boce za vodu.

Kao što smo već spomenuli, glavni problem zagađenja vode je plastika, a posebno boce. Budući da su ove boce napravljene od PET-a, mogu se reciklirati kroz poseban proces koji uključuje pretvaranje nekada zagađujućih boca u korisni filament za 3D štampanje. Ovo je nešto što ne samo da smanjuje zagađenje, već također i troškove vezane za filament.

Kada se boce skupe, peru se, zagrijavaju i ispravljaju kako bi se smanjili neželjene nuspojave. Dno boce se reže kako bi se mogla staviti na skup ležajeva koji imaju pričvršćen rezač. Isečeni deo plastične boce se stavlja kroz vrući kraj koji ima grejač i mlaznicu na kraju. Trenutkom kada se plastika otopi, može se izvesti kroz mlaznicu i staviti na zupčanik koji pokreće stepper motor. Dok se motor okreće, zupčanici stvaraju vučnu silu na plastiku i boce se okreću.

Nakon segmenta vruće glave, tu je ventilator koji se koristi za hlađenje filamenta jer je sklon kristalizaciji – negativna nuspojava. Sve se kontrolira putem mikrokontrolera LGT8F koji je baziran na 328p. Postoje i potenciometri koji mogu neovisno podešavati temperaturu hotenda, brzinu ventilatora i obrtaje stepper motora.

Nedostaci ovog procesa:

- Filament je u komadima i mora se ručno dodavati tokom štampanja. Količina filamenta koja se dobija određena je veličinom boce.
- Kristalizacija ekstrudiranog filamentu tokom dugotrajnog zagrijavanja. Tokom kristalizacije, zapetljani lanci polimera se usklađuju u gusto raspoređene, uređene regije dok se materijal hladi. To povećava gustinu i uzrokuje skupljanje, što može generisati unutrašnji stres I iskrivljenje.
- Ponekad je potrebno osušiti ekstrudirani filament.

EN/ From waste to reuse - 3D printing filament

In today's world, manufacturing is everywhere around us and to say the least and it is polluting our planet greatly. Vast majority of plastic waste ends up in rivers and oceans especially water bottles that are scattered everywhere waiting for degradation. It is fair to say, people became very negligent and about their environment and the planet in general.

There are numerous manufactoring processes of which some are „subtractive manufactoring". These methods use CNC machines such as CNC mills, CNC lathes and CNC router and all these use certain amount of material and through special set of instructions, which are contained in so called „G-code", subtract the given material e.g. aluminum block using spinning mills, drills and turning inserts. These are one of the most used machines in the world, however even the smallest mistakes can cost a lot since the material can not be added. This is where 3D printing steps in, a complete opposite process. In contrast to traditional subtractive methods 3D printing is based on additive technology where a physical object is created layer by layer. Unlike machining and casting, this process only adds what and where it is needed which drastically changes how things are designed and manufactured.

3D printing involves a designed 3D model (CAD File: .stl, .3mf, .stp...) and „slicing". Slicer is a program that converts models into thin horizontal layer, toolpaths and previously mentioned G-code. There are many slicing programs and some are PrusaSlic3r, Cura, OrcaSlicer. Additive technology is divided in few groups: FDM (Fused Deposition Modeling), SLA (Stereolithography), SLS (Selective Laser Sintering). FDM printing uses filament for printing . It is thin plastic wire, usually 1.75mm or 2.85mm diameter, wound on a spool usually weighing 1kg. The printer melts this filament according to instructions and builds the object. Different types of filaments exist and some of the most known are PLA, PET, PETG, ABS, TPU, ASA, Nylon. PLA is bio-based polyester, prints easily and looks good but there are a downsides such as being brittle and cracking under stress and it is not for mechanical or structural parts. In contrast to PLA which is hard to find in industry, PET (Polyethylene Terephthalate) is material used for food packaging, polyester and most importantly plastic water bottles.

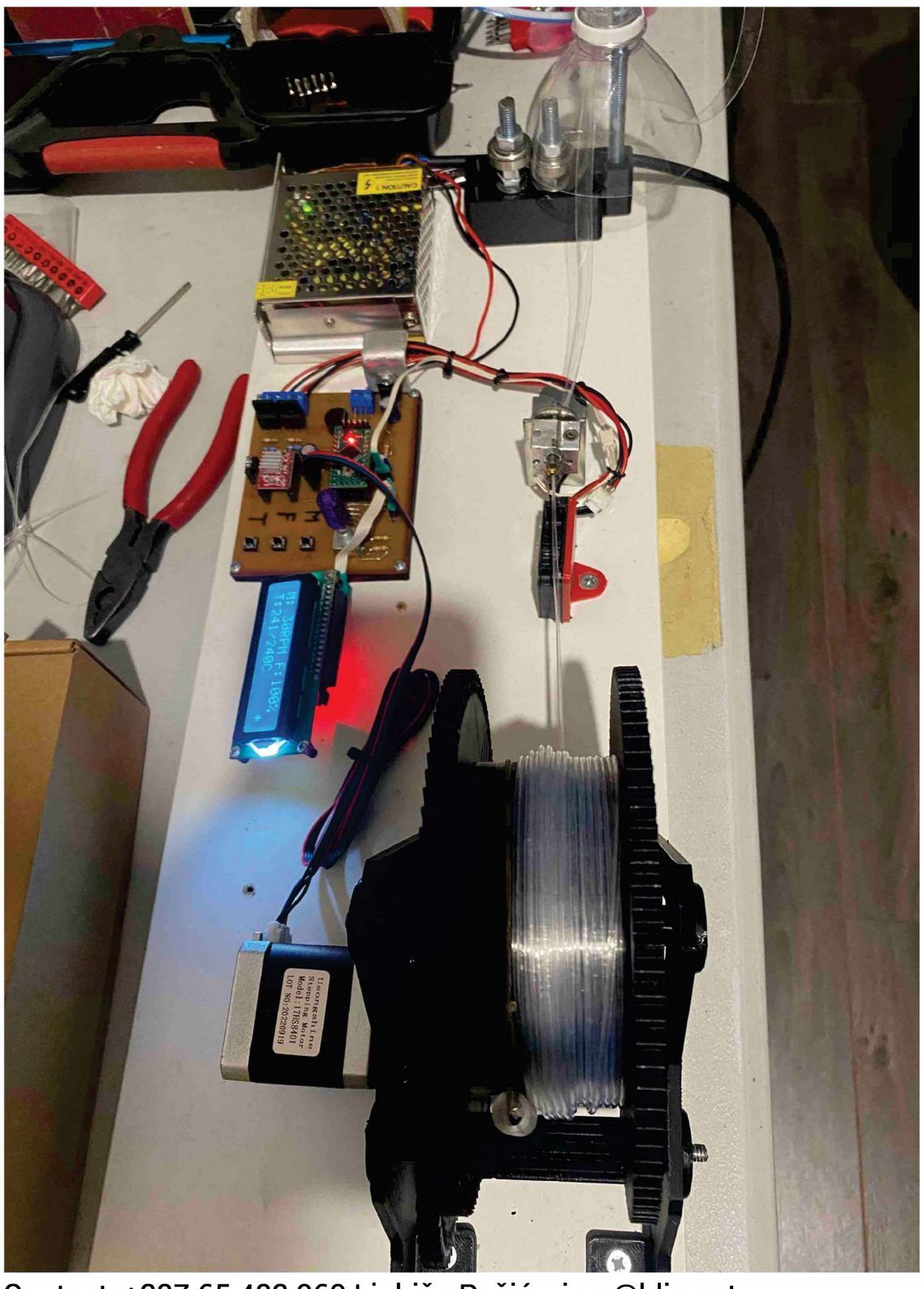
As we already mentioned major problem with water pollution is plastic, moreover bottles. Since these bottles are made from PET they can be recycled through a special process that involves turning once polluting bottles in useful filament for 3D printing. This is something that not only reduces pollution but also the expenses regarding filaments.

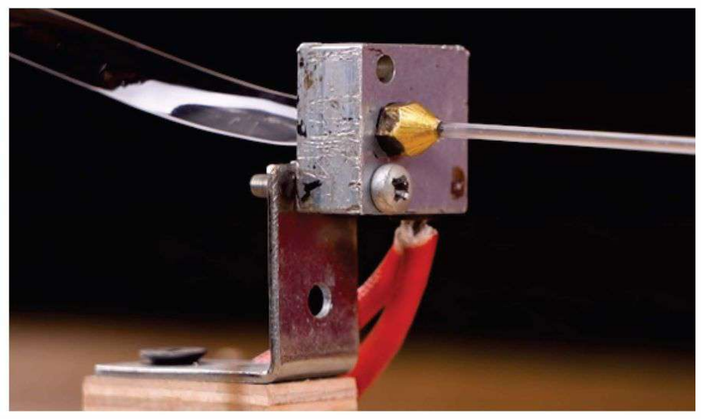
Once the bottles are gathered they are washed, heated and straightened in order to reduce unwanted side effects. The bottom of the bottle is cut off so it can be put on a set of bearings that have a cutter attached. Cut strand of the plastic bottle is put thru a hotend that has a heater and a nozzle at the end. The moment plastic melts it can be extruded through the nozzle and be put on a gear driven by a stepper motor. As the motor spins the gears it creates pulling force on the plastic and the bottles spins.

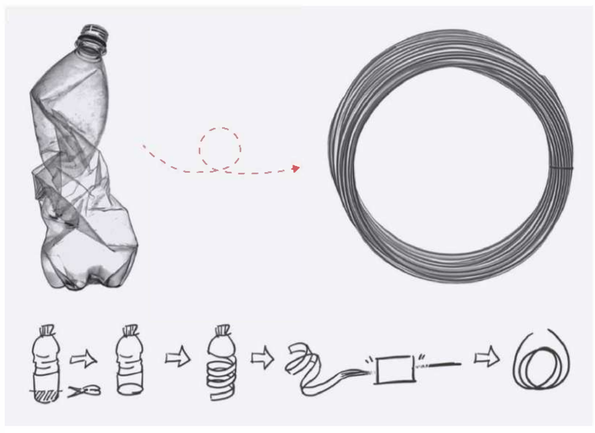
After hotend segment there is a fan used for cooling the filament because it is prone for crystallization – negative side effect. Everything is controlled by LGT8F based on 328p. There are potentiometers which can independently set the hotend temperature, fan speed and stepper motor RPMs.

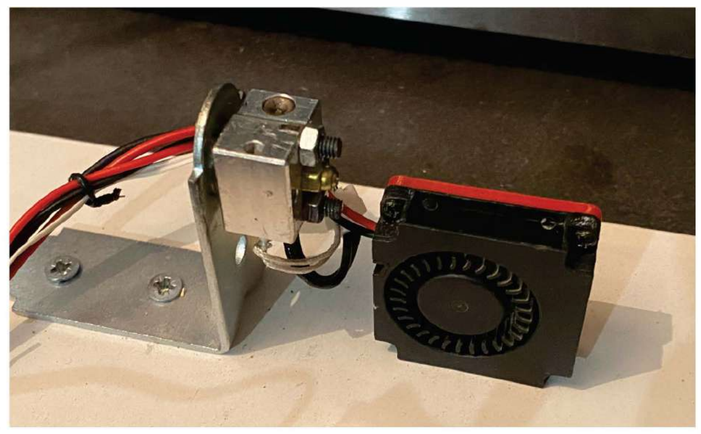
Downsides of this process:

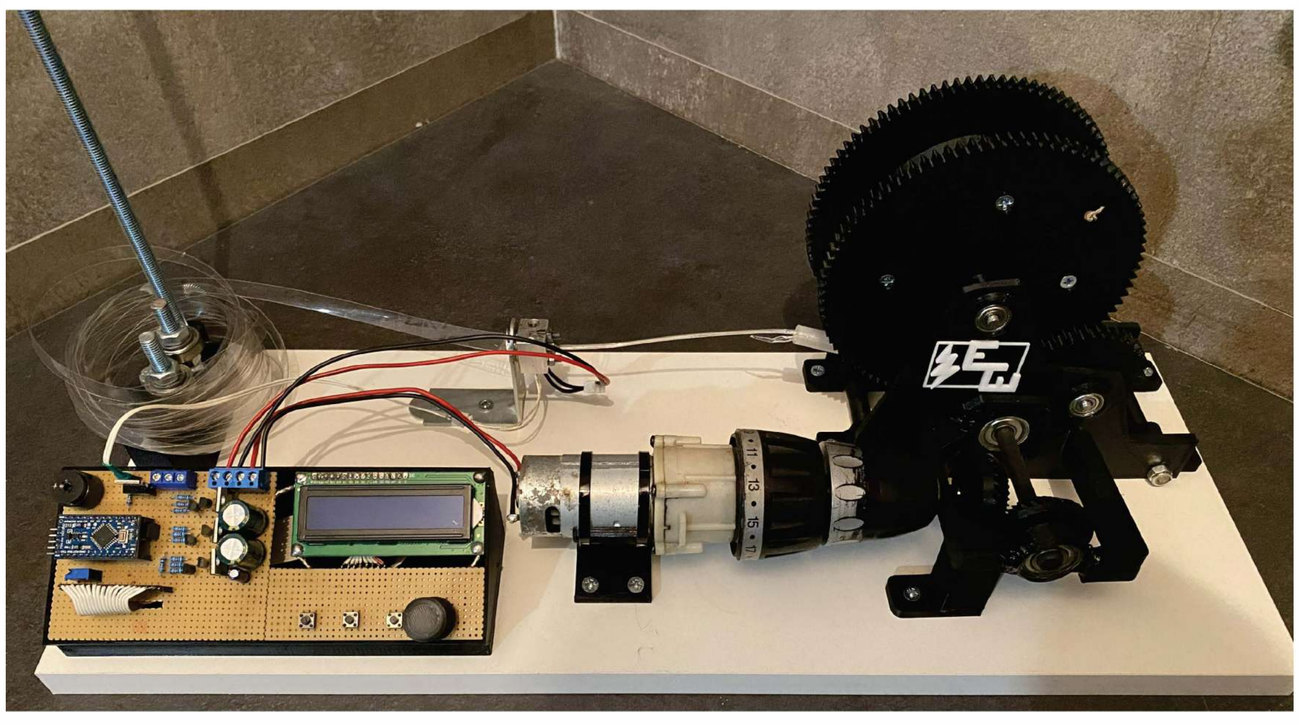
- Filament is in pieces, and it needs to be added manually during printing. The amount of filament gained is determined by the bottle's size.
- Crystalization of extruded filament over longterm heating. During crystallization, the tangled polymer chains align into tightly packed, ordered regions as the material cools. This increases density and causes shrinkage, which can generate internal stress and warping.
- Sometimes the extruded filament requires drying











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Research and Application of Digital Control Production Line for Quenching Furnaces

Patent No.: *LU500921; 200705142735; 2021/09538; 2021/06544; ZL202010476761.X; ZL202010592984.2; ZL202010333934.2; ZL202021217192.9; ZL202020638377.0; ZL202020639840.3; ZL202020187747.3; ZL202021209083.2; ZL202021142947.3; ZL202021142976.X; ZL202020638386.X; ZL202020952216.9; ZL202020198070.3; ZL202020215157.7; ZL202020215183.X; ZL202020187748.8; ZL202021209081.3*

CAI No.ON01 **A**

Inventor: *Ruizhang Hu; Chun Guo; Zhenzhen Hui; Shengbiao Zheng; Jing Tang; Zirong Li; Shuqiao Huang; Longqiang Ye .*

Company: *Anhui Science and Technology University*

Description :

1. The invention is aimed at the existing quenching process with high energy consumption and high pollution and other technical problems. The team developed a new environmentally friendly quenching process based on PAG quenching media. The performance of the specimen was tested through experiments, and compared with the existing process, energy consumption was reduced while performance was improved. Based on this technology, the team invented a deep learning-based method and control system for detecting defects in binder clip, which realizes the detection and recognition of defective images of binder clip. It has published 4 papers in journals in the field of materials engineering, declared several Chinese patents and international patents, and won 1 provincial award. The search report shows that the technology has strong novelty, creativity and industrial practicability.

2. Aiming at the existing quenching equipment structure is simple, the temperature control is not accurate and other problems. With the research and development of the new environmentally friendly quenching process as a guide combined with the actual production of quenching equipment needs, the development of intelligent quenching equipment. Constructed a dynamic model of the quenching furnace feeding equipment, developed the quenching furnace feeding system, and realized the orderly and dense rows of feeding. The automatic control process designed by the team improves the productivity of the quenching equipment and reduces the work intensity of the operators. This shows that the invention has high technical, economic and social value.

3. Existing quenching equipment is mostly high power consumption, low intelligence components, in response to low carbon emission reduction, the results of this invention fits the current policy trend, while intelligent equipment can be promoted and applied to other mechanical parts manufacturing fields, such as powder metallurgy products. Therefore, intelligent quenching furnace and quenching process key technology has high application value, economic value and social value. Accumulated new sales of 102 million yuan.

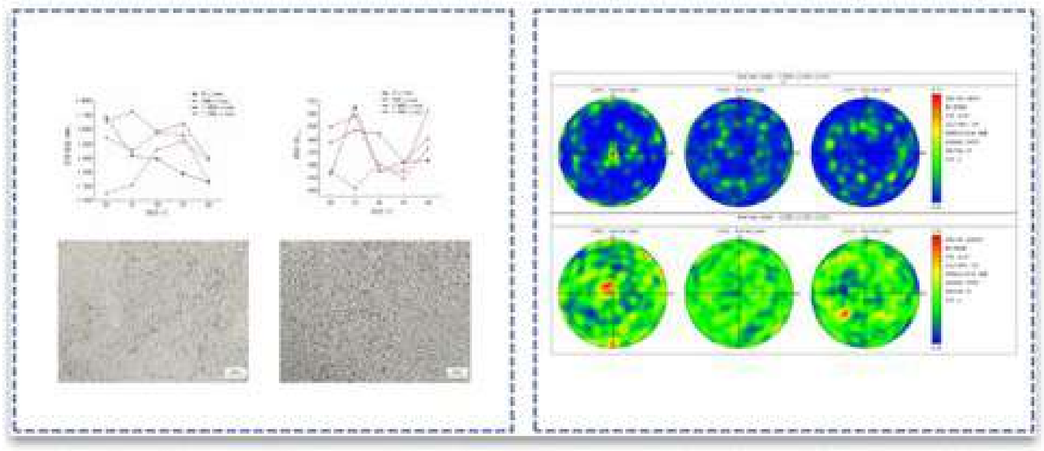

Fig.1 Microstructure Analysis and Property Comparison of Specimens Before and After Quenching

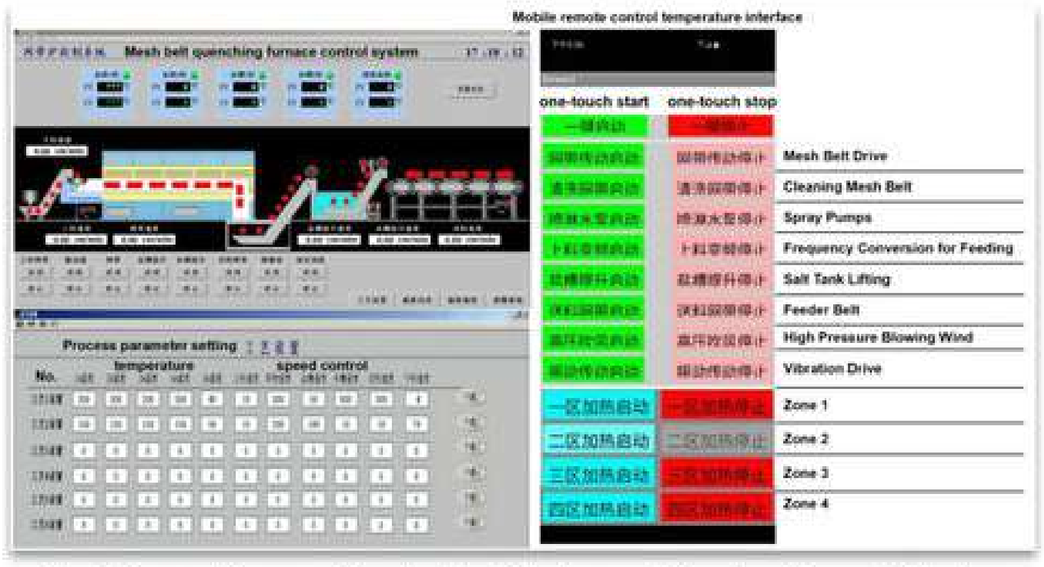

Fig.2 Control System Monitoring Display and Heating Control Display

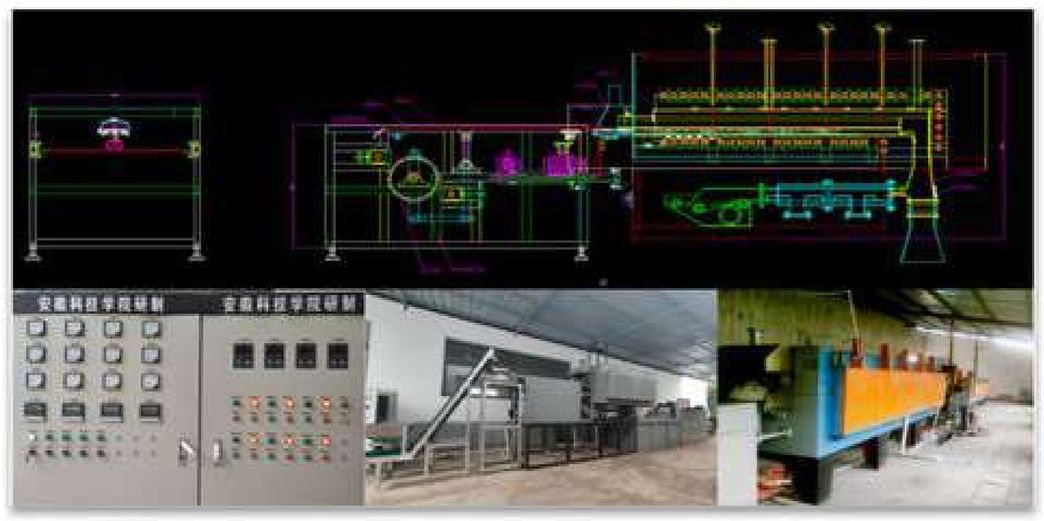

Fig.3 Quenching Equipment Two-dimensional Drawing and Actual Prototype Display

Fig.4 Invention Patents and Award Certificates Obtained for this Invention

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A lightweight measurement method for surface displacement deformation of slopes with poor visibility

CAI No. ON06 **A**

Patent No.: *ZL 202411473888.3*

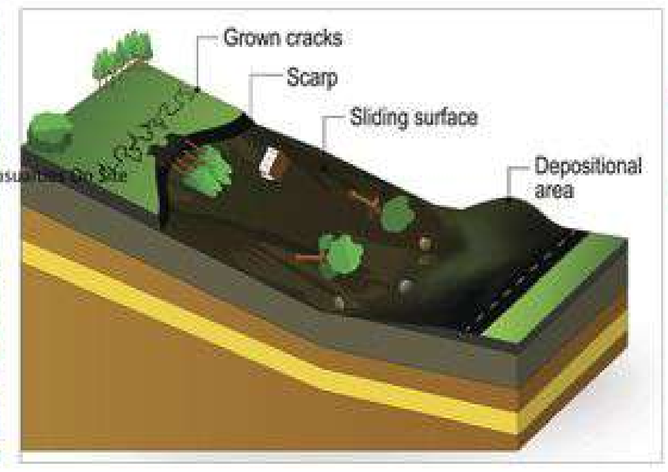
Authors: *Zhenghao Ding Zhiwen Wu Canrong Xie Weikun He Yichan Hu Ping Shao*

Company: *Hunan University, Guangxi University, Guangxi Road and Bridge Engineering Group Co., LTD*

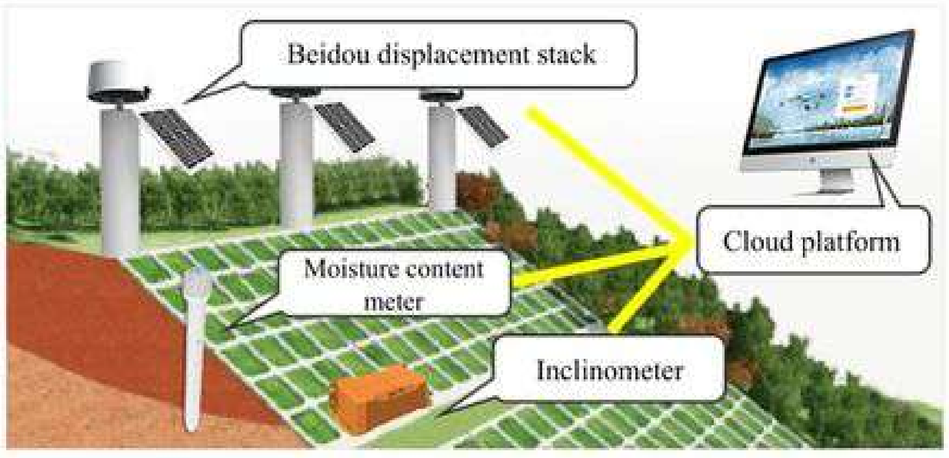
Project Summary

To effectively, promptly and cost-effectively warn of landslides, a **non-contact lightweight measurement method** for surface displacement and deformation of slopes with **poor visibility** has been invented. In particular, this invention has solved the problem of **obtaining meta-image data in adverse rainy and foggy weather**.

Background



Traditional technology



Most traditional slope displacement monitoring technologies are **contact technologies** (such as using inclinometers, moisture content meters, etc.). These technologies are **extremely costly**, have a **short lifespan** and are **difficult to install**.

Technical logic for novel method

- **All-Weather Low-Visibility Recognition**
  Integrating **millimeter-wave radar** technology, it breaks through the recognition of **poor visibility in heavy rain and fog weather**.
- **Synchronous Multi-Point Sampling**
  Realize dynamic sampling with **multiple measurement points synchronized** at **≥ 25 Hz**.
- **Enhanced Sub-Pixel algorithm**
  Enhanced **sub-pixel image algorithm** is adopted, and the accuracy can reach **±0.02mm**.

Applications and achievements

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COMPOSITE MIXTURE BASED ON HEMICELLULOSE ESTERS, PROCESS FOR OBTAINING IT, AND TESTING THE SPECIFIC PROPERTIES OF PACKAGING FOR AGRI-FOOD PRODUCTS

Patent number: **WO2025216645-A1**

Authors: Petronela Nechita, Mirela Iana-Roman, Mihaela-Aida Vasile, Rodica -Mihaela Dinică, Silviu- Marian Năstac, Alina-Mihaela Ceoromila, Andreea-Veronica Botezatu, Bianca Furdui, Cristian-Silviu Simionescu

A

Description

The invention refers to a composite mixture based on xylan hemicelulose esters, with improved thermal stability and hydrophobic properties and a method for obtaining it. The composite mixture, according to the invention, is used for surface treatment of paper for agri-food products packaging. The preparation process of the composite mixture involves, in the first stage, obtaining hemicellulose esters of the xylan type through an acetylation reaction between native xylan, ionic liquids based on imidazolium salts, and acetic anhydride. These are then mixed with other natural polymers (chitosan) and/or metal oxide nanoparticles (ZnO and CuO). The mixture is homogenized at a temperature of 20°C for 12...24 hours using magnetic stirring, and the specific properties of the food packaging are tested by applying the mixture as a layer/film with a mass of 2.5 – 5 g/m² on each side of the paper/cardboard support, followed by drying for 10 minutes. The paper/cardboard treated with this composite mixture ensures protection of agri-food products against bacterial action and provides resistance to moisture, water vapours, oxygen, oils, and fats. The process of obtaining and testing the composite mixture, according to the invention, involves the following steps:

1. **Obtaining the xylan hemicellulose esters -** ***Acetylation of xylan hemicellulose with 1-Ethyl-3-methylimidazolium acetate*** **[EmimOAc] -** a solution of xylan and 1-Ethyl-3-methylimidazolium acetate at a concentration of 4.5% to 5% is stirred for 30 to 40 minutes at a temperature of 80°C. Then, acetic anhydride is added in a molar ratio of 1:20 relative to xylan. Stirring continues at the same temperature for an additional 25 to 30 minutes. The resulting mixture is precipitated in 100 to 250 ml of 96% ethyl alcohol and then washed with distilled water to remove residual reaction products. The xylan acetate ester with functional groups presented in Figures 1,2, is dried in an oven at 40 to 50°C for 20 to 24 hours.

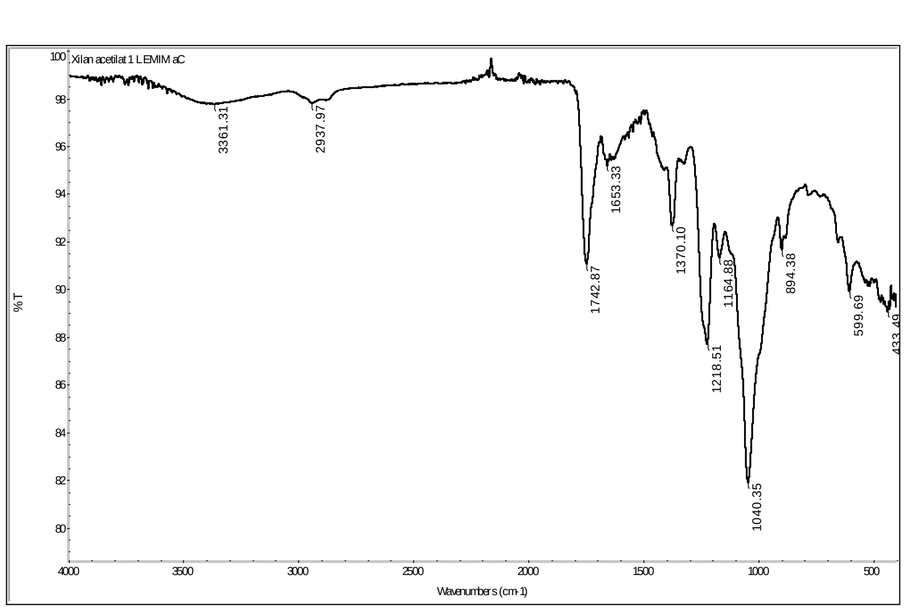

Figure 1. FT-IR Spectrum of xylan hemicellulose esters acetylated with ionic liquids [EmimOAc]

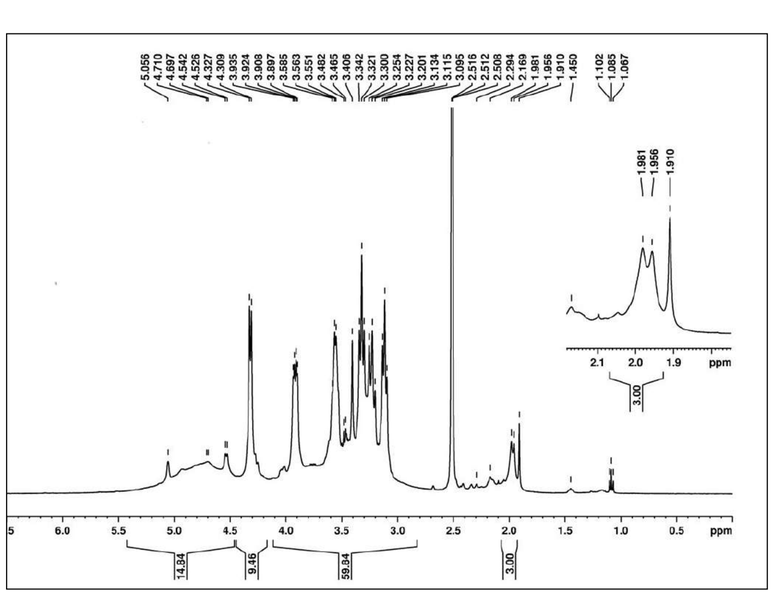

Figure 2. ^1H NMR Spectra of xylan hemicellulose esters acetylated with ionic liquids [EmimOAc]

1. **Dispersing the xylan hemicellulose esters and obtaining the composite mixture -** the acetylated xylan hemicellulose is dispersed in distilled water in a proportion of 2.5% to 3% by mixing and maintaining under magnetic stirring at 1000–1500 rpm for 12 to 24 hours until a uniform dispersion is obtained. This dispersion can be used as is by applying it in the form of a film/layer to the surface of the paper or cardboard **(Variant 0),** or it can be used as a polymer matrix for obtaining the composite mixture in the following options: **Variant 1:** Mixture of Acetylated Xylan and Chitosan (1:1); **Variant 2:** Mixture of Acetylated Xylan and ZnO nanoparticles **(**10% to 20%); **Variant 3:** Mixture of Acetylated Xylan and CuO nanoparticles (10% to 20%).
2. **Applying the dispersion and composite mixture to the surface of the paper/cardboard -** the composite mixtures obtained according to the above options are applied to the surface of the paper or cardboard in a uniform layer with a mass of 2.5 to 5 g/m² on each side of the paper/cardboard (figure 3), air-dried for 10 minutes and then placed in an oven at 50 to 60°C. The dried paper samples were tested regarding the functional properties (table 1).

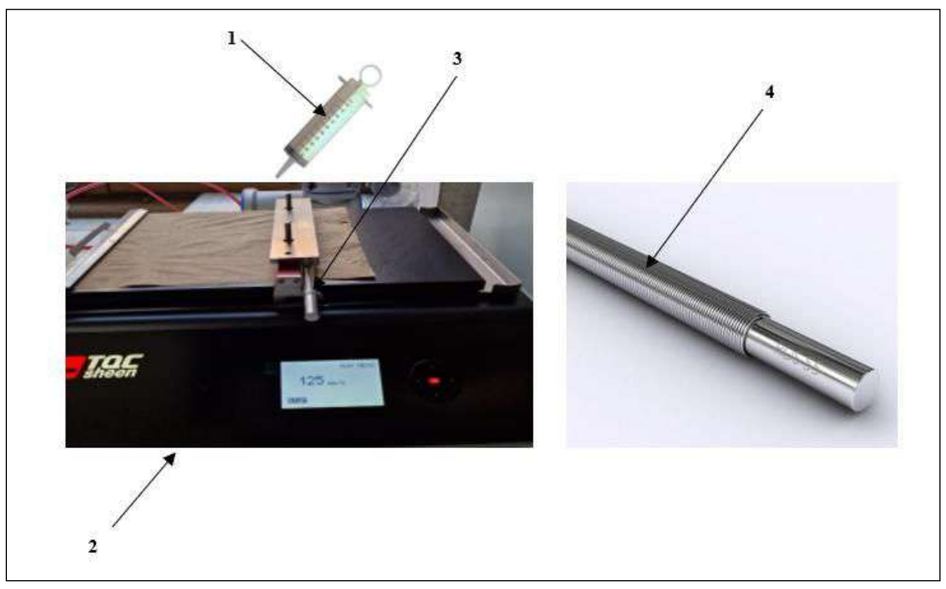

Figure 3. Process diagram for the application and leveling of the composite mixture on the surface of the paper
1.Manual dosing device for the coating mixture; 2. Automatic application device for the composite mixture; 3. Meyer rod for leveling and equalizing the coating layer; 4. detail of the Meyer rod

Table 1. The quality characteristics of papers coated with composite mixtures based on xylan hemicellulose esters, obtained according to the previous description

Characteristic	Variant 0	Variant 1	Variant 2	Variant 3
Bursting strength, kPa	273	288	277	286
Water contact angle, °	92	102	98	98
KIT test	5	8	7	6
Air permeability, s	103	19288	95	86
Global migration of components in isooctane, mg/dm³	0,35	0,75	0,30	0,45
Inhibition degree of gram positive bacteria– *Bacillus sp* at 24 h, %	40	70	66	66
Inhibition degree of – *Bacillus sp* at 48 h, %	40	70	35	66
Inhibition degree of fungi *Penicillium sp.* by the inoculation method, (%), after 3 days	35	85	50	50

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Portable Generators

Authors: Boară Andrei, Lucas Văduva
Mentor: Mircea Nistor

Patent/Project number: prototype

A

The **Health Generator** is a rotating platform designed to mitigate the risks of a sedentary lifestyle, such as cardiovascular issues, by encouraging leg movement while sitting. This system effectively transforms physical activity into electricity, functioning as a generator capable of charging various devices.

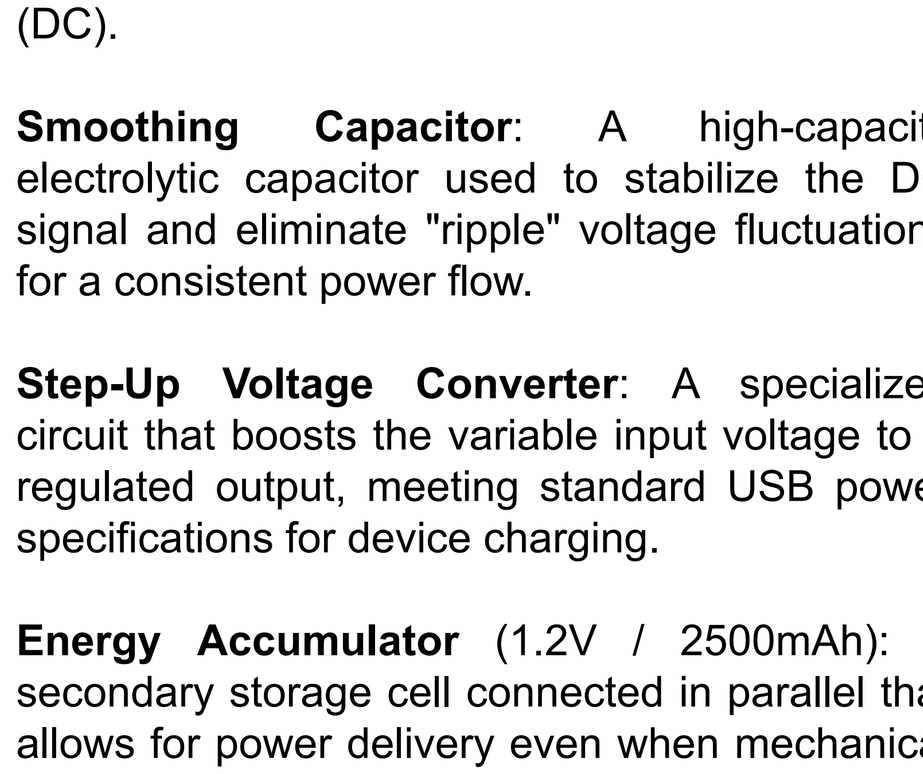
The **Bearer Generator** is a wearable device designed to capture energy otherwise wasted during physical activity, specifically the natural swinging motion of arms while walking. Developed for hikers or individuals in remote areas, this system converts kinetic movement into electrical power, providing a vital energy source for charging mobile phones in emergency situations or daily life.

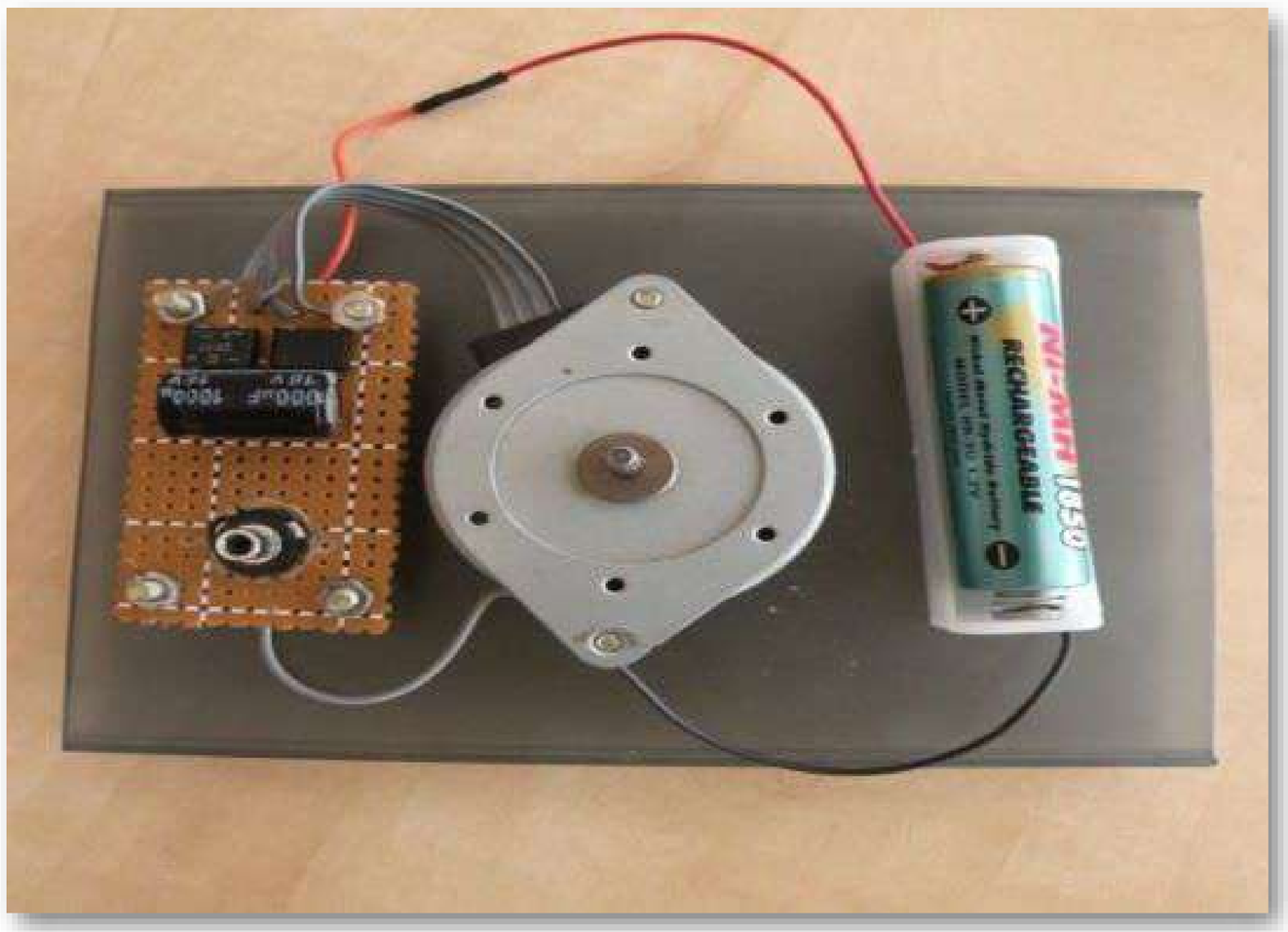
Electronic Components:

- **Bipolar Stepper Motor**: Functions as a high-efficiency generator that produces alternating current (AC) when the internal rotor magnets are moved by mechanical force.
- **Dual Bridge Rectifiers**: These components rectify the multi-phase AC output from the motor coils, converting it into a unified direct current (DC).
- **Smoothing Capacitor**: A high-capacity electrolytic capacitor used to stabilize the DC signal and eliminate "ripple" voltage fluctuations for a consistent power flow.
- **Step-Up Voltage Converter**: A specialized circuit that boosts the variable input voltage to a regulated output, meeting standard USB power specifications for device charging.
- **Energy Accumulator** (1.2V / 2500mAh): A secondary storage cell connected in parallel that allows for power delivery even when mechanical activity has ceased.

Mechanical Components:

- **Kinetic Drive Interface**: A rotating platform (Health Generator) or a pendulum-style linkage (Bearer Generator) designed to capture specific human motions.
- **Integrated Gear Reduction System**: A high-torque gear assembly coupled to the motor shaft that optimizes the ratio between slow human movements and the high-speed rotation required for electrical induction.
- **Precision Support Assembly**: A structural framework, utilizing either high-stability bases or custom 3D-printed housings to ensure the alignment and longevity of the internal moving parts.
- **Damping and Guidance Rollers**: Spring-loaded mechanical guides that ensure smooth, fluid motion of the primary drive components while minimizing friction and vibration.





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HR EXCELLENCE IN RESEARCH

ECO-FARMING FOR INNOVATIVE PROTECTION OF NEW WALNUT VARIETIES: HARNESSING METHODOLOGIES AND TECHNOLOGIES

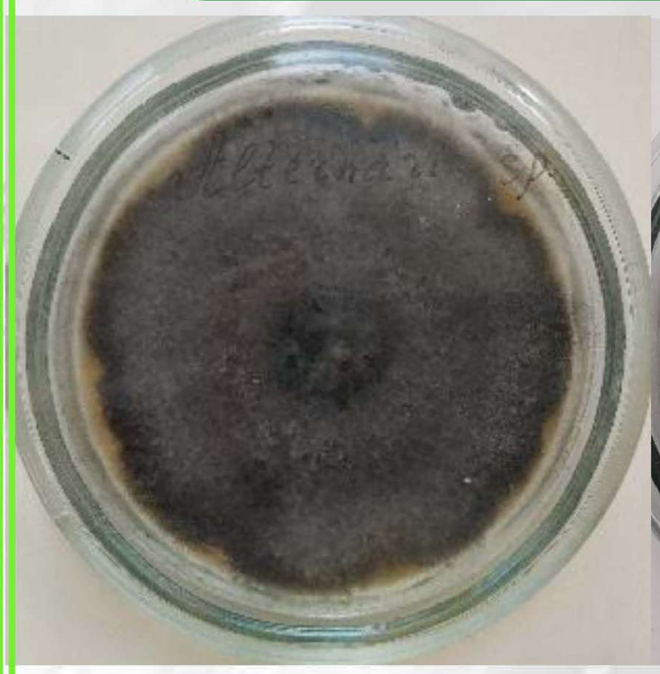
RESEARCH PROJECT NUMBER: 25.80013.5107.01TR

AUTHORS: STÎNGACI Aurelia, SCERBACOVA Tatiana, HARCIUC Oleg

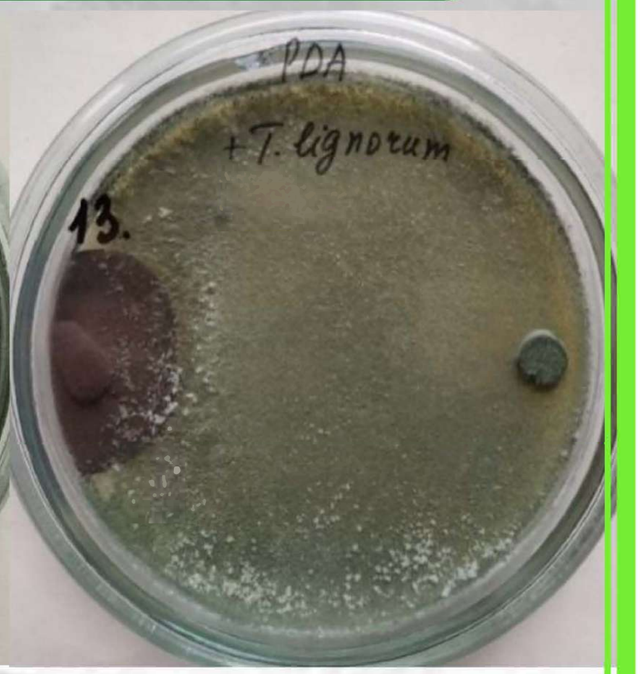
APPLICATION FIELDS: A - Biotechnology; G - Agriculture

AIM: Use of the biological product Trichodermină, SC based on the microfungus *Trichoderma lignorum* (syn. *T. viride*) to protect walnuts from disease

SOLUTION: Experiments have shown that spraying green leaves with the biological product Trichodermină, SC helps reduce walnut leaf spot disease. In laboratory conditions, walnut pathogens were isolated from diseased leaves: *Alternaria* sp., *Cladosporium* sp., *Phoma* sp., *Phyllosticta* sp. et al. In a double culture, the microfungus *Trichoderma lignorum*, which produces the biological product, inhibited the growth of disease pathogens. The percentage of pathogen inhibition on the 10th day was 72-75%.



Alternaria sp.



Cladosporium sp.

ADVANTAGES: The biological product Trichodermină, SC has not been used previously to protect walnuts from disease

IMPLEMENTATION STAGE: Initial use of innovation

ACKNOWLEDGMENTS: Research was funded by TÜBITAK (Turkey) and the National Agency for Research and Development (Republic of Moldova)

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2,6-Diacetylpyridine-bis(picolinoylhydrazone)-bis(aqua)iron(III)–hydrate(1/2.5) perchlorate with stimulatory properties of lipase synthesis in the *Rhizopus arrhizus* CNMN FD 03 fungal strain

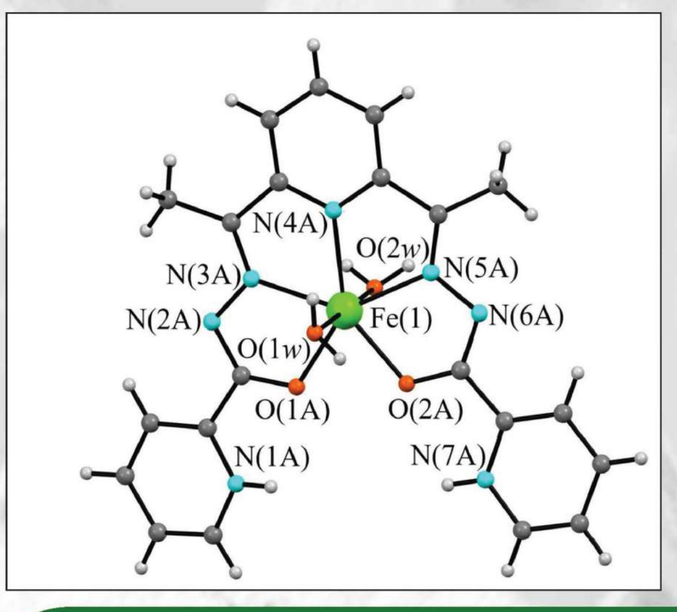
PATENT NUMBER: MD 4874

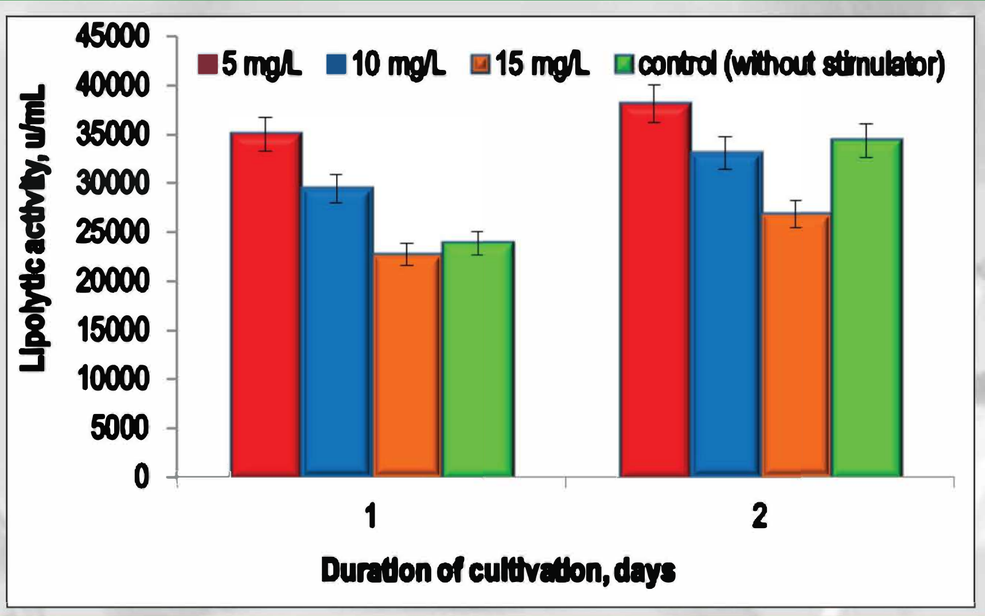
AUTHORS: DANILESCU Olga, BULHAC Ion, COCU Maria, BOUROSH Pavlina, CILOCI Alexandra, CLAPCO Steliana, LABLIUC Svetlana, DVORNINA Elena

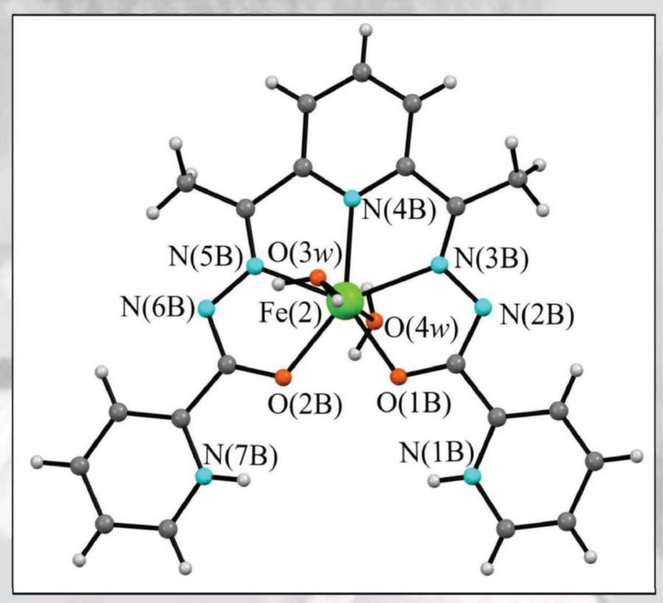
APPLICATION FIELDS: Agriculture and Food Industry

AIM: Chemical synthesis and characterization of new coordination compound with stimulating properties on exocellular lipase synthesis for the *Rhizopus arrhizus* CNMN FD 03 fungal strain that may find application in industrial microbiology.

SOLUTION: As a result of interaction $Fe(ClO_4)_3 \cdot xH_2O$ with 2,6-diacetylpyridine bis(picolinoylhydrazone) (H_2L) (molar ratio of 1:1) in methanol under refluxing (4 h), mononuclear complex $[Fe(H_2L)(H_2O)_2](ClO_4)_3 \cdot 2.5H_2O$ was synthesized.







ADVANTAGES: The addition of coordination compound $[Fe(H_2L)(H_2O)_2](ClO_4)_3 \cdot 2.5H_2O$ to the nutrient medium of *Rhizopus arrhizus* CNMN FD 03 fungal strain, in concentration of 5.0…15.0 mg/L increases biosynthesis of lipases with 1.8 – 10.9%, depending on the concentration and reduces the producer`s cycle of cultivation by 24 h. Thus, the highest values of lipase activity were found at the first day of growth, while in the control (without stimulator) the maxim of activity was revealed on the second day. The most effective concentration for enzyme production was 5.0 mg/L.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: The authors are grateful for the research subprograms financed by MER 010602 of the Institute of Chemistry of MSU, 011202 of the Institute of Applied Physics of MSU, as well as the authors thanks for the research subprogram financed by MER 020101 of the Institute of Microbiology and Biotechnology of TUM.

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Tris(2,6-dimethyl pyridinecarboxylate-1kONO)-di-μ-(isothiocyanato-1,2kN)-(diisothiocyanato-2kN)barium(II)cobalt(II) with biostimulatory properties of the synthesis of bioactive principles on fungi

PATENT NUMBER: MD 4847/2023.09.30

AUTHORS: BULHAC Ion; URECHE Dumitru; COCU Maria; BOUROSH Pavlina; CILOCI Alexandra; CONDRUC Viorica; DVORNINA Elena

APPLICATION FIELDS: The invention relates to coordination chemistry, in particular to the synthesis of a new Ba-Co heterodinuclear coordination compound with biostimulatory properties, that may be used in the development of biotechnologies, in order to increase the biosynthesis of enzymes and the productivity of microbial biomass.

AIM: The essence of the invention is to propose a novel coordinating compound - [BaCoL3(μ-NCS)2(NCS-κN)2] (Figure) with biostimulatory properties of exocellular amylase synthesis in the fungal strain Aspergillus niger CNMN FD 06 and biomass productivity mycelial in Lentinus edodes (Berk) Sing CNMN FB 01.

SOLUTION: The technical result of the invention is to obtain a new well-crystallizable and non-corrosive monocrystalline heterodinuclear complex $[BaCoL_3(\mu\text{-}NCS)_2(NCS\text{-}\kappa N)_2]$ (L = 2,6-pyridinecarboxylic acid dimethyl ester), which is introduced into the nutrient composition of the producers increases the biosynthesis of amylases in the fungal strain *Aspergillus niger* CNMN FD 06 (Table 1) and the productivity of mycelial biomass in *Lentinus edodes* (Berk) Sing CNMN FB 01 (Table 2) with the reduction of the cultivation cycle by 24... 48 hours.

The complex has a stimulating influence on the biosynthesis of exocellular amylases in the *Aspergillus niger* micromycete, exceeding 35.6% and 51.0% of the control on the 5th day of cultivation (6th day of cultivation), facilitating the reduction of the technological cycle with 24 hours.

The application of the heterometallic coordination compound in the cultivation process of the fungi *Lentinus edodes* (Berk) Sing CNMN FB 01 strain producer of mycelial biomass with curative and nutraceutical properties, ensures the increase of the amount of biomass already accumulated on the 6th day of cultivation until the 21,87…22,52 g/L compared to 16.37 g/L maximum of the control on the 8th day of cultivation, which exceeds the level of the maximum of the control by 33,6-37,6% depending on the applied concentration, while reducing the cultivation term by 48 hours.

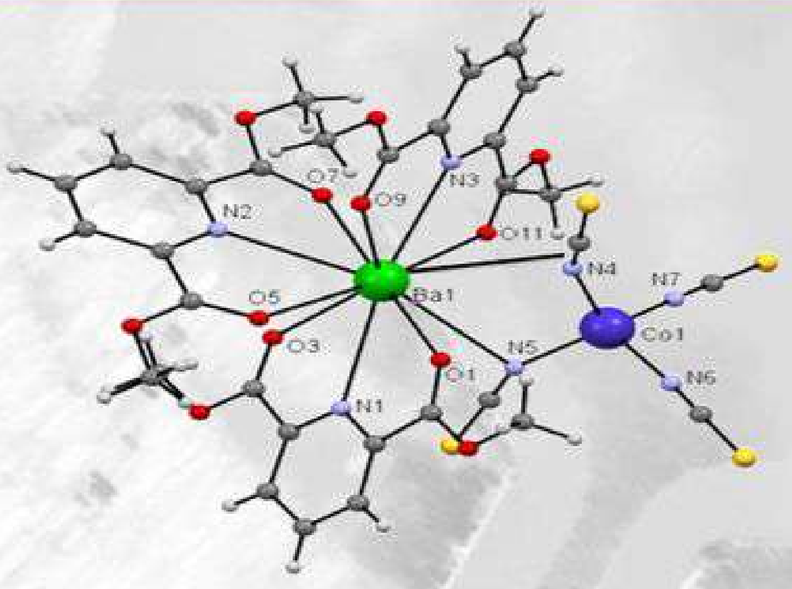

Fig. Molecular structure of the compound Tris(2,6-dimethyl pyridinecarboxylate-1k*ONO*)-di-μ-(isothiocyanato-1,2k*N*)-(diisothiocyanato-2k*N*)barium(II)cobalt(II

Table 1

Modification of the amylolytic activity of *Aspergillus niger* CNMN FD 06 strain under the influence of the coordination compound.

Coordination compound	Conc. g/L	Amylolytic activity			
		Day 5		Day 6	
		Activity, u/mL	% towards control	Activity, u/mL	% towards control
$[BaCoL_3(\mu\text{-}NCS)_2(NCS\text{-}\kappa N)_2]$	0,001	110,08	139,2*	143,94	182,0
	0,005	96,68	122,2	132,15	167,1
	0,010	72,86	92,1	61,40	77,6
Control	-	72,86	100,0	79,09	100,0

*Calculations are performed against the blank maximum (day 6)

Table 2

The influence of the coordination compound on biomass accumulation in the basidiomycete *Lentinus edodes* (Berk) Sing CNMN FB 01 in submerged culture.

Coordination compound	Concen., g/L	Day 6		Day 8	
		g/L	%/control**	g/L	%/control
$[BaCoL_3(\mu\text{-}NCS)_2(NCS\text{-}\kappa N)_2]$	0,0025	24,27	118,8	23,67	115,7
	0,005	28,15	137,6	25,23	123,3
	0,010	27,76	135,7	24,98	122,1
	0,015	27,13	132,6	24,70	120,7
Control*	-	17,32	100	20,46	100

*Nutrient medium (g): beer wort – 270-320; molasses – 50-70; sunflower oil - 0,5-1,5; the rest – water up to 1L. Initial pH 4,5-5,0.
**Calculations are performed relative to the blank maximum (day 8).

ADVANTAGES: According to the invention, a novel coordination compound: tris(2,6-dimethyl pyridinecarboxylate-1k*ONO*)-di-μ-(isothiocyanato-1,2k*N*)-(diisothiocyanato-2k*N*)barium(II)cobalt(II) is claimed. The compound possesses biostimulatory properties of the synthesis of bioactive principles on fungi. The complex increases by 35.6–51.0% the biosynthesis of exocellular amylases in the fungal strain *Aspergillus niger* CNMN FD 06 and by 33.6–37.6% the amount of mycelial biomass accumulated at *Lentinus edodes* (Berk) Sing CNMN FB 01, facilitating the reduction of the technological cycle by 24–48 hours.

IMPLEMENTATION STAGE: Laboratory stage.

ACKNOWLEDGMENTS: The results reported in this paper were obtained within two research subprograms entitled: "Synthesis and studies of new materials based on complex combinations with polyfunctional ligands and having useful application in medicine, biology and technology" (code: 010602) and "Design and fabrication of intelligent materials with advanced magnetic, adsorption, luminescent and biologically active properties" (code 011202).

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HR EXCELLENCE IN RESEARCH

Tris(dimethyl pyridine-2,6-dicarboxylate)strontium tetra(isothiocyanate)cobaltate(II) with lipolytic activity biostimulatory properties for the fungal strain *Rhizopus arrhizus* CNMN FD 03

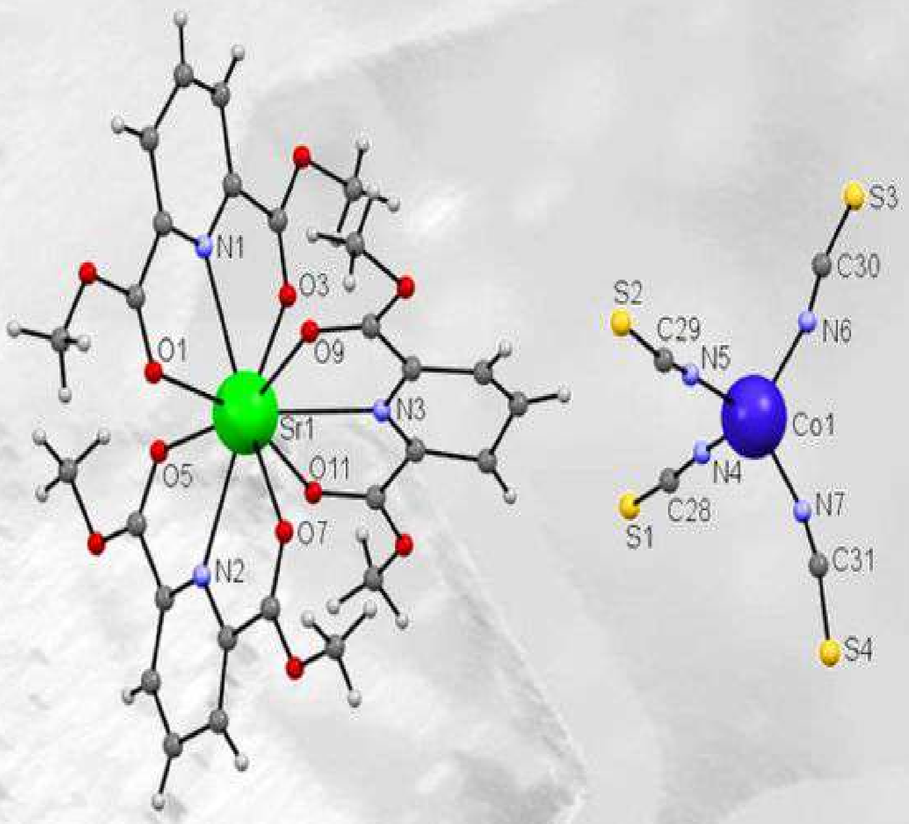
PATENT: MD 4831/2022.11.30

AUTHORS: Ion BULHAC, Dumitru URECHE, Alexandra CILOCI, Pavlina BOUROȘ, Janeta TIURINA, Svetlana LABLIUC

APPLICATION FIELDS: Agriculture – Horticulture – Gardening.

AIM: coordination chemistry and microbiology, especially in the synthesis of a compound of Sr(II) and Co(II), which can be used as a stimulator of lipolytic activity in the fungal strain *Rhizopus arrhizus* CNMN FD 03.

SOLUTION: New Sr(II) and Co(II) coordination compound with dimethyl-2,6-pyridinedicarboxylate (L) ligand was obteined.



Molecular structure of the compound $[SrL_3][Co(NCS)_4]$

The influence of the claimed compound on the lipolytic activity of the micromycete *Rhizopus arrhizus* CNMN FD 03

Compound	Conc., mg/L	1st day		2nd day	
		Activity, U/mL	%/control*	Activity, U/mL	%/control
$[SrL_3][Co(SCN)_4]$	0,5	27562	**153,7/146,9**	20000	106,7
	1.0	21000	**117,1/112,0**	20000	106,7
	1,5	15312	85,4	15000	80,0
Control	-	17930	100,0	18750	100,0

*153,7/146,9 – vs. the daily control/ vs. the absolute maximum of the control (day 2)

ADVANTAGES: The synthesized $[SrL_3][Co(NCS)_4]$compound increases the activity of exocellular lipases by 12-46.9%, depending on the applied concentration. Thus, the lipolytic activity was 27562 u/mL (0.0005 g/L) and 21000 u/mL (0.0010 g/L) on the 1st day of cultivation, exceeding the level of the control sample from the same day by 53.7 , respectively, 17.0% and of the witness from day 2 – with 46.9 and 12.0%, respectively. Respectively, in the same case, an intensification of the biosynthesis of lipases by 24 h in relation to the control is found.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: This research was supported by the research projects: 20.80009.5007.28 and 20.80009.5007.15.

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INTEGRATED UV-C SYSTEM FOR INACTIVATING PATHOGENS IN VENTILATED AIR

BREVET: MD 1919 Y/2026.01.31

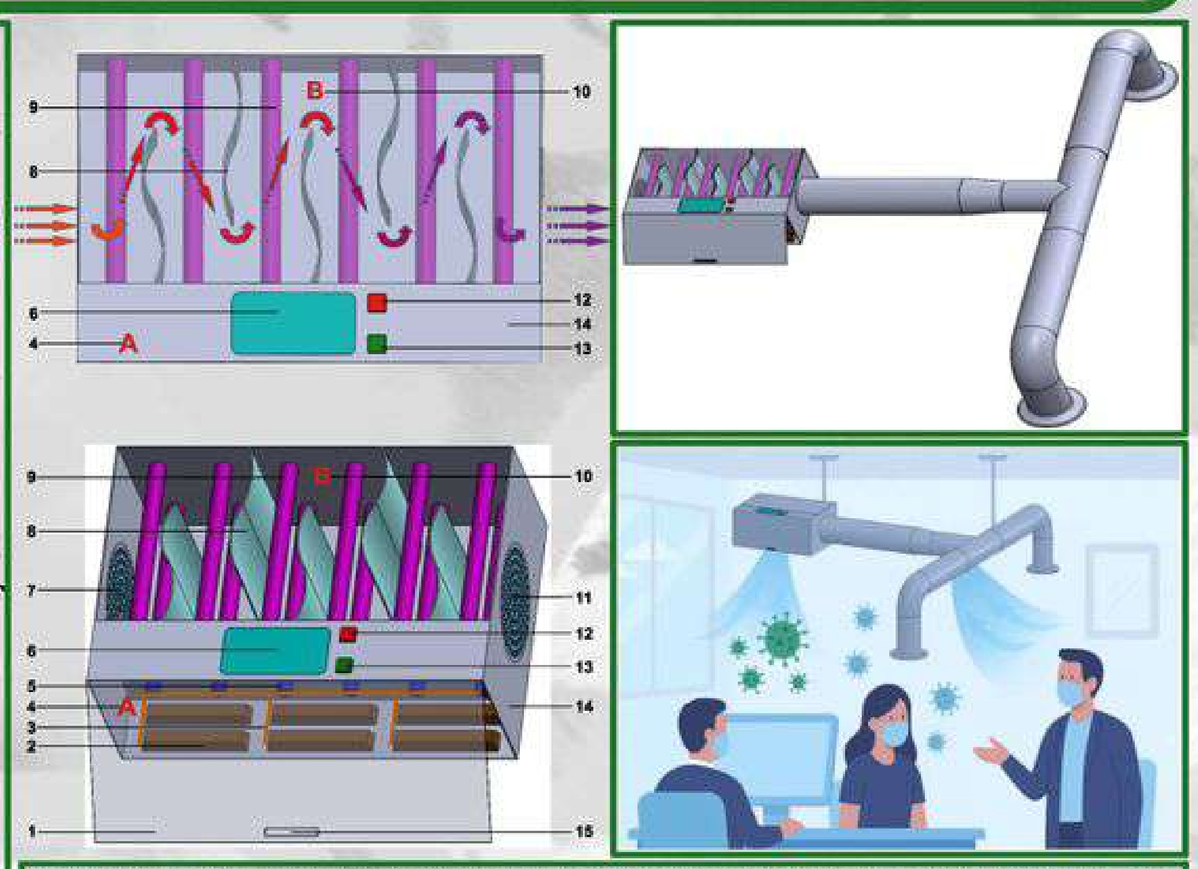
AUTHORS: MUNTEANU Ion

APPLICATION FIELDS: Medicine – Health – Hygiene – Industry – Home.

AIM: The invention relates to an innovative sterilization system based on ultraviolet C (UV-C) radiation, designed to inactivate pathogens (bacteria, viruses, fungi and other harmful microorganisms) in ventilated air. The system is designed to be integrated into the existing infrastructure of ventilation systems, being intended to purify air before its distribution in rooms, to ensure a sanitized and safe indoor environment, especially in spaces with a high risk of airborne disease transmission, such as hospitals, schools, offices or other public spaces.

SOLUTION: Integration of an innovative UV-C system directly into the ventilation ducts, which uses reflective walls with wavy geometry to optimize the dispersion of UV-C radiation, both direct and diffuse, throughout the entire volume of contaminated air.

Viruses and bacteria can enter the body not only through traditional transmission mechanisms (direct contact with other people), but recently a positive correlation has been observed between the spread of the virus and the pollution of fluids (water or air). The peculiarity of this device consists in the integration of an innovative UV-C system directly into the ventilation ducts, which uses reflective walls with wavy geometry to optimize the dispersion of UV-C radiation, both direct and diffuse, throughout the entire volume of contaminated air. The decontamination compartment (B) is equipped with strategically arranged UV-C sources, connected in such a way that, in the event of a lamp failure, the others remain functional, ensuring continuous operation throughout the entire period of operation. This innovative design significantly reduces the exposure time required for effective pathogen inactivation, compared to conventional systems, which require longer operating times to achieve the same effect.



Integrated UV-C system for inactivating pathogens in ventilated air, comprising the main housing of the device (14), equipped with an access door (1) and an ergonomic handle (15), which allows access to compartment A (4), intended for maintenance of the UV-C radiation sources (9). Compartment B, dedicated to the decontamination process, is provided with inner walls covered with a highly efficient reflective material (99%) and walls with a corrugated surface (8) to optimize radiation dispersion. The UV-C radiation sources (9) are mounted in two rows for redundancy. The device includes an air inlet filter (7) and an exhaust filter (11) for safety. The electrical system consists of the ballast set (2), an electrical cable (3) and specialized connectors (5). A main switch (13) controls the operation of the device. Optionally, a smart display (6) can be integrated to display relevant information.

ADVANTAGES: The device ensures superior inactivation of airborne pathogens by integrating an advanced UV-C system within ventilation ducts. The interior wavy, highly reflective walls enable uniform, multidirectional irradiation, delivering high UV-C doses that result in faster, safer, and more energy-efficient pathogen inactivation.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: This research was supported by ANCD Subprogram code 011206.

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UV-C STERILIZING DEVICE

BREVET: MD 1911 Y/2025.12.31

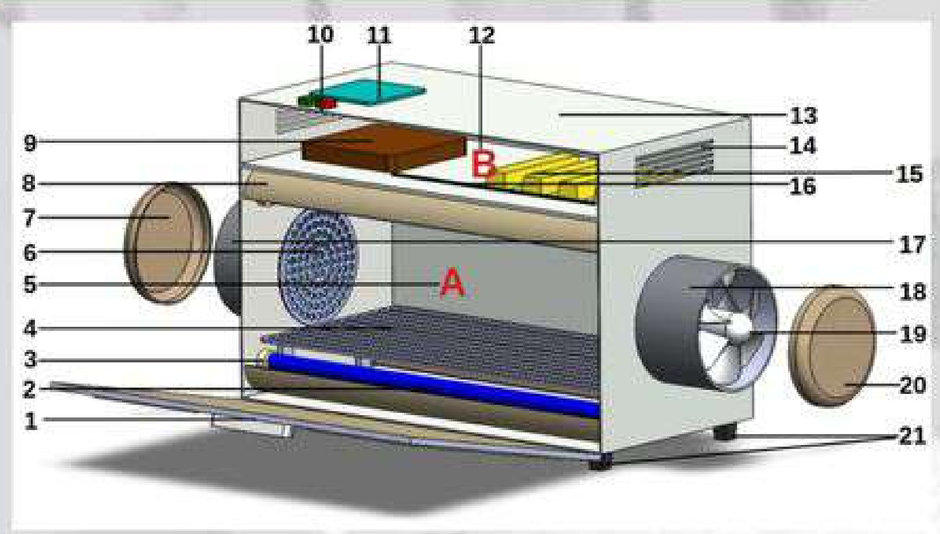
AUTHORS: MUNTEANU Ion

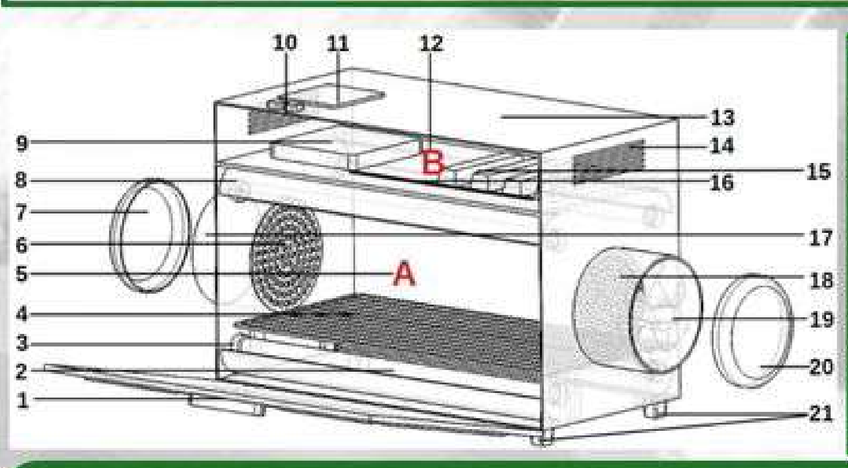
APPLICATION FIELDS: Medicine – Health – Hygiene – Industry.

AIM: The invention relates to equipment for fungal, bacterial or viral sterilization, but especially refers to a universal device for sterilizing both rooms in medical, educational, public institutions, etc., and objects found inside the respective rooms, such as: laboratory instruments, surgical instruments, dental instruments and equipment, measuring instruments, various devices, all of which are commensurate with the dimensions of the sterilization chamber.

SOLUTION: An increased dose of radiation is administered to shaded, recessed, or partially shielded areas of such objects, where direct radiation exposure is minimal or absent, as a result of secondary physical effects, including radiation reflection and scattering, thereby exposing pathogenic microorganisms located in these areas to lethal doses of radiation, thus inactivating them.

A universal bactericidal device is proposed, simple in construction, convenient to use due to its appearance resembling a microwave oven, which allows the disinfection of closed rooms or, more precisely, the contaminated air inside the rooms, as well as the decontamination of pathogens found on the surfaces of various irregular objects much more effectively compared to other devices. This effectiveness is achieved through an increased radiation dose in shaded or recessed areas of objects with irregular geometries, where direct radiation is limited or absent. Owing to secondary physical effects such as radiation reflection and scattering, pathogens in these otherwise inaccessible regions receive lethal doses of radiation and are thereby effectively inactivated. The system operates in two regimes: object decontamination (regime 1) and continuous air sterilization (regime 2), ensuring safety by blocking UV-C radiation.





UV-C sterilising device includes the housing (13), the legs (21), the door (1), the decontamination compartment A (5), the UV-C radiation sources (2), with the reflectors (8), respectively, a stainless steel support (4) is provided on which the objects subject to decontamination are placed, the inlet (17), the filter (6), the fan (19) that forces the decontaminated air to exit compartment A through the outlet (18), the covers (20) and (7) cover the holes (17) and (18), respectively, the compartment B (12) contains the electrical part such as: the set of electrical ballasts (15), the electrical wire (16) to the connector (3), providing current to the UV-C source (2), the switch (10), the control module (9) provides information about the UV-C radiation source and the working mode of the device on the monitor (11), the ventilation of compartment B is done through the holes (14).

ADVANTAGES: Consist in its universal capability to inactivate pathogens within workspaces while simultaneously sterilizing instruments and equipment with uneven or irregular surface geometries.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: This research was supported by ANCD Subprogram code 011206.

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EVALUATION OF THE STRUCTURAL DIVERSITY OF PLANT SPECIES IN THE "PLAIUL FAGULUI" SCIENTIFIC RESERVE AND THEIR IMPACT ON FOREST CONSERVATION (EDIVPLANTCON).

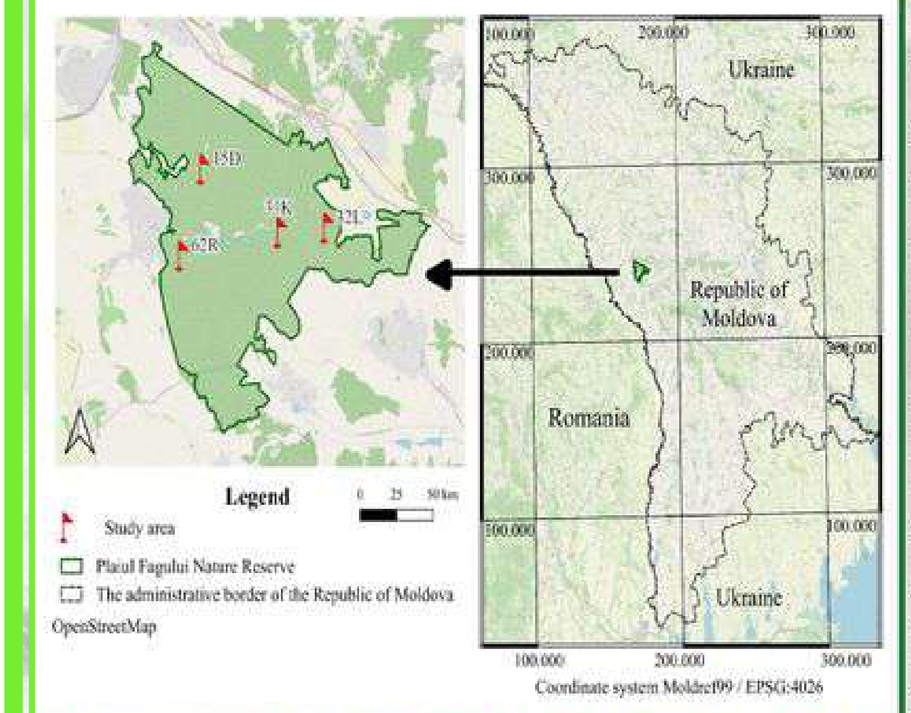
RESEARCH PROJECT NUMBER: 25.80012.7007.23SE

AUTHORS: SÎRBU Tatiana, CUZA Petru, PÎNZARU Pavel, FLORENȚĂ Gheorghe

APPLICATION FIELDS: PROTECTION OF THE ENVIRONMENT , CONSERVATION OF PLANT DIVERSITY

AIM: The objectives for the first year of research included: Research on vascular flora and phytocoenological assessment; evaluation of diversity indices in distinct forest types in the "Plaiul Fagului" Scientific Reserve of the Republic of Moldova.

SOLUTION: The project aims to investigate the diversity and ecological convergence of vascular plant species, as well as the stand structure in the ,,Plaiul Fagului" Reserve, with particular attention to rare and sensitive species. The influence of environmental factors on vascular plant diversity will be assessed using advanced mathematical models.



Lunaria rediviva subsp. *bassarabica* Pînzaru

Floristic and phytosociological surveys were conducted in the experimental plots, resulting in the identification of 148 vascular plant species. The life forms: trees (16), shrubs (16), lianas (2), and herbs (114). The rare species: 17 (10 are listed in the Red Book). Within the project, the presence of *Lunaria annua* L. was documented for the first time in the reserve. *Lunaria rediviva* subsp. *bassarabica* Pînzaru was confirmed, clarifying its status in relation to previous floristic literature. Furthermore, 17 previously conducted relevés (2001–2007) were digitized and analyzed, allowing the detection of floristic changes over the last two decades. Simultaneously, *α*- and *β*-diversity were assessed using an integrated set of indices for diversity, evenness, dominance, and structural convergence. The ICF index indicates moderate structural convergence, characteristic of mature stands in a relatively stable ecological equilibrium.

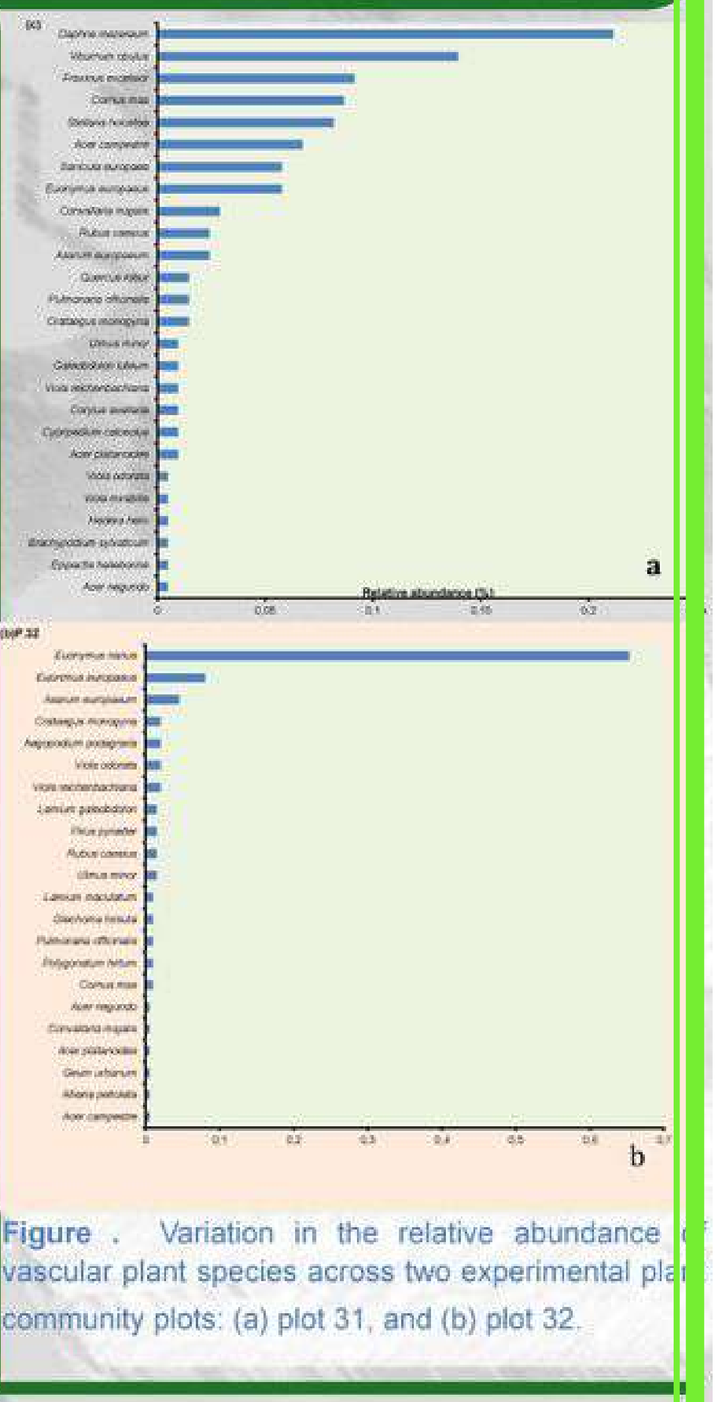


Figure . Variation in the relative abundance of vascular plant species across two experimental plant community plots: (a) plot 31, and (b) plot 32.

ADVANTAGES: By integrating methods based on diversity indices and ecological convergence, the project will contribute to the development of adaptive management measures for biodiversity conservation in the "Plaiul Fagului" Reserve.

IMPLEMENTATION STAGE: ***Research Project – 2025-2026.***

ACKNOWLEDGMENTS: The research was conducted within the project **25.80012.7007.23SE**

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Tris(diethyl pyridine-2,6-dicarboxylate) calcium tetra(isothiocyanato)cobaltate(II) with lipolytic activity biostimulatory properties for the fungus strain Rhizopus arrhizus CNMN FD 03

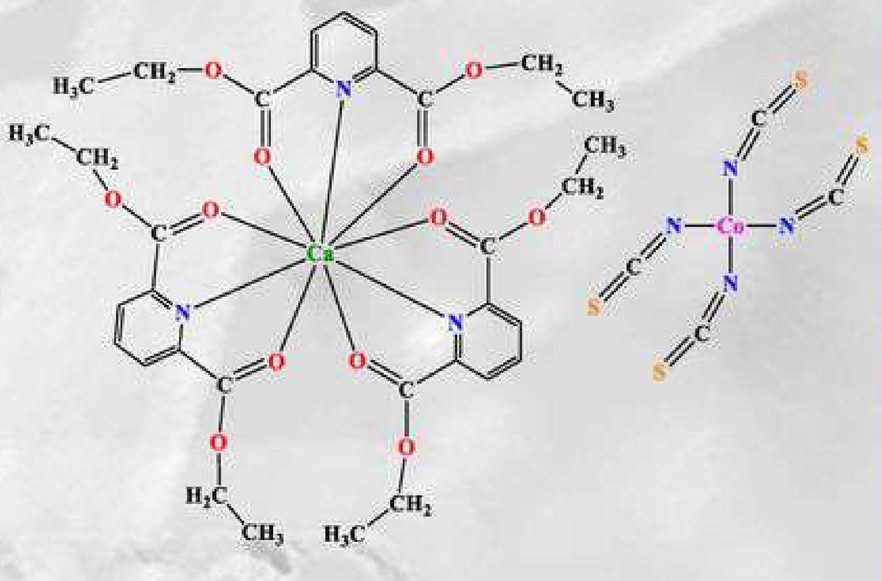
PATENT No.: MD 4870/2024.05.31

AUTHORS: BULHAC Ion, URECHE Dumitru, CILOCI Alexandra, COCU Maria, CLAPCO Steliana, LABLIUC Svetlana

APPLICATION FIELDS: Energy, Protection of the environment, Biotechnology.

AIM: Coordination chemistry and microbiology, especially in the synthesis of a compound of Ca(II) and Co(II), which can be used as a stimulator of lipolytic activity in the fungal strain *Rhizopus arrhizus* CNMN FD 03.

SOLUTION: New Ca(II) and Co(II) coordination compound with diethyl-2,6-pyridinedicarboxylate (L) ligand was obteined.



Formula de structură grafică posibilă a compusului $[CaL_3][Co(NCS)_4]$.

Table
The influence of the claimed compound on the lipolytic activity of the micromycete Rhizopus arrhizus CNMN FD 03

Compound	Conc., g/L	1st day		2nd day		3rd day	
		Activity, u/mL	%/control	Activity, u/mL	%/control	Activity, u/mL	%/ control
$[CaL_3][Co(NCS)_4]$	0,005	41125,0	198,6/137,1	19375,0	64,6	2083,3	9,4
	0,010	28291,7	136,6/94,3	25000,0	83,3	2083,3	9,4
	0,015	20125,0	97,2	23750,0	79,2	1250,0	5,7
Control	-	20708,3	100,0	30000,0	100,0	22083,3	100,0

198,6/137,1 – vs. the daily control/ vs. the absolute maximum of the control (day 2)

ADVANTAGES: The analysis of the data, regarding the influence of the claimed compound on the lipolytic activity of the producing strain highlights a significant intensification of the enzyme accumulation process, the positive effect being observed already on the first day of cultivation. At this stage, the lipolytic activity in the variants with the claimed compound $[CaL_3][Co(SCN)_4]$ was 41125.0 u/mL (0.005 g/L), 28921.7 u/mL (0.010 g/L) and 20125.0 u/mL (0.015 g/L) depending on the applied concentration, exceeding the maximum level of the control sample, the 1st day of cultivation – by 37.1% at the concentration of 0.005 g/L with the reduction of the technological cycle by 24 hours.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: The results reported in this paper were obtained within research subprogram entitled: "Synthesis and studies of new materials based on complex combinations with polyfunctional ligands and having useful application in medicine, biology and technology" (code: 010602).

BIOTECHNOLOGICAL INNOVATIONS FOR THE CONSERVATION OF RARE PLANT SPECIES IN THE ERA OF CLIMATE CHANGE

Project: *25.80013.7007.06RE*

COROPCEANU Eduard, CĂLUGĂRU-SPĂTARU Tatiana,

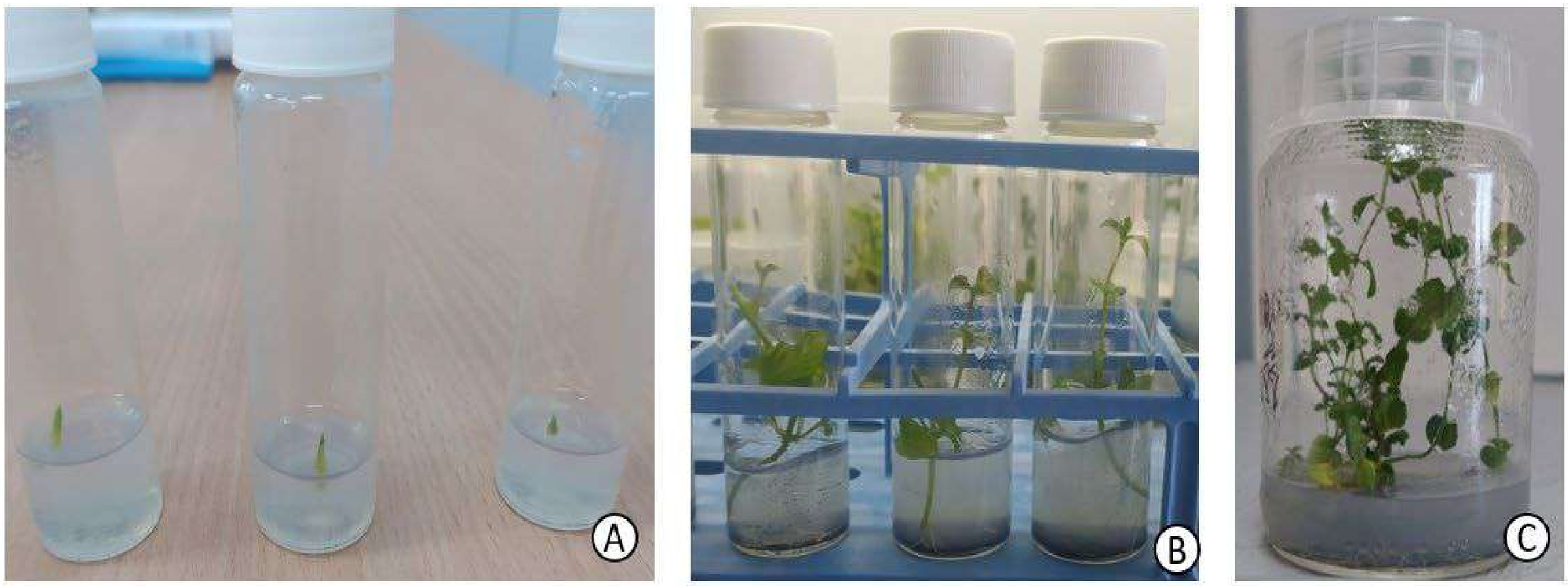
BRÎNZĂ Lilia, LOZINSCHI Mariana

A

The biotechnological research carried in the laboratory aimed to optimize the critical stages of micropropagation for *M. citrata* and *G. plicatus*, two species with ecological, medicinal and conservation value. Several sterilization protocols were tested for *M. citrata*, evaluating the effectiveness of sodium hypochlorite, commercial fungicides, and mercuric chloride. The results demonstrated that the combined NaOCl–fungicide procedure provides an optimal balance between eliminating contamination and maintaining explant viability, and is recommended as a standard method. Analysis of explant types highlighted the superiority of very young meristems, which presented the highest regeneration rates. Based on these findings, nutrient media adapted to each stage were formulated: inoculation, initiation, multiplication and rhizogenesis, thus creating a robust technological scheme for microcloning the species.

For *G. plicatus*, studies have focused on rigorous selection of explants and the application of effective sterilization protocols, steps recognized as decisive in the success of geophyte cultures. Explants from the internal layers and basal area of the bulb proved to be the most suitable, showing a significantly reduced rate of internal contamination. The results confirm that the selection of explants and the application of an appropriate sterilization regime have a stronger impact on the success of *Galanthus* cultures than variations in the composition of nutrient media.

Experimental activities allowed the optimization of initiation steps, the reduction of contaminations, the identification of appropriate nutrient media and the establishment of a solid technological base for future advanced steps such as long-term preservation, somatic embryogenesis or the controlled production of secondary metabolites**.**



The main stages of *in vitro* culture of *M. citrata*:

A – culture initiation; B – explant development; C – multiplication

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COORDINATIVE COMPOUNDS WITH USEFUL PROPERTIES IN ENZYMOGENETIC PROCESSES

Patent: MD 3943

Authors: DESEATNIC A., STRATAN M., COROPCEANU E., BOLOGA O., RIJA A., CLAPCO S., TIURIN J., LABLIUC S., RUDIC V., BULHAC I.

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One of the main goals of contemporary chemical synthesis is to obtain compounds with useful properties in the biosynthesis processes of vitally important enzymes. A series of coordination compounds with oxime ligands were synthesized, which were used as stimulators of biosynthetic processes in fungal strains of the genera *Aspergillus, Rhizopus, Penicillium, Trichoderma, Fusarium* – producers of various enzymes useful for technological processes in the food, pharmaceutical and other industries. The results of microbiological tests demonstrate that the studied complexes exhibit stimulatory properties (biomass accumulation, increased enzymatic activity), stabilize biosynthetic processes under unfavorable conditions of activity, and shorten the duration of technological processes.

Table 1. Influence of some dioximates on the biomass accumulation process of the micromycete Aspergillus niger 412 at different temperatures (stabilizers of biosynthetic processes under unfavorable conditions)

Compound	Concentr., mg/L	30 °C		20 °C	
		Biomass, g/L LC	% of activity	Biomass, g/L LC	% of activity
$[Co(DH)_2(Thio)_2]F·3H_2O$	1	13.75	115.06	18.70	228.05
	5	12.12	101.42	16.35	199.39
	10	12.75	106.69	17.05	207.93
$[Co(DH)_2(Thio)_2][BF_4]·3H_2O$	1	12.62	105.60	15.75	192.07
	5	13.30	111.29	15.85	193.29
	10	11.37	95.15	17.25	210.36
$[Co(DH)_2(Py)_2][BF_4]$	1	14.25	119.24	19.10	232.93
	5	11.25	94.14	16.00	195.12
	10	12.50	104.60	15.27	186.28
Control	-	11.95	100%	8,20	100%

A new nutrient medium was developed for the cultivation of the *Aspergillus niger* 33-19 CNMN FD 02A fungal strain, which contains, in g/L: starch – 3.0; bean flour – 9.0; wheat bran – 18; KH_2PO_4 – 2.0; KCl – 0.5; $MgSO_4$ – 0.5 and as a biostimulator – the coordination compound $[Co(DH)_2(Anil)_2]_2[TiF_6]$ – 0.005...0.010, the rest – drinking water up to 1 L. The result of the invention is to increase the biosynthesis of amylolytic enzymes: by 27.8% – the activity of ordinary amylases and 12.5...23.8% of acid-stable amylases compared to the closest solution and reduce the cultivation time of the producer by 24 hours.

Table 2. Modification of the activity of ordinary amylases (pH 4.7) of the micromycete Aspergillus niger 33-19 CNMN FD 02A under the influence of the coordination compound $[Co(DH)_2(Anil)_2]_2[TiF_6]$

Compound	Concentr., mg/L	Amylolytic activity					
		Day 4		Day 5		Day 6	
		u/mL	% compared to control	u/mL	% compared to control	u/mL	% compared to control
$[Co(DH)_2(An)_2][TiF_6]$	1	392.2	99.0	458.9	115.8	382.3	96.5
	5	392.2	99.0	506.3	127.8	382.3	96.5
	10	415.2	104.8	506.3	127.8	450.0	113.6
Control	-	299.6	100	385.6	100	396.2	100

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Innovative models for implementing the guarantee-return system

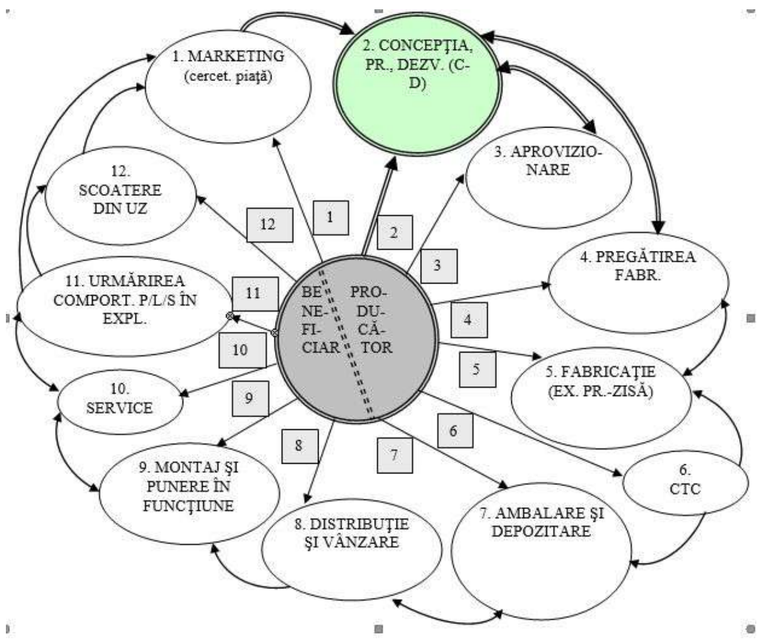
Patent/project number: UNSTPB 1/2025

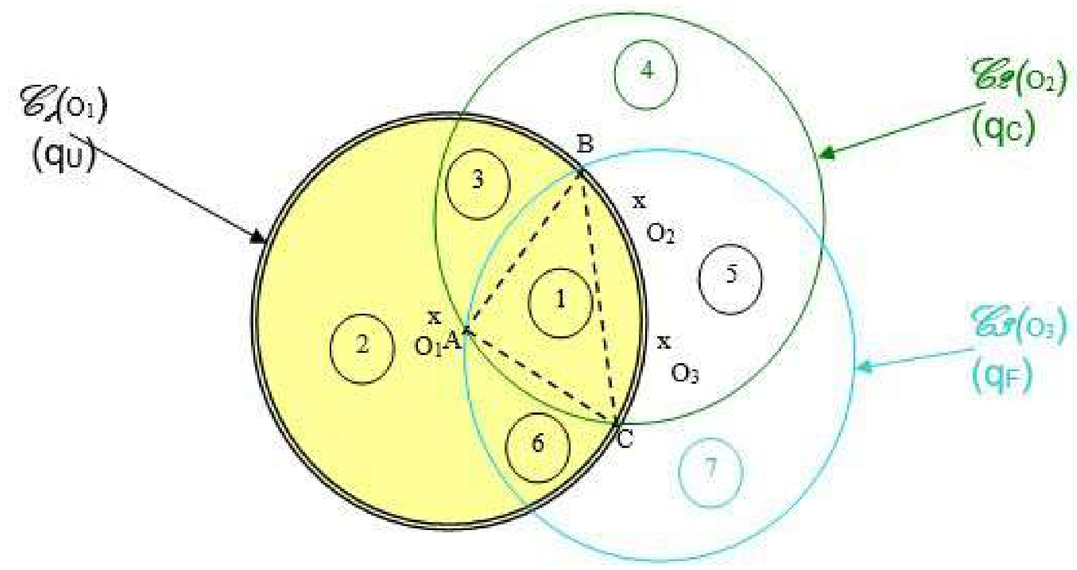
Authors: Marcu Dragos Florin, Semenescu Augustin, Costoiu Mihnea Cosmin, Craciunica Monica, Florea Bogdan

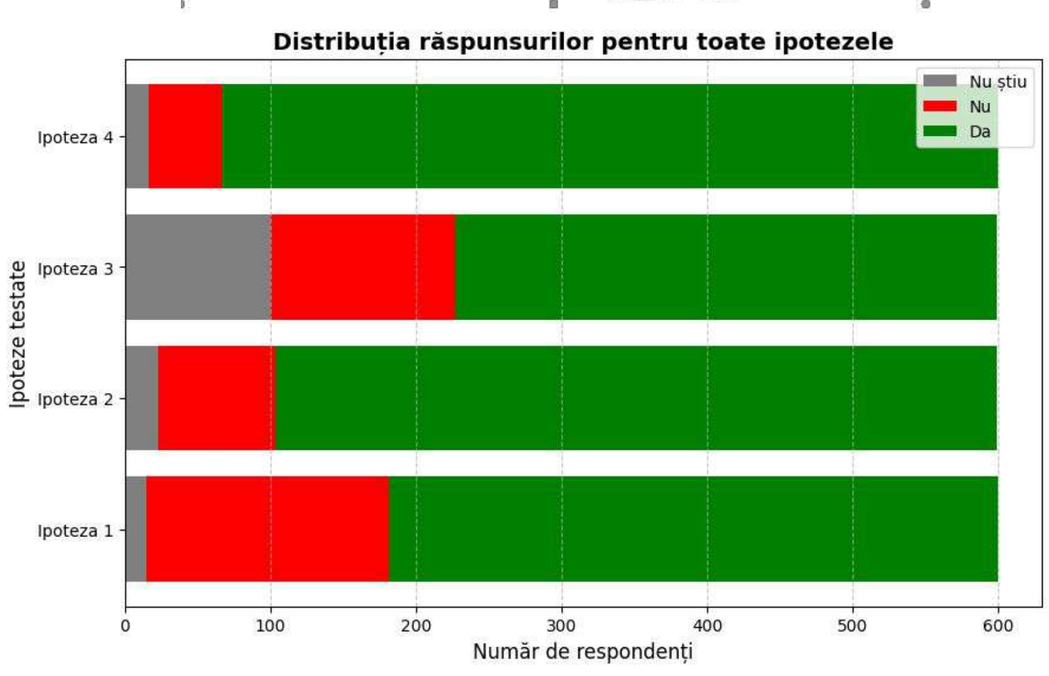
A

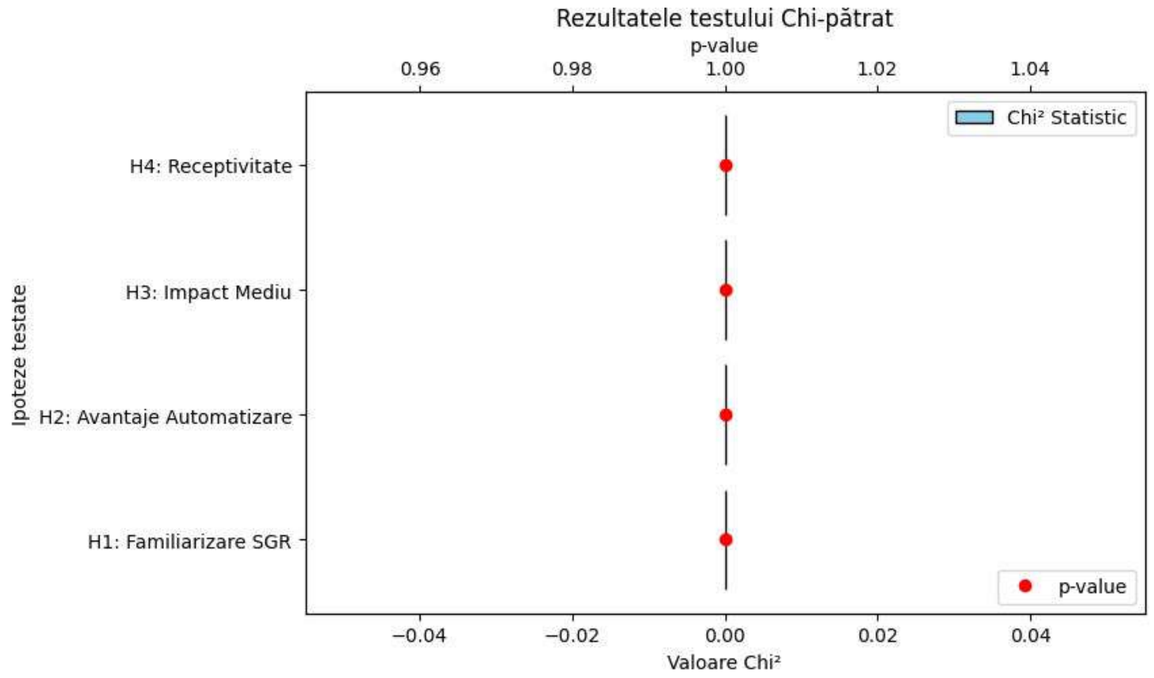
Description

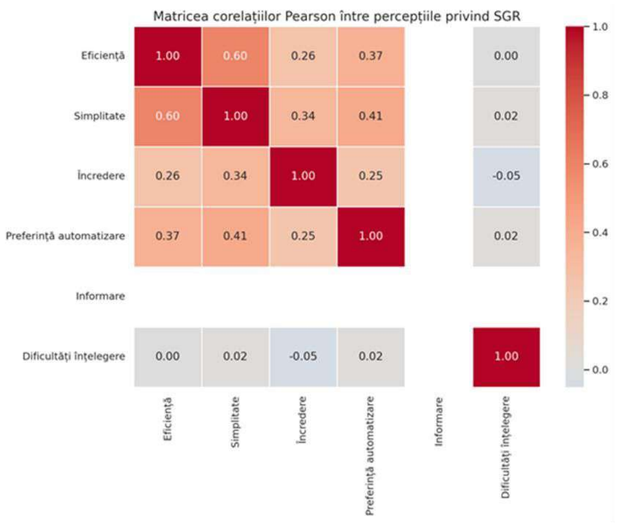
Based on the identified quality concepts, a qualitative research was conducted to identify the correlation as perceived among stakeholders regarding the quality and impact on the analyzed system. In order to support the results obtained through the logistic regression analysis, a series of graphical representations were created that illustrate the relationships between the dependent variable – the preference for the automated system – and the most important predictors: the perception of efficiency, the simplicity of use and the trust in the system. These scatterplot graphs, accompanied by regression lines, provide an intuitive and convincing picture of how the users' responses are grouped and evolve according to each factor.

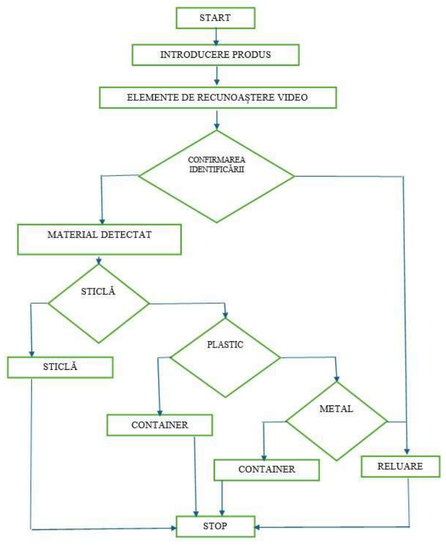


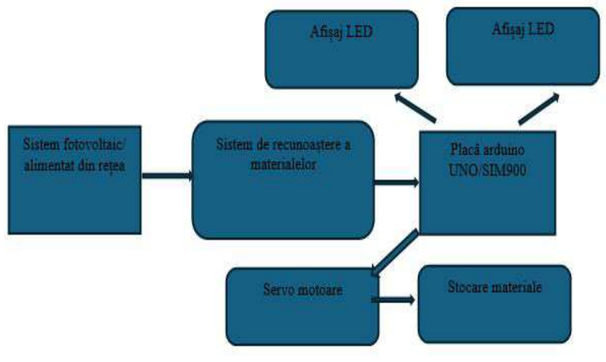












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Plastic-Degrading Capability of *Aspergillus* sp. and the Development of a Fungal-Based Innovation for Plastic Waste Decomposition

Naphatsorn Khonkhunthod, Thongthip Srichandaeng and Thakdanai Phalathip
Mentor: Nattapon Phontham and Suppapong Niamthiang

A

This study aimed to explore the potential of fungi for developing an innovative biodegradation approach. Fungal diversity in a local landfill was investigated, and selected isolates were tested for their ability to degrade specific types of plastic. The results revealed that *Aspergillus* sp. was the dominant fungal genus present in the landfill and exhibited the capability to degrade several plastic types. Based on these findings, an innovative concept termed the "Fungi Ball" was developed by encapsulating *Aspergillus* sp. spores in sodium alginate. When applied to landfill environments, the Fungi Ball absorbs soil moisture, enabling fungal spores to germinate into hyphae that secrete enzymes responsible for breaking down plastic polymers.

If Fungi Ball has the potential to enhance and accelerate the degradation of certain types of plastic waste in landfills, it represents a promising biological strategy for mitigating plastic pollution.

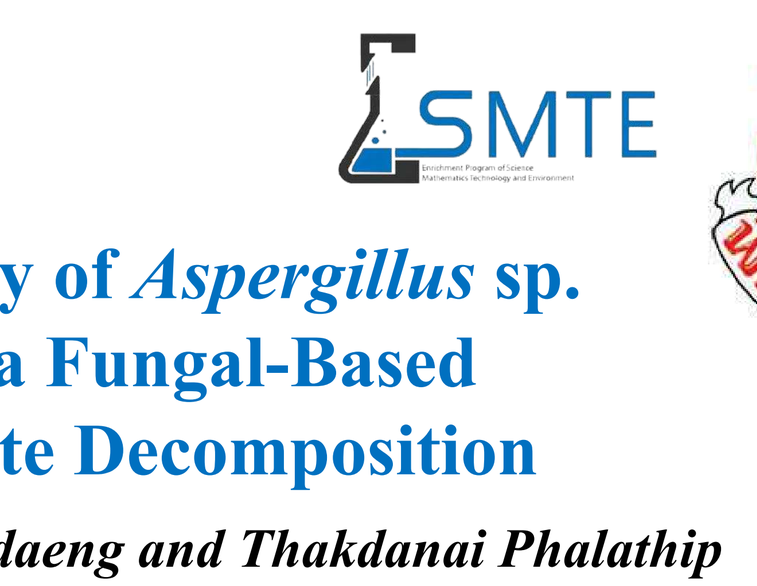

Fig.1 This study found six genera of fungi, including *Alternaria, Fusarium, Pyricularia, Rhizopus, Aspergillus* and *Phytophthora* that found in Phimai landfills. The genera *Aspergillus* were predominant genus. Most of them are of saprotrophic lifestyle, which plays a significant role in nutrient cycling in the ecosystem

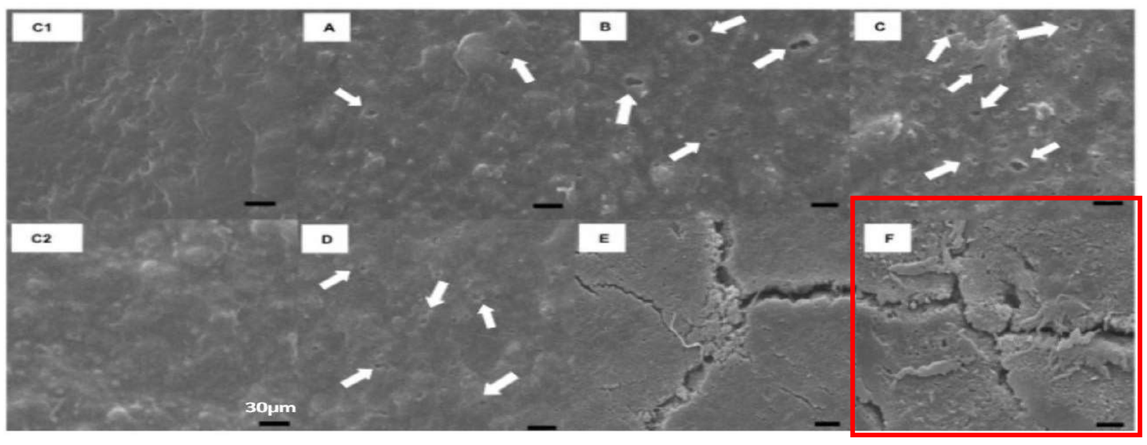

Fig.2 Scanning electron microscopic view of the bioplastics degraded sheets after test with different genus of fungi for 60 days. and we found that (F) BP sheet of incubation with *Aspergillus* sp. Illustrated high potential of *Aspergillus* sp. to degrade bioplastic

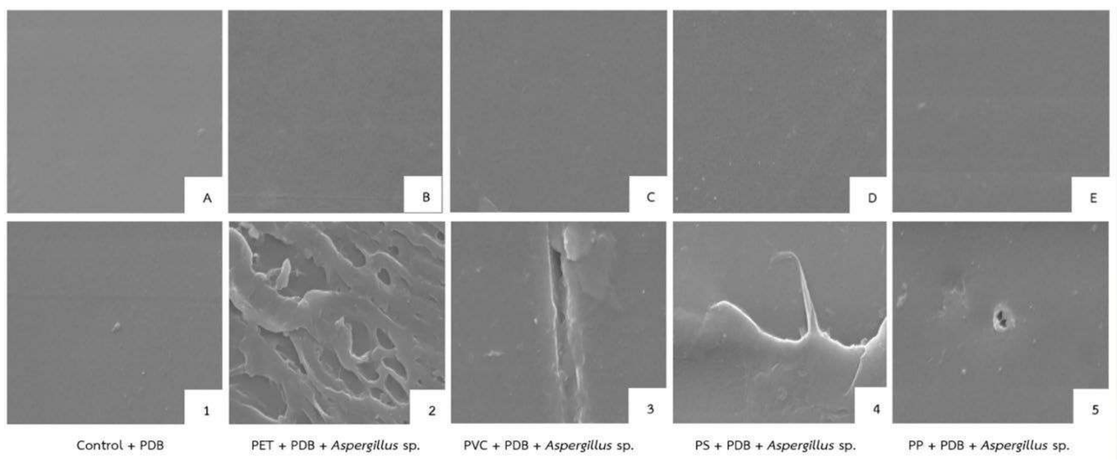

Fig.3 Scanning electron microscopic view of the plastics degraded sheets after test with *Aspergillus* sp. for 60 days.

Fungal-Based Innovation for Plastic Waste Decomposition

Fungal Encapsulation

Fig. 4 The *Aspergillus* sp. was first cultured, and its spores were subsequently harvested. These spores were mixed with a sodium alginate solution to perform fungal spore encapsulation. The resulting encapsulation solution was used to form alginate beads. This was achieved by using a micropipette to drop the solution into a calcium chloride solution, leading to the formation of Fungi Balls.

Application Principle of Fungi Balls

Fig. 5 The core principle for the application is as follows: A Fungi Ball is capable of germination when exposed to adequate moisture levels in the soil, and the hyphae of the Aspergillus fungus can grow beneath the soil surface. Therefore, when plastic waste is landfilled, the Fungi Balls can be scattered onto the landfill site. The landfill pit may be constructed in layers (as illustrated in simulated fig.6), incorporating a thin layer of natural material to serve as an initial nutrient source (food) for the *Aspergillus*. Once this initial organic material is degraded, the Aspergillus will seek new carbon sources for growth. The plastic will then be biodegraded by specific *Aspergillus* enzymes to serve as a carbon source for its proliferation. This natural method facilitates the decomposition of plastic waste, thereby accelerating the plastic degradation process.

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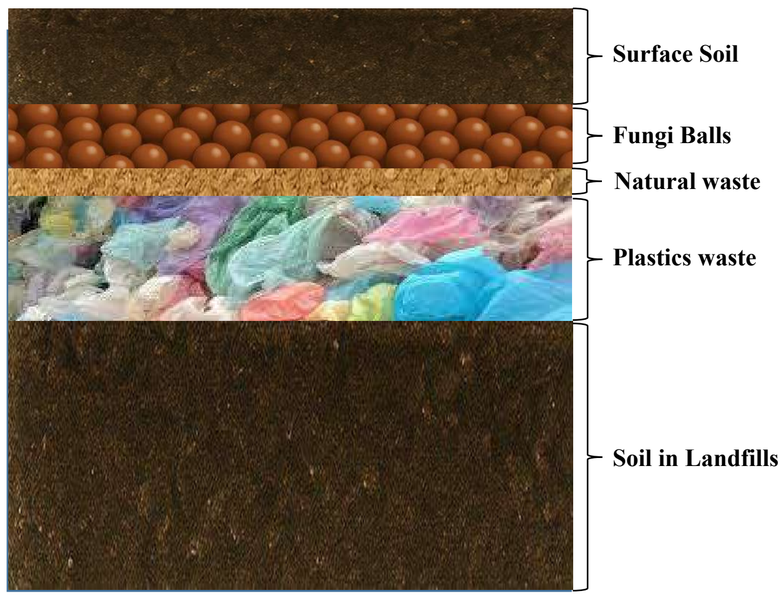


Fig.6 illustrates the simulated layered stratification of plastic waste landfilling utilizing Fungi Balls to enhance plastic waste biodegradation

Current Research Status and Significance

The project team is currently designing the experimental plan for the construction of the Fungi Balls and their subsequent application in real-world plastic waste landfilling trials. The resulting findings from this study will constitute a significant contribution to research focused on accelerating the natural biodegradation of plastic waste. Furthermore, this work is crucial for raising global awareness about reducing plastic consumption to conserve the environment and preserve natural resources, thereby supporting the future sustenance and well-being of humanity.

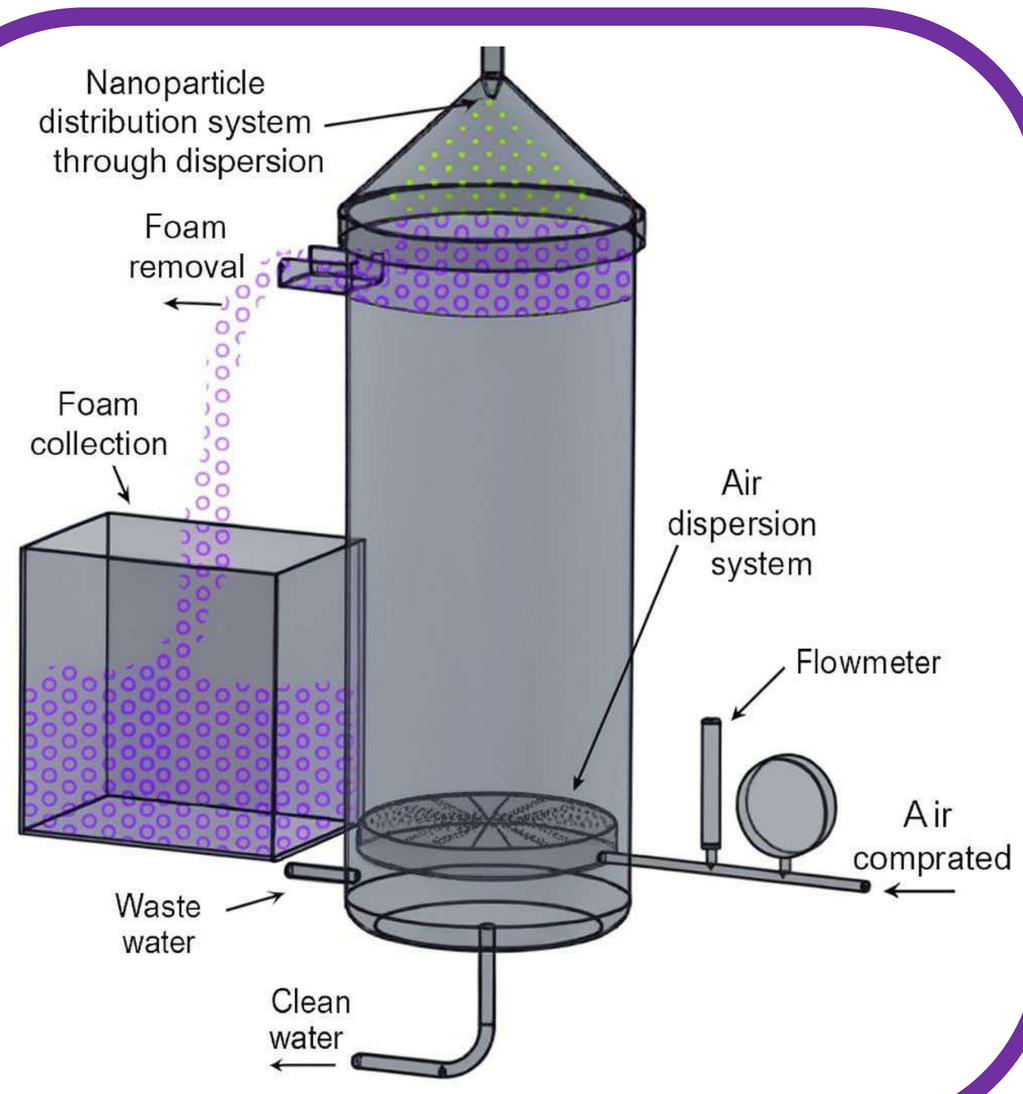
INNOVATIVE FLOTATION INSTALLATION WITH HYBRID ECOLOGICAL NANOMATERIALS, USED IN WASTEWATER TREATMENT

Ioana Corina MOGA [1], Ileana Cristina COVALIU-MIERLA [2], Gigel PARASCHIV [2], Gabriel PETRESCU [1]

1 - DFR Systems SRL
2 – National University of Science and Technology POLITEHNICA Bucharest

The *WaterFlo* project aims to develop an innovative technology for treating industrial wastewater heavily loaded with fats and colloidal particles, using a flotation process supported by hybrid eco-friendly nanomaterials. The proposed technology advances from experimental validation to the design and testing of a pilot installation capable of treating up to 50 m³/day of industrial wastewater.

The efficiency of wastewater treatment through flotation can be enhanced using nanoparticles by increasing foam generation and reducing bubble coalescence. Literature indicates two main approaches: adding nanoparticles as suspensions with flotation agents, or directly into the foam. Laboratory studies at NUSTPB (TRL 4) showed that introducing nanoparticles onto the foam surface after its formation is the most effective method, leading to stable foam and improved flotation. This method, integrated with an automated nanoparticle dispersion system and an advanced air distribution unit, is proposed to be scaled up to TRL 6 within the *WaterFlo* project.



For the pilot stage, the researchers plan to develop hybrid oxide nanoparticles (Fe_3O_4, $CuFe_2O_4$, $NiFe_2O_4$) coated with biopolymers such as chitosan or sodium alginate. These coatings will ensure steric stabilization at fluid interfaces, thereby improving foam stability and pollutant removal. The nanomaterials can later be recovered through their magnetic properties, regenerated, and reused, increasing both efficiency and sustainability of the process.

Key advantages include achieving a very high pollutant removal efficiency (96–100%), recovery and reuse of nanomaterials, reduced environmental impact, and the generation of patentable know-how that provides a competitive advantage in the wastewater treatment market.

ACKNOWLEDGEMENT

This work was funded by the Ministry of Research and Innovation, within National PN-IV-P7-7.1-PTE-2024-0200, contract 59PTE/2025 (*WaterFlo*).

Opportunity
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Quantum Optics and Kinetic Processes Laboratory

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HR EXCELLENCE IN RESEARCH

Device for continuous air disinfection with the use of UV-C and IR radiation

BREVET: MD s2026 0022

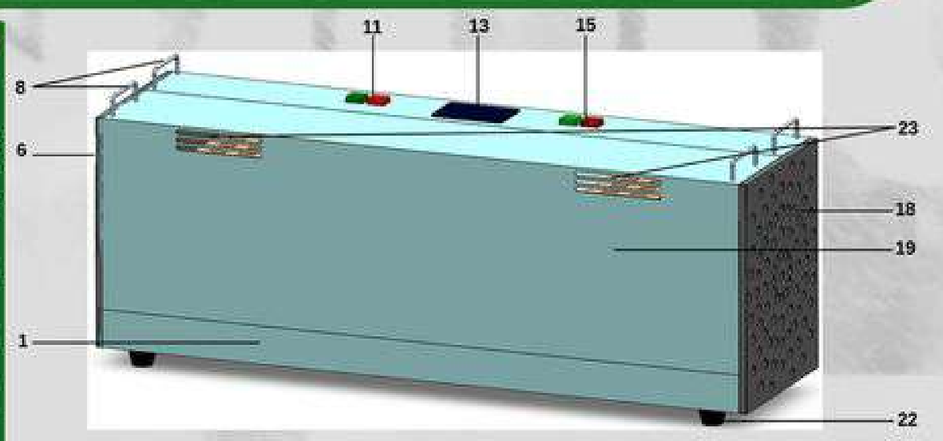
AUTHORS: MUNTEANU Ion, ŢURCAN Marina, ENACHI Nicolae, TONU Viorica, STARODUB Elena, BÎZGAN Serghei and PÎSLARI Tatiana

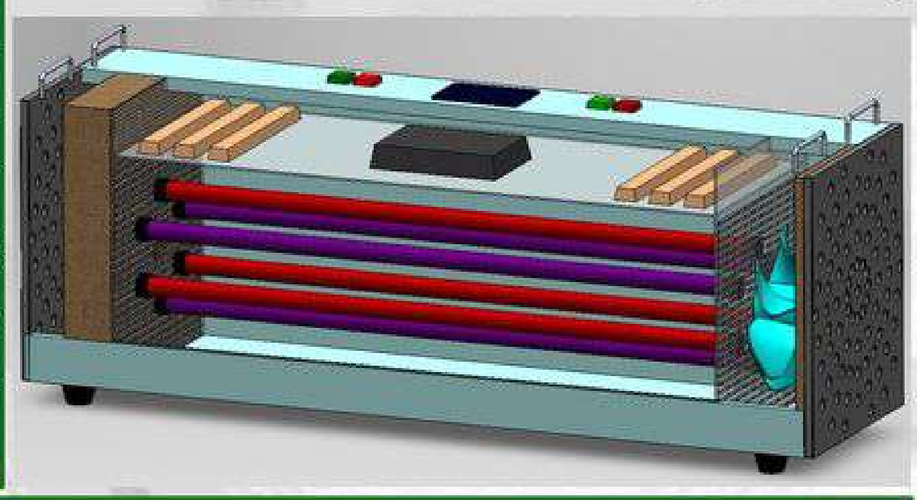
APPLICATION FIELDS: Medicine – Health – Hygiene – Industry.

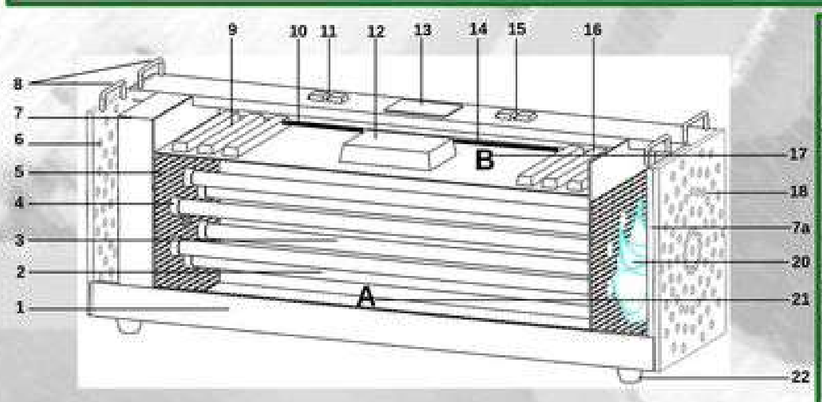
AIM: The invention relates to equipment for fungal, bacterial or viral sterilization, but especially refers to a device for continuous air disinfection rooms in medical, educational, public institutions, etc.

SOLUTION: The invention addresses the need to enhance and diversify devices for decontaminating airborne pathogens in enclosed environments—such as educational, public, and medical facilities—by significantly reduces UV-C and IR exposure time by improving disinfection efficiency through broader, more uniform radiation dispersion.

The invention relates to equipment for air disinfection and sterilization and refers to a device intended for neutralizing biological agents of a fungal, bacterial and viral nature, as well as reducing suspended particles, which performs continuous and safe air disinfection by physical methods harmless to users, by recirculating ambient air in a sealed housing and treating it by mechanical filtration combined with ultraviolet irradiation of type C (UV-C) and controlled pulsed infrared radiation (IR), the device being designed for operation in permanently occupied closed spaces, including medical units, educational institutions and public buildings, without emitting harmful substances or radiation to the external environment.







The device for continuous air disinfection with the use of UV-C and IR radiation includes the device housing (1), legs (22), a cover (19), the decontamination compartment A (21), the inlet grille (6), filter (7), the UV-C (2) and IR (3) sources, fan (20), exhaust grille (18) equipped with a filter, the separate compartment B (17) contains electrical ballasts (16, 9), electrical wires (10, 14) connected to the radiation source connector (4), the electric current to the dedicated switch for UV-C (11), respectively IR (15), the control module (12) configured for monitoring and displaying information regarding the operation of the UV-C and IR radiation sources, as well as the operating mode of the device, the information being displayed on a monitor (13), the ventilation of compartment B is ensured through the air vents (23).

ADVANTAGES: The device ensures continuous, safe air disinfection in occupied spaces, increases sterilization efficiency, reduces exposure time, and effectively neutralizes microorganisms without releasing harmful substances.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: This research was supported by the projects No. ANCD 25.80012.5007.36TC and subprogram 011206

PROCESS FOR REACTIVATING OF PIGMENTED YEAST STRAINS AFTER PROLONGED STORAGE

Patent/project number: nr. s2026 0001, s2026 0002 from 09.01.2025

Author/s: Balan Ludmila, Bogdan-Golubi Nina, Rozlovan Ana, Tibirnac Evelina, Chiselita Natalia, Chiselita Oleg

A

This study was supported by the research project 25.80012.7007.16TC „Viability and productive potential of pigmented yeasts of the genus Rhodotorula – carotenoid producers, after long-term preservation”, funded by NARD.

Description

The invention relates to microbiology and biotechnology, in particular to a process for reactivating of pigmented yeast strains *Rhodotorula gracilis* CNMN-YS-03 and *Rhodotorula glutinis* CNMN-YS-08 after prolonged storage in a lyophilized state with increased cell viability. The essence of the present invention provides a method for reactivating the pigmented yeast strains Rhodotorula gracilis CNMN-YS-03 and Rhodotorula glutinis CNMN-YS-08 which proposed rehydrating strains with mannoproteins extract from yeast biomass obtained from the wastes of Merlot red wine production (MPV), standardized at a concentration of 25 mg/mL S.D., used at a concentration of 1–10%. Reactivation is carried out for 4 hours at a temperature of +28±1°C. The result of the invention consists in an increasing cell viability by 21,1–35,6% compared to standard medium or by 24.8–32.7% compared to the medium with mannoprotein extracts obtained from the waste products of the beer production (MPB).

The result obtained may be conditioned by the fact that the mannoproteins extract obtained from the yeast biomass remaining after wine production has a much higher antioxidant and antiradical capacity compared to the extract from the prototype, with $ABTS^{+}$ scavenging capacity 74.5% inhibition and $DPPH^{\cdot}$ radical scavenging 23.8% inhibition at a concentration of only 0.5 mg/mL (compared to 39.6% and 4.1% inhibition, respectively, at a concentration of 2.5 mg/mL).

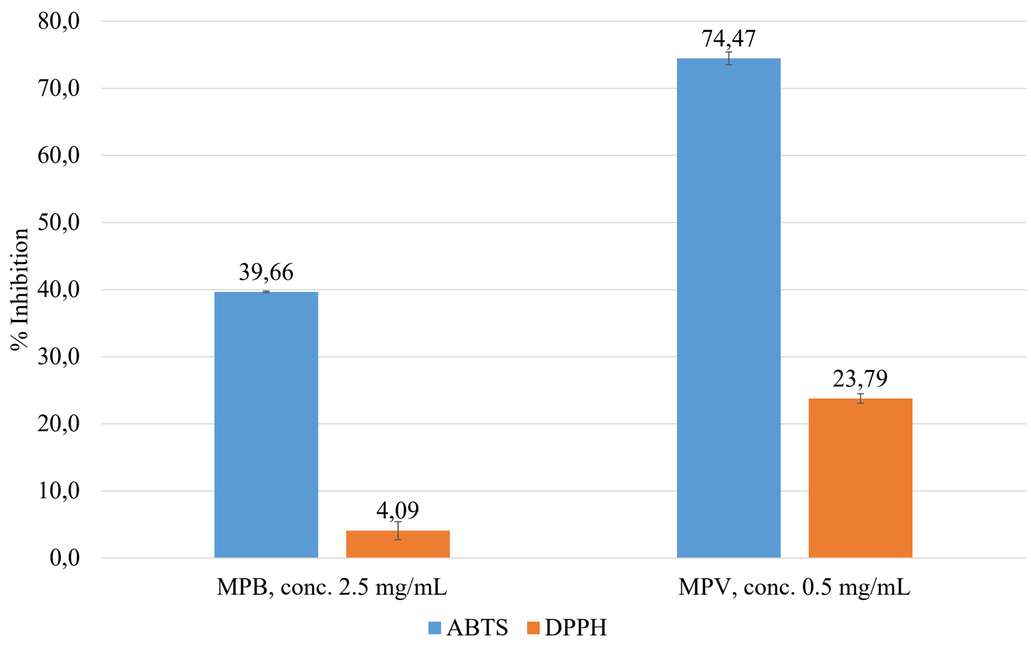


Fig. 1 Antioxidant and antiradical activity of mannoprotein extracts from the yeast biomass remaining after *Lager* beer and *Merlot* red wine production

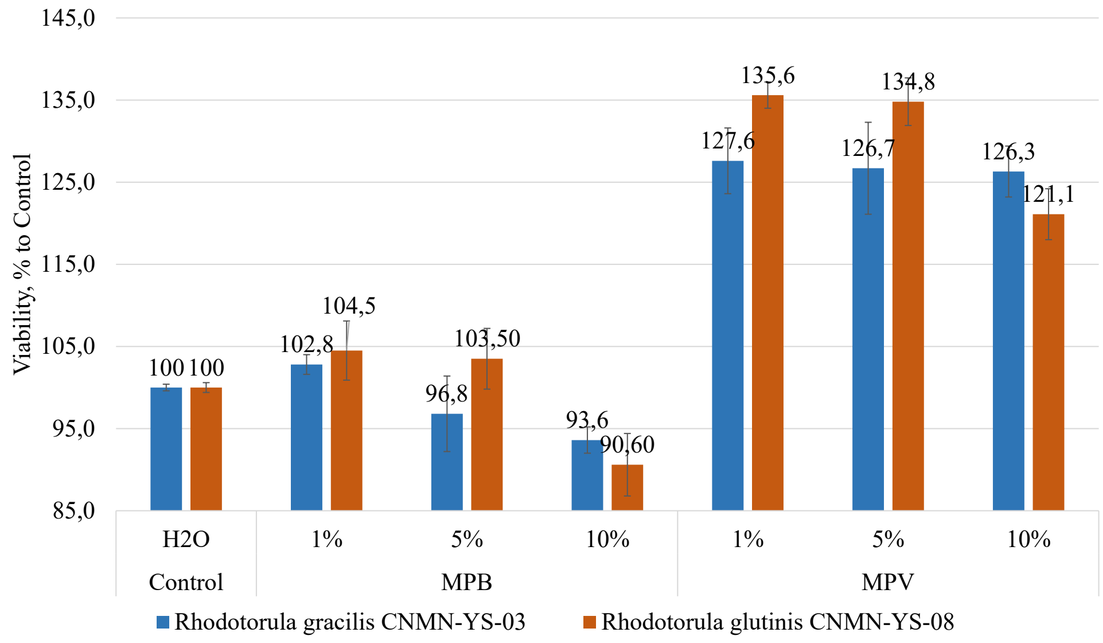


Fig. 2 Cell viability of pigmented yeast strains *Rhodotorula gracilis* CNMN-YS-03 and *Rhodotorula glutinis* CNMN-YS-08 after reactivation with mannoprotein extracts

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Stimulation of the nutraceutical potential of sprouts used as functional foods, based on the nonthermal plasma processing of the seeds

Project number: PN-IV-P2-2.1-TE-2023-1383

A

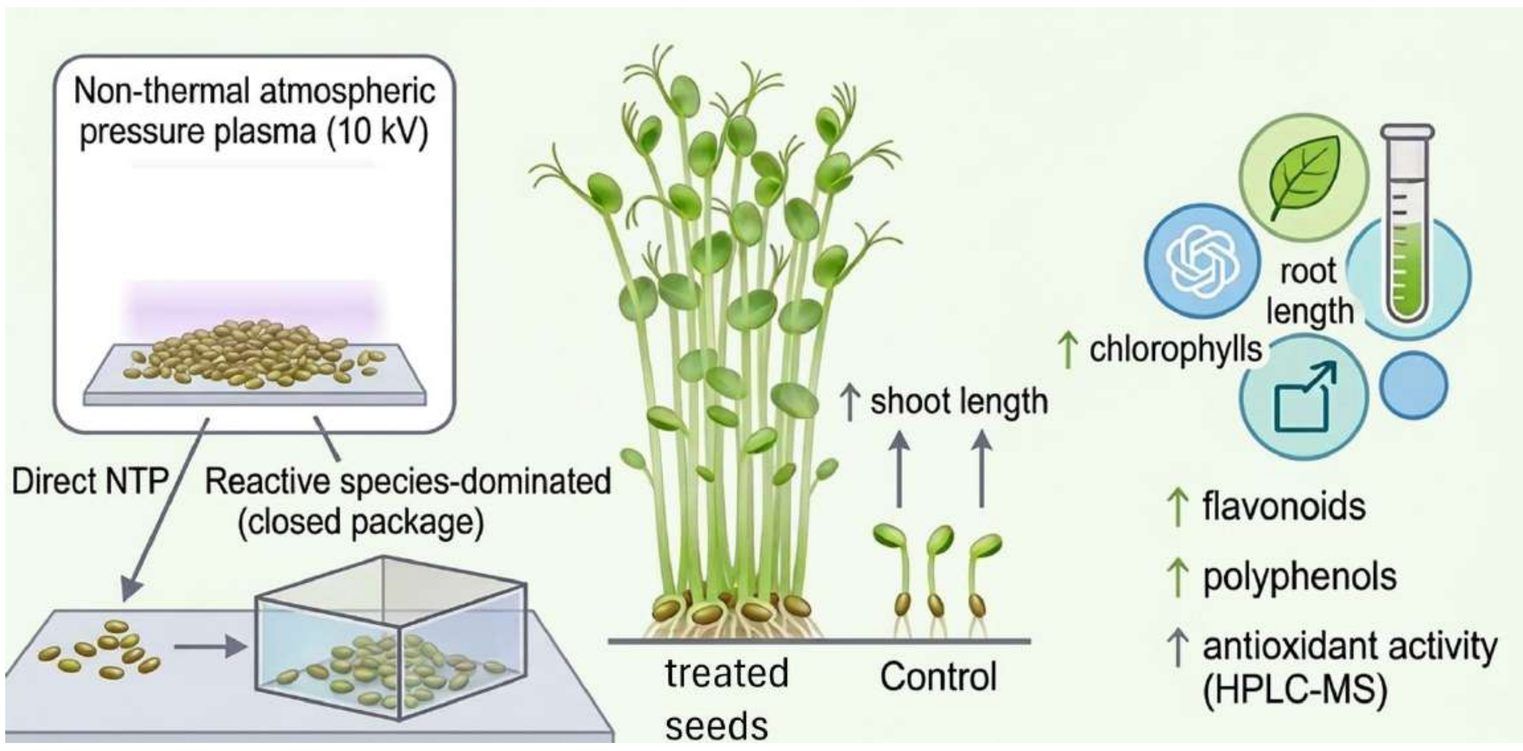
Author/s: Iuliana Motrescu

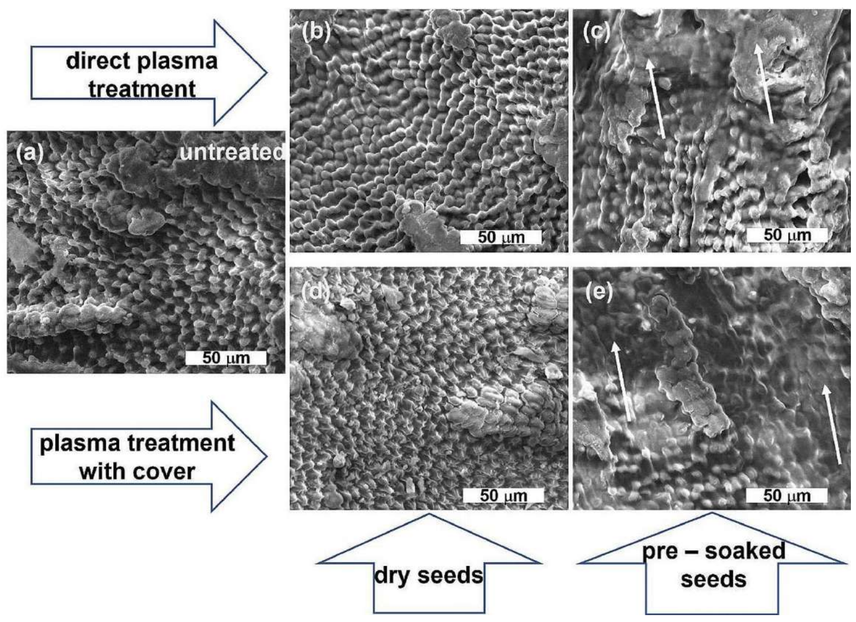
Main objective: Stimulate the production of nutraceutical compounds in sprouts by non-thermal plasma treatment of seeds.

Advantages:

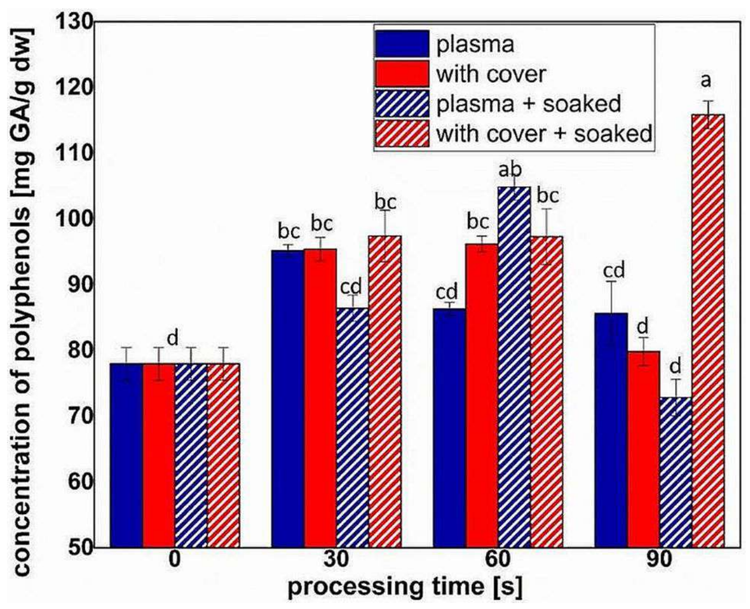
→ **non-thermal plasma (NTP)** – electrical discharged that operates at low temperature; powerful chemical in gas-phase reactor ⇒ green & sustainable technology

→ **nutraceutical compounds** - all compounds that have nutritive and pharmaceutical properties, such as chlorophylls, phenols, flavonoids, vitamins, etc.

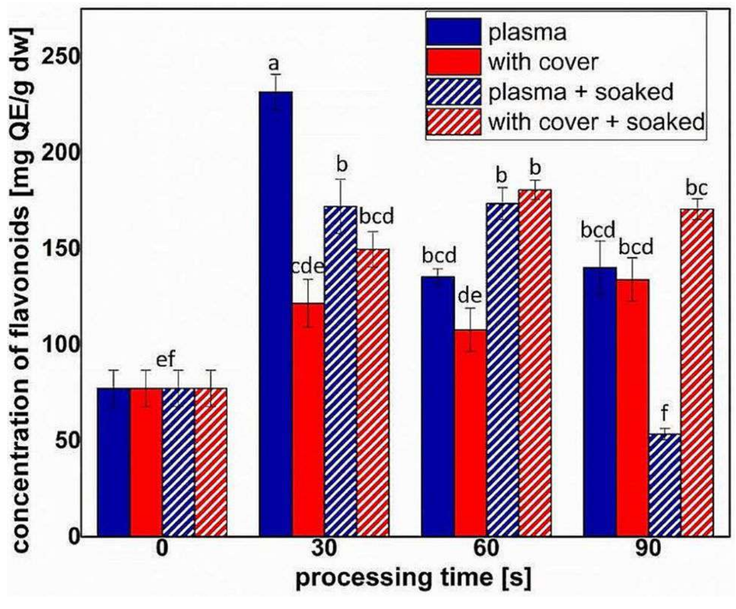




Electron microscopy images of the surface of the seeds in different conditions: (a) untreated, (b) 90 s dry seeds treated in direct plasma, (c) 90 s pre-soaked seeds treated in direct plasma, (d) 90 s dry seeds treated in plasma with cover, and (e) 90 s pre-soaked seeds treated in plasma with cover. Arrows indicate areas made smoother by strong etching.



Concentration of polyphenols.



Concentration of flavonoids.

Highlights

- Non-thermal plasma (NTP) was tested as a green method to stimulate sprout growth and production of nutraceutical compounds.
- Optimized treatment of the seeds led to increased roots and shoots.
- NTP boosted chlorophylls, phenolics, flavonoids, antioxidant activity.
- The approach shows promise for improving the nutraceutical value of sprouts.

Contact: iuliana.motrescu@iuls.ro, imotrescu@yahoo.com project link

Chemical Profile, Bioactive Constituents and In Vitro Growth Stimulation Properties of Cold-Pressed Hemp Seed Oils from Romanian Varieties: In Vitro and In Silico Evaluation

doi.org/10.3390/plants14223465

A

Doris Floares (Oarga), Diana Obistioiu, Anca Hulea, Mukhtar Adeiza Suleiman, Iuliana Popescu, Ciprian Buzna, Ciprian Buzna, Adina Berbecea, Ersilia Alexa, Cristina Dehelean, Isidora Radulov

Industrial hemp (Cannabis sativa L.; Cannabaceae), traditionally cultivated for fiber, also represents a valuable source of nutrient-rich seed oil. In this study, cold-pressed hemp seed oils from three Romanian varieties (Teodora, Silvana, and Armanca) were evaluated for their fatty acid composition, minor bioactive constituents, antioxidant activity, growth-promoting property toward probiotic strains in vitro, and molecular docking interactions with probiotic targets. Gas chromatography revealed a fatty acid profile dominated by linoleic (49.4–51.9%), oleic (16.3–22.8%), and α-linolenic acids (9.8–14.4%), resulting in favorable PUFA/SFA ratios (5.17–6.39) and ω-6/ω-3 ratios (3.93–5.53). The oils also contained phenolics (118–160 mg GAE/kg), chlorophylls (6.18–8.31 mg/kg), and carotenoids (2.58–3.37 mg/kg), which contributed to their antioxidant activity (DPPH inhibition 35.92 µM TE/100 g–43.37 µM TE/100 g). Broth microdilution assays against Lacticaseibacillus rhamnosus GG, L. paracasei ATCC BAA-52, and L. acidophilus ATCC 4356 demonstrated strain- and dose-dependent potential to promote probiotic growth under in vitro conditions. While L. rhamnosus and L. paracasei were inhibited at low concentrations and only mildly stimulated at higher levels, L. acidophilus showed robust growth promotion, reaching +54.7% effect and CP = 1.55 with Teodora oil at 16 mg/mL. Molecular docking highlighted strong binding affinities of γ-linolenic and linoleic acids with key metabolic enzymes involved in probiotic metabolism (hydratase, enolase, glyceraldehyde-3-phosphate dehydrogenase, ribonucleoside hydrolase), forming stable hydrophilic and hydrophobic interactions which are explored in defining the stability of the ligand-protein complexes. These results indicate that both major fatty acids and minor bioactive constituents contribute to the nutritional and antioxidant value of Romanian hemp seed oils and reveal a potential to promote probiotic growth under in vitro conditions, as supported by complementary in silico evidence.

Pictures & graphics

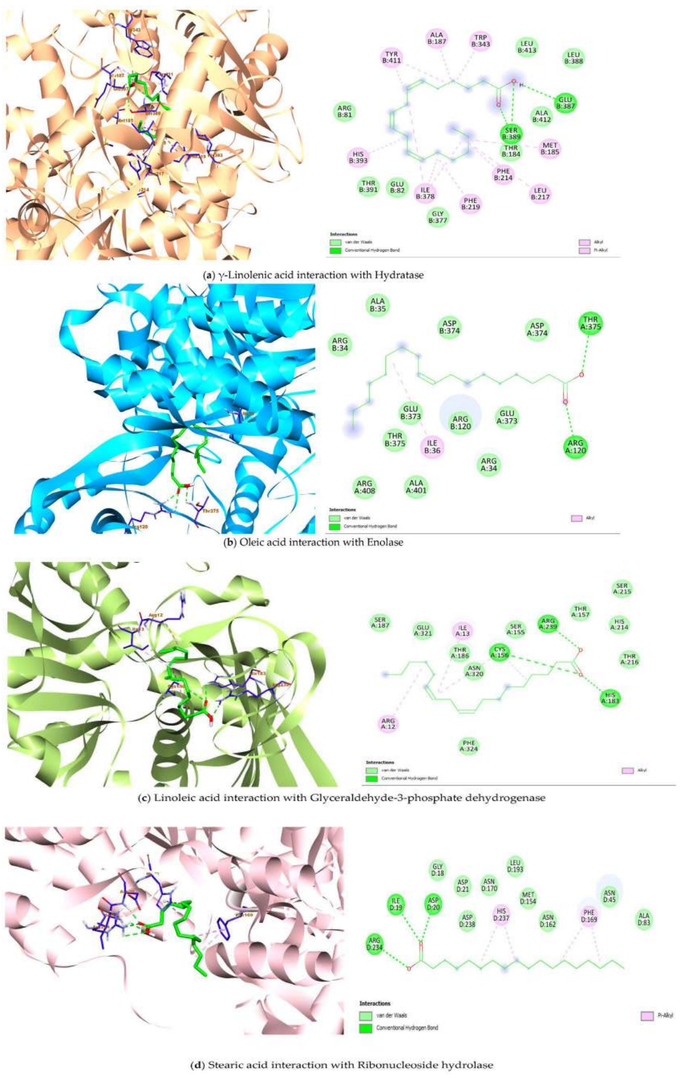


Figure.1 Architecture of the best binding interaction between the compounds and the four *Lactobacillus* protein targets.

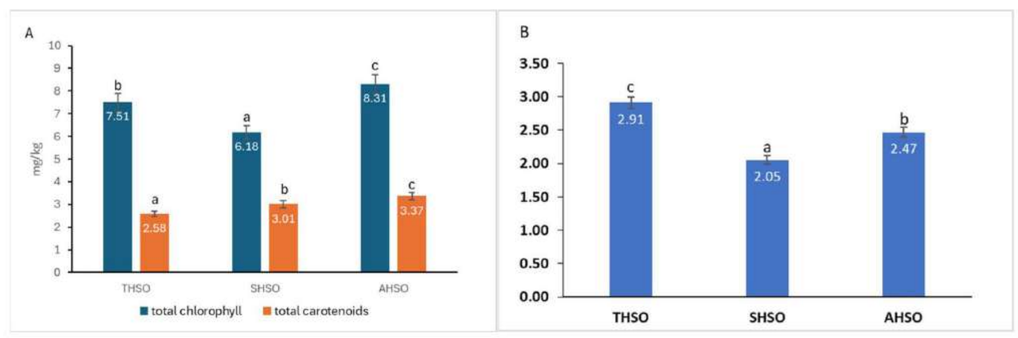


Figure 1. (**A**) Total chlorophylls and carotenoids content of hemp seed oil. (**B**) Ratio of total chlorophyll to total carotenoids. Hemp seed oil: THSO–Teodora; SHSO–Silvana; AHSO–Armanca

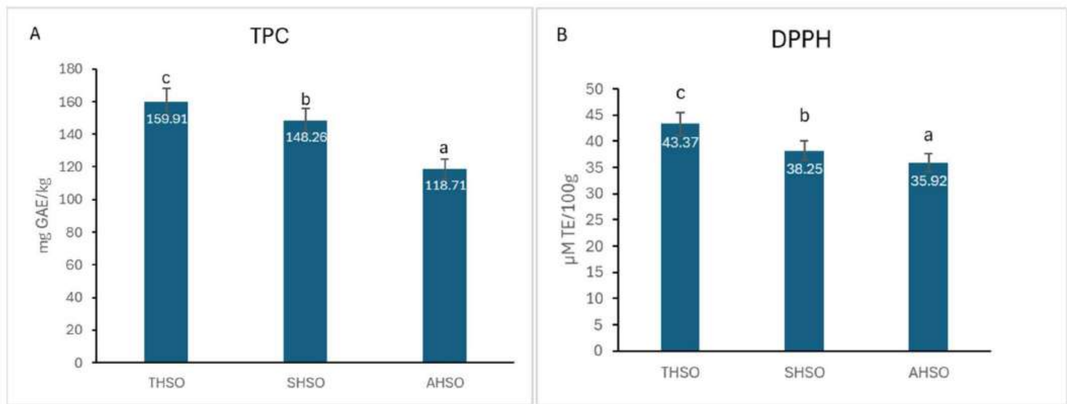


Figure 2. (**A**) Total phenolic content (TPC) and (**B**) DPPH scavenging activity of hemp seed oil. Hemp seed oil: THSO–Teodora; SHSO–Silvana; AHSO–Armanca

Contact: **isidora_radulov@usvt.ro**

BIOBASED AND SOCIAL INNOVATION TO REVITALIZE EUROPEAN LOCAL COMMUNITIES

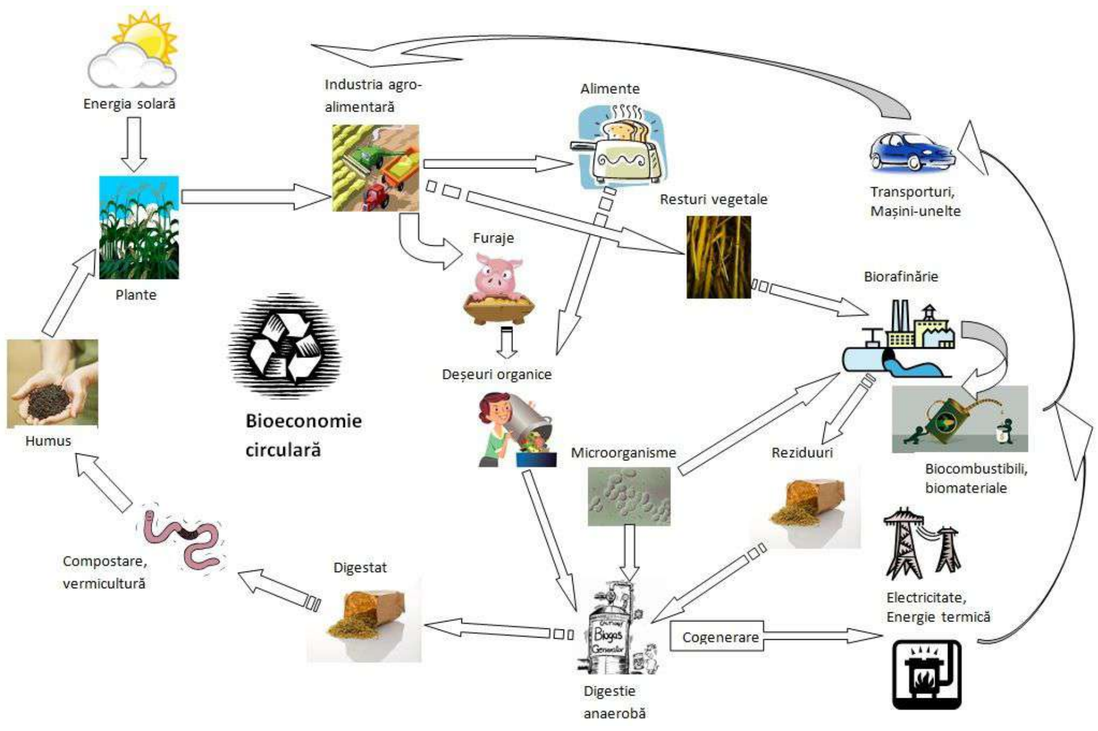
Category A

Project number: 101060558, Acronym: BIOLOC

Authors: Vintilă Teodor, Samfira Mirela, Șuster Gabriel, Chiș Codruța, Grozea Adrian, Pandur Ioana

Description

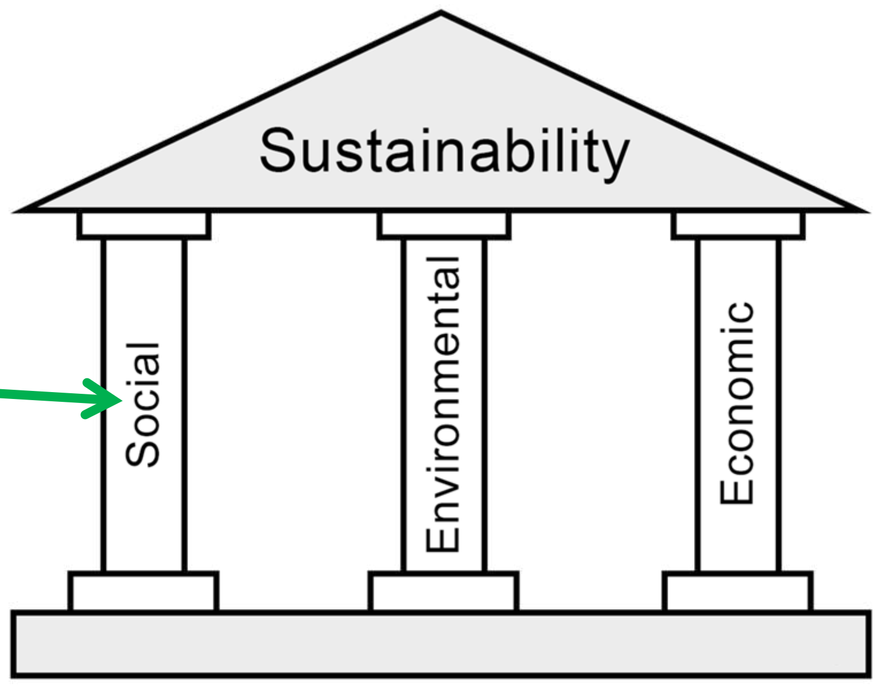
BIOLOC provide an overview of the region's bioeconomy landscape, including local, regional, and national policies or strategies. Describe the conditions in the region (e.g., economic challenges, environmental issues like soil degradation, or social barriers to employment). Biomass from various types, especially by-products and organic wastes resulted from agro-food supply chains are considered feedstock for production of compost, vermicompost, biogas to electricity. Bio-based products such as digestate, compost, bio-humus from vermicomposting are considered in BIOLOC project as the main tools to be used for remediation of areas contaminated by chemical and fossil energy industry.



What are the possible products from the proposed value chain?

Biorefinery of biomass obtained in polluted areas and marginal land to deliver biofuels, energy and biomaterials (bioplastic);

Processing by anaerobic digestion of all organic (waste) materials generated in agro-food supply chain and in communities to deliver biogas-to-methane / biogas-to-electricity / biogas-to-thermal and digestate;



How to boost the role and impact of social innovation for the revitalization of EU local communities by accelerating the transition to circular bioeconomy?

BIOLOC achieved this ambitious goal through comprehensive methodological work and specific actions that the project will implement in 12 locations in Romania (West), Spain (Aragon), Greece (Western Macedonia), Bulgaria (Plovdiv), Slovakia (Nitra), Slovenia, Croatia (Adriatic), Hungary (North), Czechia (Ostrava), the Netherlands (Apeldoorn), Germany (Baden-Wurttenberg), and Italy (Campania).

CONTACT US

BIOLOC Romania team: Teodor Vintilă, Codruța Chiș, Adrian Grozea, Ioana Pandur, Gabriel Șuster, Mirela Samfira from ULS "Regele Mihai I" from Timisoara

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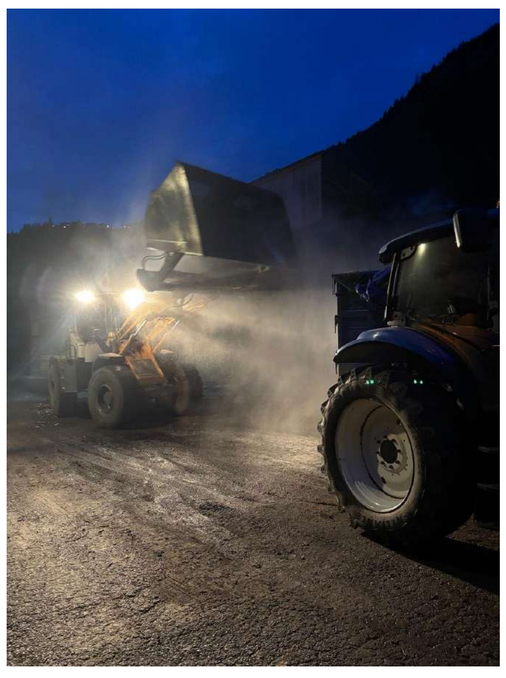
CONVERSION OF LOCAL BIOMASS INTO HEAT AND ELECTRICITY USING AN ORC TURBINE

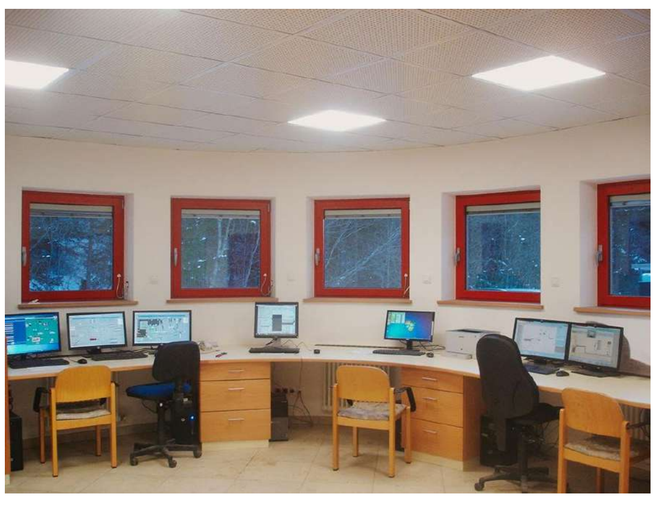
A

Authors : Kovacs Adina Steliana , Kovacs Estera Andreea , Blendea Ionuț Andrei
Mentor : Assoc.prof.PhD.eng. Comarlă Adriana

Heat is generated using wood chips as biomass, which are burned in the boiler. Combustion is fully controlled automatically by a regulator to achieve maximum combustion efficiency.
An electric filter combined with flue gas condensation minimizes emissions, ensuring environmentally friendly operation. The heat produced in the combustion chamber warms a thermal oil system, which drives the ORC turbine to generate 300 kW of electricity. Residual heat is supplied to a district heating network.

The district heating system transfers heat from the plant to end-users through two insulated pipes (supply and return), with a supply temperature of approximately 80°C. Heat reaches the user's heating system via a thermal exchange station, where an automated controller regulates the desired temperature.
Boiler combustion and heat flow in the distribution network are adjusted based on real-time customer demand. Operators can program individual heat station temperatures for each end-user, ensuring efficient and personalized heating.





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INTELLIGENT AUTOMATIC SYSTEM FOR THE COLLECTION OF WASTE FROM HYDROGRAPHIC BASINS

A

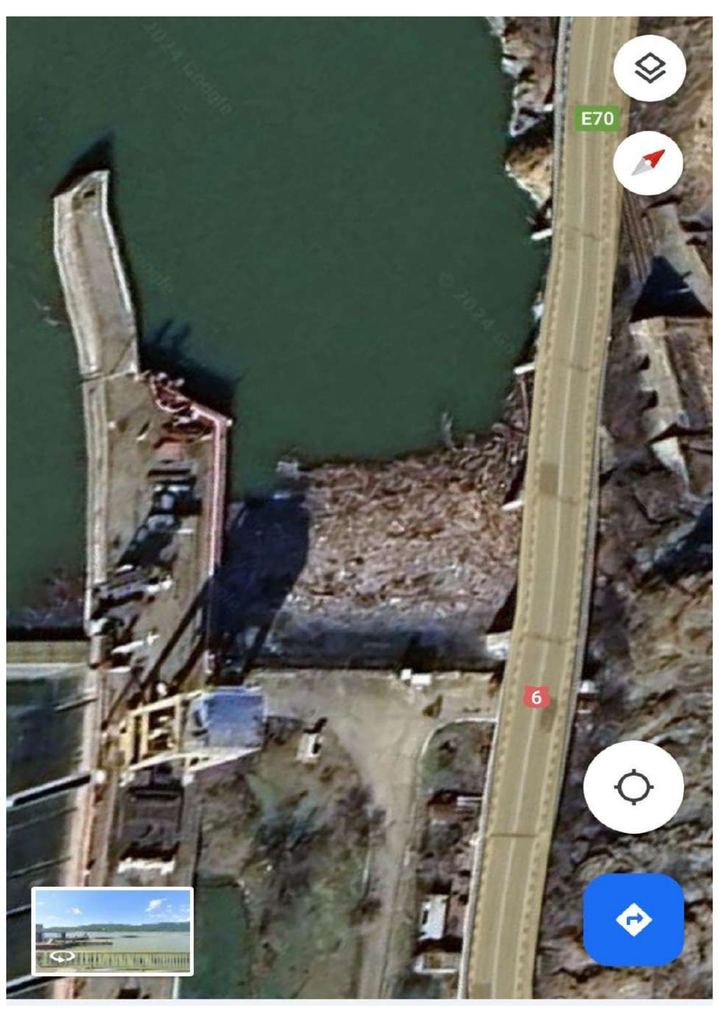
Authors : Năsui Samuel, Boltașu Marian Victor

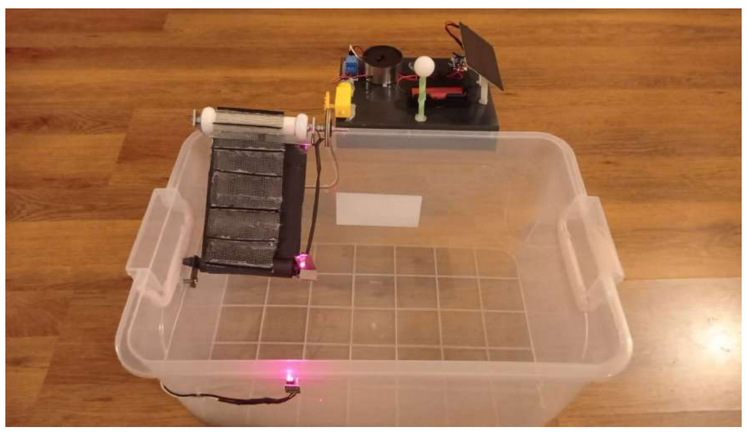
Mentor : Assoc.prof.PhD.eng. Comarlă Adriana

This project was born as a result of frequent walks with the family on reservoirs (hydrographic basins) where, in all the lakes, we could observe how nature, water currents and air currents, drive all the garbage from the water to a specific place. I have wondered many times why the garbage does not collect from those points, telling myself that it would be very easy to use a conveyor belt to collect the garbage from the water. This is how our project came into being. Our concept was the basis of this reality.

This project consists of a platform on which an automatic conveyor belt controlled by an electric motor is installed and an Arduino nano board powered by a solar panel for independence and energy efficiency. In order to identify the filling of the garbage collection space, we used a laser beam with a receiver that, if the laser beam was blocked for more than 10 seconds, the Arduino board will command the motor through a relay to start and run for 30 seconds after which it will stop, when the beam is blocked again the cycle will repeat continuously.

Our project can be adapted using even artificial intelligence through a video camera that can identify the garbage and command the conveyor belt to start and stop the conveyor belt. After collecting the garbage, we can make an automatic selection of the garbage and recycle the waste.





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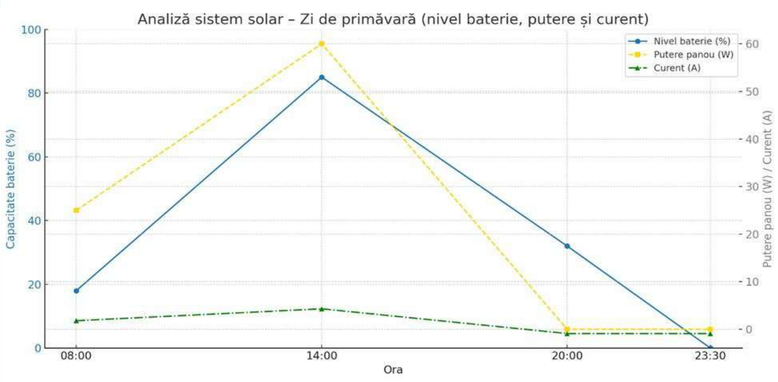
ENERGY STORAGE

Authors : Nedoiu Denisa-Alexandra, Smărăndoiu Popescu Norbert- Mario, Duțu Constantin-Gabriel
Mentor : Assoc.prof.PhD.eng. Comarlă Adriana

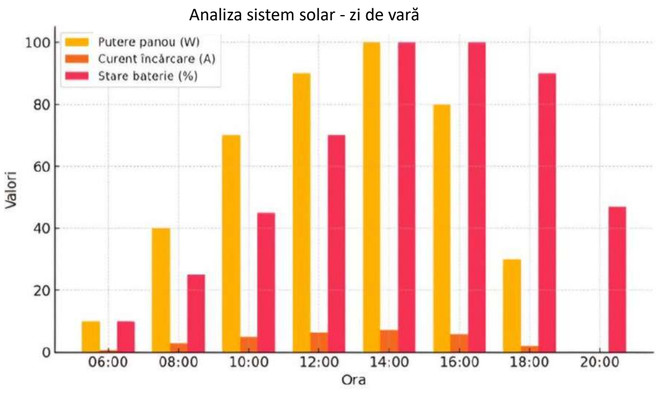
A major challenge of these renewables is their intermittent nature. This variability makes it difficult to synchronize production with energy consumption. Thus, the need arises for solutions that ensure a constant energy supply – and this is where energy storage comes in.
Energy storage allows the surplus energy produced to be captured at a given time when needed. Energy storage has become a key element of the transition to a sustainable and flexible energy system.
Decarbonising the energy system, supporting the achievement of climate goals.

We analyzed both the theoretical foundations and the most relevant technologies and applications at global level and we carried out a case study of the automatic charging system - storage of solar electricity in Li-Ion batteries.

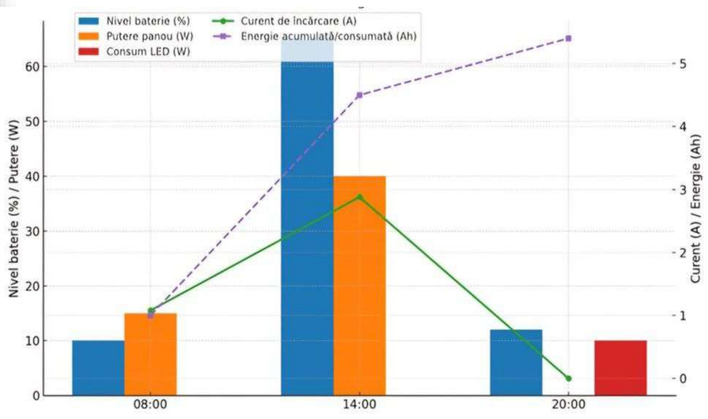
It has been found that, although the technology is mature in some areas (Li-ion batteries), there are still many challenges – technical, economic and legislative.
Energy storage is no longer an option, but a necessity. In the context of climate change and energy transition, the success of the future energy system will fundamentally depend on the ability to store, manage and deliver energy at the right time.



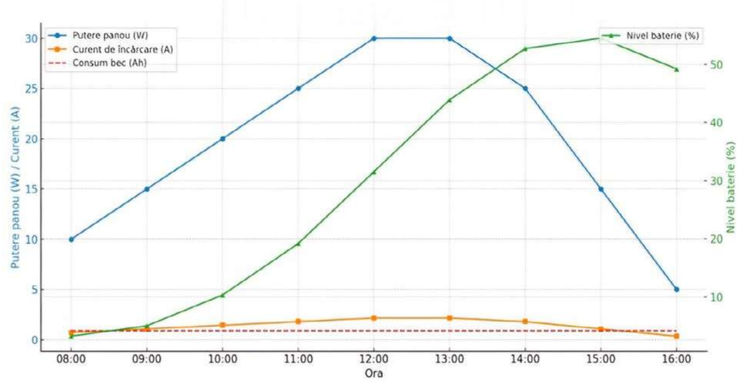
Analiza sistem solar - zi de vară

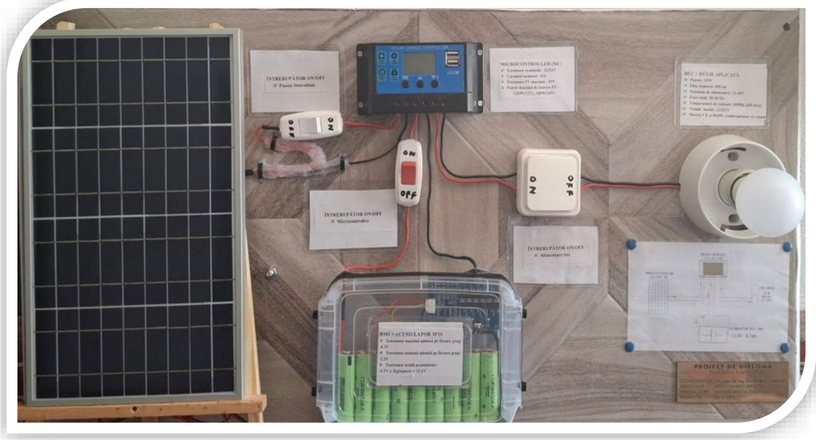


Analiza sistem solar - zi de toamnă



Analiza sistem solar - zi de iarnă





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ENVIRONMENTAL IMPACT ASSESSMENT RELATED BY ENERGY SECTOR IN ROVINARI MINING AREA

his paper was personally funded by the author below, in addition to the project being completely self - funded by the author

Patent/project number: DOI: 10.2478/minrv-2021-0017 Mining Revue ISSN-L 1220-2053 / ISSN 2247-8590 vol. 27, issue 2 / 2021, pp. 59-75

Author/s: **Crina-Adriana DRĂGĂNESCU**

Energy-related activities in this area are carried out by open pit mining activities in the context of Tismana, Roșia, Pinoasa, Peşteana and Rovinari locations and Rovinari thermal power plant. Some information that has formed the input for the author's approach has been provided by SC. Complexul Energetic Oltenia SA (CEO) and S.C. Institute of Scientific Research, Technological Engineering and Mine Designs on Lignite S.A. Craiova (ICSITPML) which has been processed, analysed and used for the presented environmental impact assessment. Two methods from specialized studies have been used for the impact assessment, namely: the Matrix Method for Rapid Impact Assessment (MERI) and the Method for Integrated Quantitative Impact and Risk Assessment of Environmental Pollution (EIRM). Based on the analysis carried out, it can be concluded that the activity in this sector does not lead to significant negative effects strictly associated with it.

A

Fig. no. 1. Location of the Rovinari Mining Basin

Fig. no. 2. The Rovinari Mining Basin

Fig. no. 3. Overview images of the Rovinari Thermal Power Plant (CET Rovinari)

ASSESSMENT USING THE INTEGRATED QUANTITATIVE METHOD FOR IMPACT AND POLLUTION RISK (EIRM)

TABLE NO. 1. CALCULATION OF ENVIRONMENTAL IMPACTS AND RISKS GENERATED BY THE ACTIVITY OF THE MINING BASIN

Component a de mediu	Indicatorul de calitate	CMA *1*	C_{det} *2*	Q *3*	UI *4*	IM *5*	P *6*	RM *7*
Solul Tabelul nr. III.2 (halde)	pH, unit. pH	6,5-8,5	7,13	1,05	233	**270**	0,95	**257**
	Arsen (As), mg/kg s.u.	5	4	1,25				
	Bariu (Ba), mg/kg s.u.	200	349	0,57				
	Cobalt (Co), mg/kg s.u.	15	5	3,00				
	Crom total (Cr), mg/kg s.u.	30	126	0,24				
	Cupru (Cu), mg/kg s.u.	20	2	10,00				
	Mangan (Mn), mg/kg s.u.	900	310	2,90				
	Nichel (Ni), mg/kg s.u.	20	16	1,25				
	Plumb (Pb), mg/kg s.u.	20	21	0,95				
	Vanadiu (V), mg/kg s.u.	50	101	0,50				
	Zinc (Zn), mg/kg s.u.	100	47	2,13				
	$(\Sigma 1/Q_i)/n$			**1,16**				
Aerul Tabelele nr. III.3 şi III.4	Monoxid de carbon, mg/m³	10	0,38	26,31	186	**203**	0.75	**152**
	Oxizi de azot (NO_x), mg/m³	200	26,11	7,66				
	Dioxid de sulf (SO_2), mg/m³	200	29,01	6,89				
	Pulberi (PM10) mg/m³	20	39,97	0,50				
	Plumb (Pb),	0,5	0,005	100,0				
	Arsen (As), ng/m³	6	2,028	2,96				
	Cadmiu (Cd), ng/m³	5	0,669	7,43				
	Nichel (Ni), ng/m³	20	2,001	10,00				
	$(\Sigma 1/Q_i)/n$			**1,09**				
Apa de suprafață Tabelul nr. III.6	pH(TºC=20,3), unit.pH	6,5-8,5	7,56	1,00	209	**224**	0,80	**179**
	Temperatura, ºC	35	13,5	2,59				
	Suspensii, mg/dm³	35	26	1,35				
	CBO_5, mgO_2/dm^3	25	2,24	11,16				
	CCO-Cr, mgO_2/dm^3	125	8,22	15,21				
	Reziduu filtrabil la 105º C	10	170	0,06				
	Cloruri, mg/dm³	500	11,40	3,86				
	Sulfați, mg/dm³	600	26.76	2,42				
	Amoniu, mg/dm³	0,32	<0,66	0,48				
	Produse petroliere, mg/dm³	10	<10	1,00				
	Calciu, mg/dm³	300	32,67	9,18				
	Substanțe extract. mg/dm³	20	<20	1,00				
	$(\Sigma 1/Q_i)/n$			**1,07**				
Apa subterană Tabelul nr. III.7	pH(TºC=20,3), unit pH	6,5-8,5	6,75	1,11	233	**101**	0,90	**91**
	CBO_5, mgO_2/dm^3	25	3,8	6,58				
	CCO-Cr, mgO_2/dm^3	125	11,4	10,96				
	Reziduu fix, mg/dm³	2000	514	3,89				
	Mangan (Mn), mg/dm³	1	0,053	18,87				
	Fier (Fe), mg/dm³	5	0,068	73,53				
	Sulfați, mg/dm³	600	6,67	89,96				
	Amoniu, mg/dm³	0,5	1,06	0,47				
	Plumb (Pb), mg/dm³	0,2	0,22	0,91				
	Crom total (Cr), mg/dm³	1	0,22	4,55				
	Calciu (Ca), mg/dm³	300	19,24	15,59				
	Magneziu (Mg), mg/dm³	100	11,67	8,57				
	$(\Sigma 1/Q_i)/n$			**0,43**				
Zgomotul Tabelul nr. III.9	Fronturile de lucru, dB(A)	87	88	0,99	139	**120**	0,70	**84**
	Incinta carierei, dB(A)	87	68	1,28				
	Limita incintei, dB(A)	65	56	1,16				
	Zona locuită proximă, dB(A)	50	39	1,28				
	$(\Sigma 1/Q_i)/n$			**0.86**				

TABLE NO. 2. CALCULATION OF ENVIRONMENTAL IMPACTS AND RISKS GENERATED BY THE ACTIVITY OF THE ROVINARI THERMAL POWER PLANT (CET ROVINARI)

Componenta de mediu	Indicatorul de calitate	CMA *1*	C_{det} *2*	Q *3*	UI *4*	IM *5*	P *6*	RM *7*
Solul Tabelul nr. III.10	pH, unit.pH	6,5-8,5	7,8	0,96	228	**347**	0,95	**329**
	Arsen, As, mg/kg s.u.	5	3,3	1,52				
	Bariu, Ba, mg/kg s.u.	200	365,8	0,55				
	Cobalt, Co, mg/kg s.u.	15	30,2	0,50				
	Crom total,Cr, mg/kg s.u.	30	78,6	0,38				
	Cupru,Cu, mg/kg s.u.	20	33,7	0,53				
	Mangan, Mn, mg/kg s.u.	900	719,2	1,25				
	Nichel, Ni, mg/kg s.u.	20	33,9	0,59				
	Plumb, Pb, mg/kg s.u.	20	39,3	0,51				
	Vanadiu, V, mg/kg s.u.	50	131	0,38				
	Cadmiu, Cd, mg/kg s.u.	1	1,1	0,91				
	Zinc, Zn, mg/kg s.u.	100	123,3	0,81				
	$(\Sigma 1/Q_i)/n$			**1,52**				
Aerul Tabelul nr. III.13	SO_2, mg/m³	200	200	1,00	287	**319**	0,95	**303**
	NO_x, mg/m³	200	185	1,08				
	Pulberi, mg/m³	20	28	0,71				
	$(\Sigma 1/Q_i)/n$			**1,11**				
Apa uzată Tabelul nr. III.14	pH, unit.pH	6,5-8,5	8,45	0,89	257	**853**	0,80	**683**
	Sulfați ( ), mg/dm³	600	161,8	3,71				
	Cloruri (Cl^-), mg/dm³	500	64,8	7,72				
	Calciu (Ca^{2+}), mg/dm³	300	145,8	2,06				
	Nitrați ( ),mg/dm³	10	3,67	2,72				
	CBO_5 , mgO_2/dm^3	25	18	1,39				
	CCO-Cr, mgO_2/dm^3	125	50	2,50				
	Azot amoniacal ( ),	0,72	3	0,24				
	Magneziu (Mg^{2+}), mg/dm³	100	52,54	1,90				
	Cupru (Cu^{2+}), mg/dm³	0,1	3,24	0,03				
	Seleniu (Se^{2+}), mg/dm³	0,1	0,4	0,25				
	Arsen (As^+), mg/dm³	0,1	0,1	1,00				
	Plumb (Pb^{2+}), mg/dm³	0,2	0,015	13,33				
	Mercur (Hg^{2+}), mg/dm³	0,05	0,1	0,50				
	Materii în suspensie (MS)	60	52,24	1,15				
	Reziduu filtrat la 105⁰,	2000	555,6	3,60				
	$(\Sigma 1/Q_i)/n$			**3,32**				
Zgomotul Tabelul nr. III.15	Incintă , dB(A)	87	75	1,16	228	**228**	0,75	**171**
	Limita incintei , dB(A)	65	60	1,08				
	Zona locuită, dB(A)	50	60	0,83				
	$(\Sigma 1/Q_i)/n$			**1,00**				

Based on the analysis carried out regarding the impact of the energy sector in the Rovinari basin, the following conclusions can be highlighted:

Soil quality is affected to varying degrees by pollution generated by different activities of the energy sector, but the environment is subject to the effects of human activities within acceptable limits, with minor risks that still need to be considered and monitored. Negative effects occur as a result of land degradation caused by the long-term removal of land from agricultural and/or forestry use, the main polluting activity being mining.

Air pollution caused by the energy sector is relatively low due to the new technologies and installations existing at the Rovinari Thermal Power Plant (CET Rovinari). The environment affected by energy activities remains within acceptable limits, with risks at an acceptable level.

The discharge of insufficiently treated or untreated wastewater is one of the main causes of pollution and degradation of **surface waters**. It can be observed that despite the large quantity of wastewater generated by the energy sector, the amount of water that required treatment was very small. Likewise, the quantity of untreated wastewater was very low. At present, however, there are significant risks, as the environment is subject to the effects of human activities that may endanger forms of life, with medium risks at an unacceptable level. Preventive and control measures are therefore necessary.

The natural regime of groundwater has undergone a series of quantitative and qualitative changes over time due both to its use as a source of drinking and industrial water supply, through the construction of hydraulic and hydro-ameliorative works, and to the action of polluting factors. The environment is subject to the effects of human activities within acceptable limits, with negligible or insignificant risks.

Noise does not create major problems for human health, although the main conveyor belts and desulfurization installations located near residential areas produce some discomfort for the population.

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A NOVEL BIOPOLYSACCHARIDE-BASED STRATEGY FOR MICROBIAL BIODEGRADATION OF PAHS IN CONTAMINATED SOILS

Ana Maria Rosu, Sid Ahmed Elhabiri, Dragoș-Alexandru Niță, Florin Nedeff, Ana-Maria Georgescu, Mirela Panainte-Lehăduș, Diana Mirilă

University "Vasile Alecsandri" of Bacău / Romania

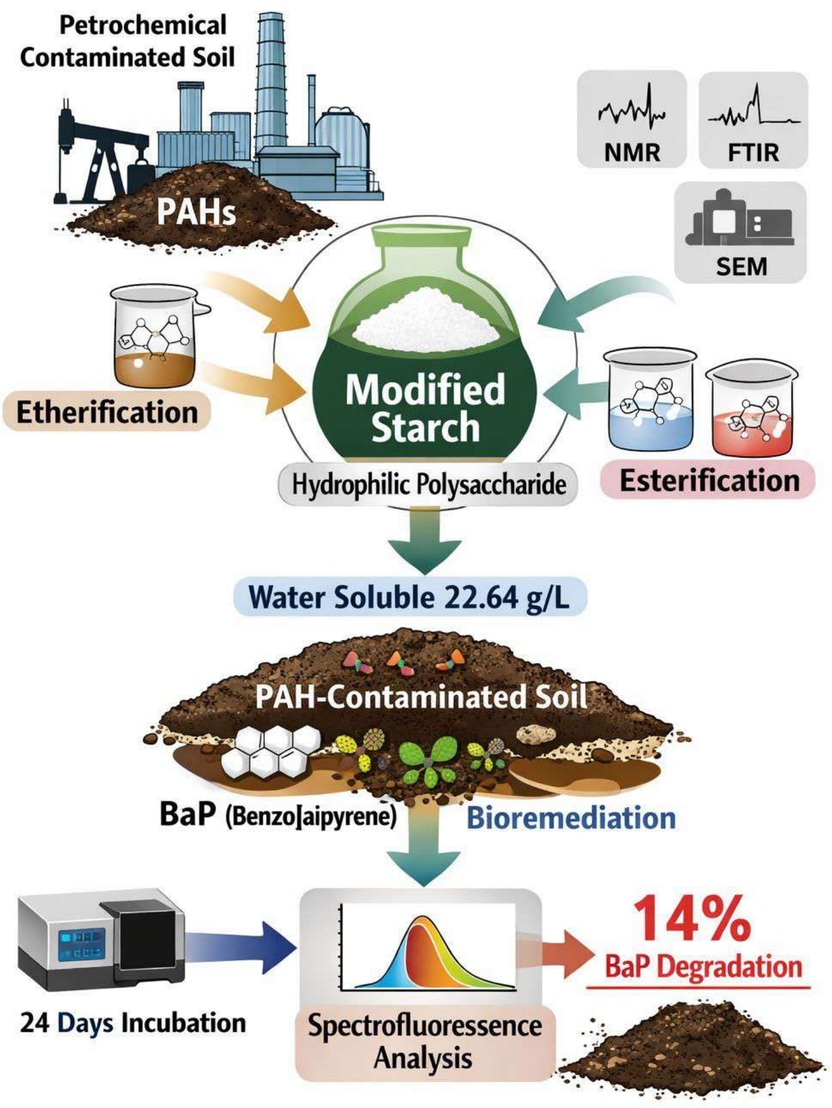
A

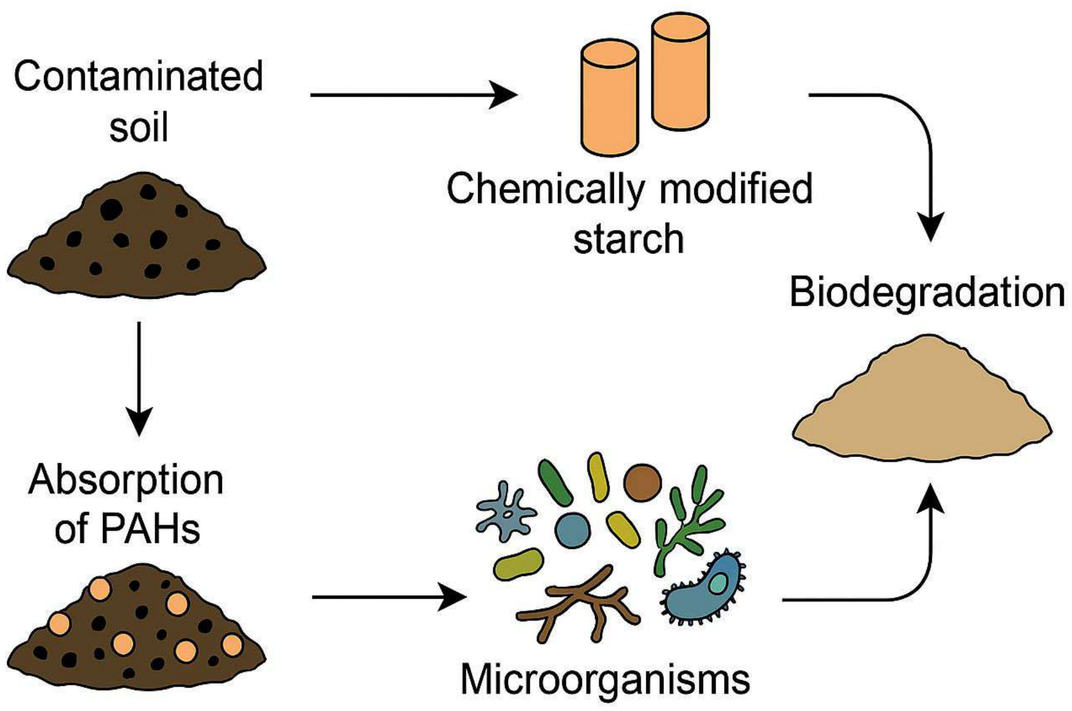
DESCRIPTION

The invention presents a novel bioremediation process for soils contaminated with polycyclic aromatic hydrocarbons (PAHs), using a chemically modified potato starch matrix. The modified starch derivatives, obtained through etherification and esterification and characterized by NMR, FTIR, and SEM, exhibit significantly enhanced hydrophilicity, with the most water soluble derivative reaching 22.64 g/L.

The innovative aspect of the system lies in employing chemically modified starch as both an absorbent substrate for hydrophobic PAHs and a nutrient source that stimulates indigenous microorganisms under mild, environmentally friendly conditions. By forming a hydrophilic polymer matrix that enhances PAH bioavailability, the method supports microbial degradation without resorting to harsh chemical oxidation processes traditionally used in soil remediation.

The remediation protocol involved applying a 1 cm layer of modified starch over PAH contaminated soil, hydrating it with controlled water inputs, and maintaining moisture conditions conducive to microbial activity. Indigenous fungal strains-ten isolates present in the soil contributed to biodegradation during a 24 day incubation period.





The results show that the proposed process enables direct, on site soil treatment using chemically modified polysaccharides and minimal water input, even under unfavorable weather conditions.

The method provides a sustainable alternative to conventional PAH remediation via chemical oxidants such as permanganate, ozone, persulfate, or Fenton reagents, which may introduce secondary environmental impacts. Furthermore, the starch based carrier system offers an environmentally benign pathway that supports microbial metabolism and facilitates pollutant degradation within a biodegradable, low toxicity matrix.

The process may be further optimized to increase degradation efficiency and broaden applicability to other hydrophobic contaminants.

Contact: Diana Mirilă, miriladiana@ub.ro

Opportunity
CORNELIUGROUP Research-Innovation Association
Creation
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INVENTCOR
Power of Creative Mind
Deva ROMANIA

BARILE

Hybrid Thermal Hub DX

A

Innovative Heating System - **Gold Medal Geneva**

Problem:

- Traditional heating systems are complex, expensive, and inefficient at low temperatures.

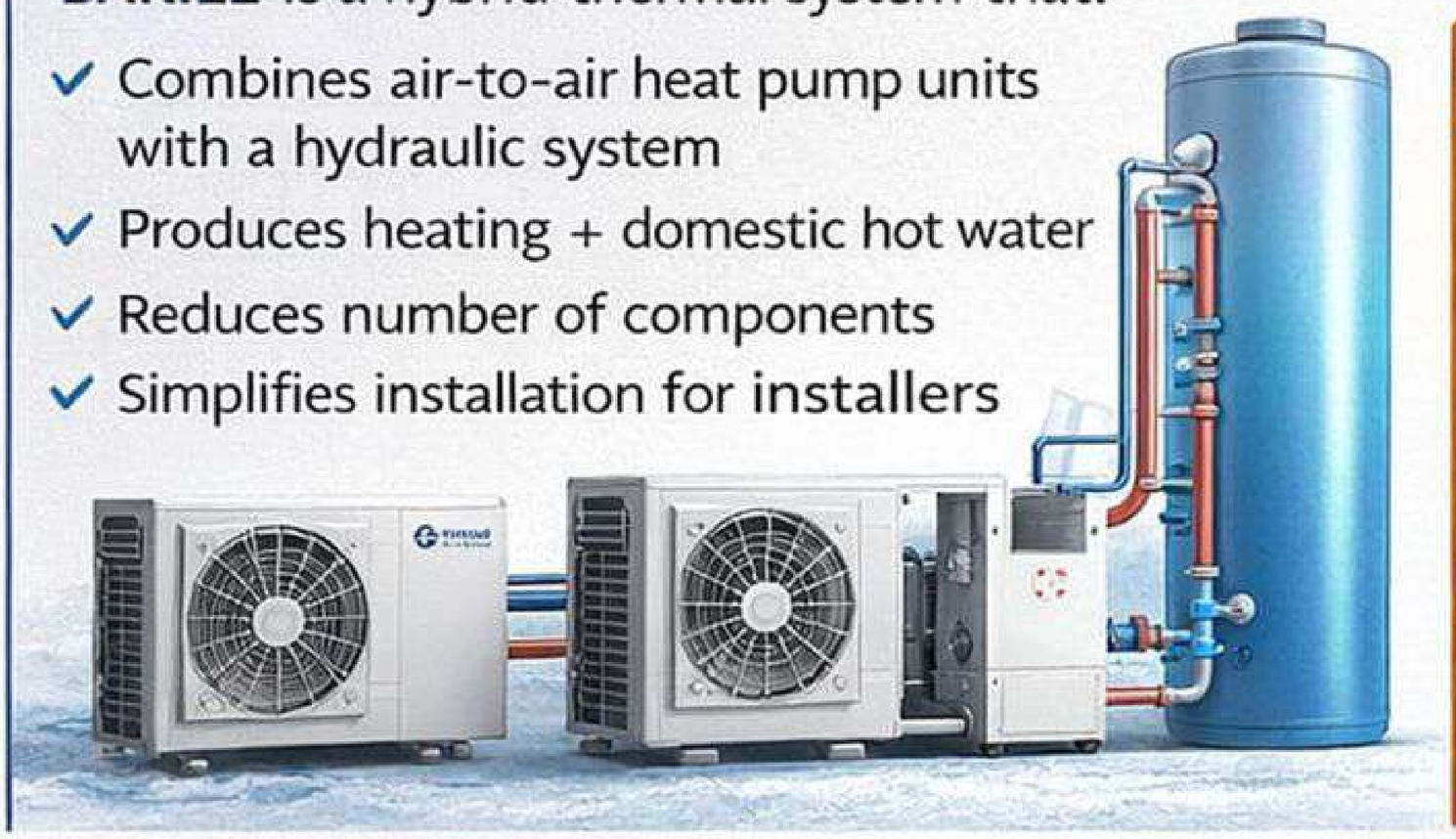
Solution:

- **BARILE** integrates direct expansion (DX) technology with a hydraulic buffer system
- Produces heating + domestic hot water
- Reduces number of components
- Simplifies installation for installers

What is BARILE?

BARILE is a hybrid thermal system that:

- ✓ Combines air-to-air heat pump units with a hydraulic system
- ✓ Produces heating + domestic hot water
- ✓ Reduces number of components
- ✓ Simplifies installation for installers



Solution:

- **BARILE** integrates direct expansion (DX) technology with a hydraulic buffer system, reducing complexity and incresing efficiency.

Advantages:

- ✓ Lower installation cost
- ✓ Fewer components (simplified system)
- ✓ High efficiency at low temperatures (–20°C to –30°C)
- ✓ Easy installation (plug & play concept)
- ✓ Scalable (1–3 outdoor units)
- ✓ Compatible with existing HVAC systems

Innovation:

- ✓ Direct expansion heat transfer into hydraulic buffer
- ✓ Smart control using temperature simulation (NTC control)
- ✓ Hybrid modular architecture
- ✓ Optimized for extreme climates

Applications:

- ✓ Residential heating
- ✓ Domestic hot water production
- ✓ Hybrid heating systems
- ✓ Retrofit systems (upgrade existing installations)

Award:

Gold Medal
International Exhibition of Inventions – Geneva

Inventor: **Ioan Stelian Bara**
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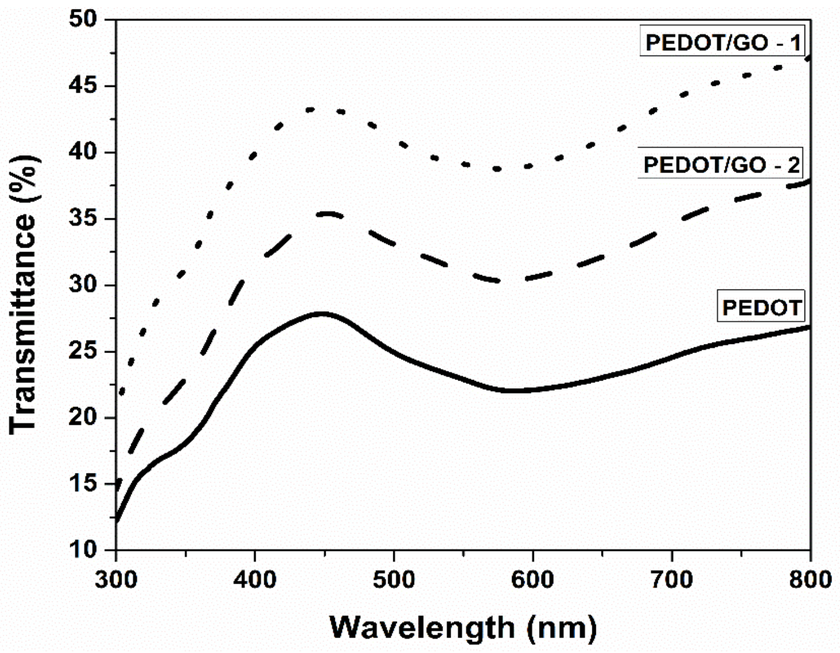
Sustainable counter electrodes based on PEDOT decorated with graphene oxide for dye-sensitized solar cells using artificial light

Project number: *PN 23 27 01 03*

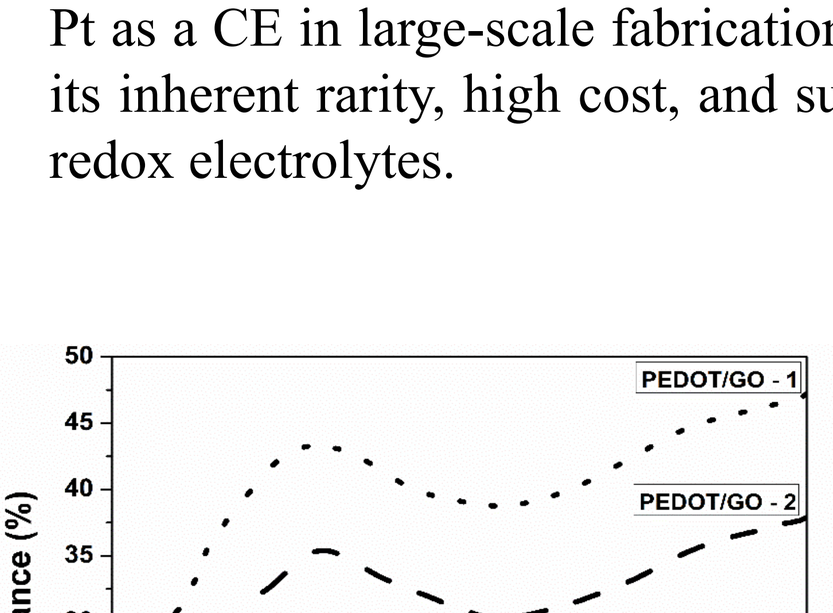
Ursu Daniel, Melinda Vajda, Marinela Miclau, Cristian Casut, Radu Banica, Bogdan Taranu*

A

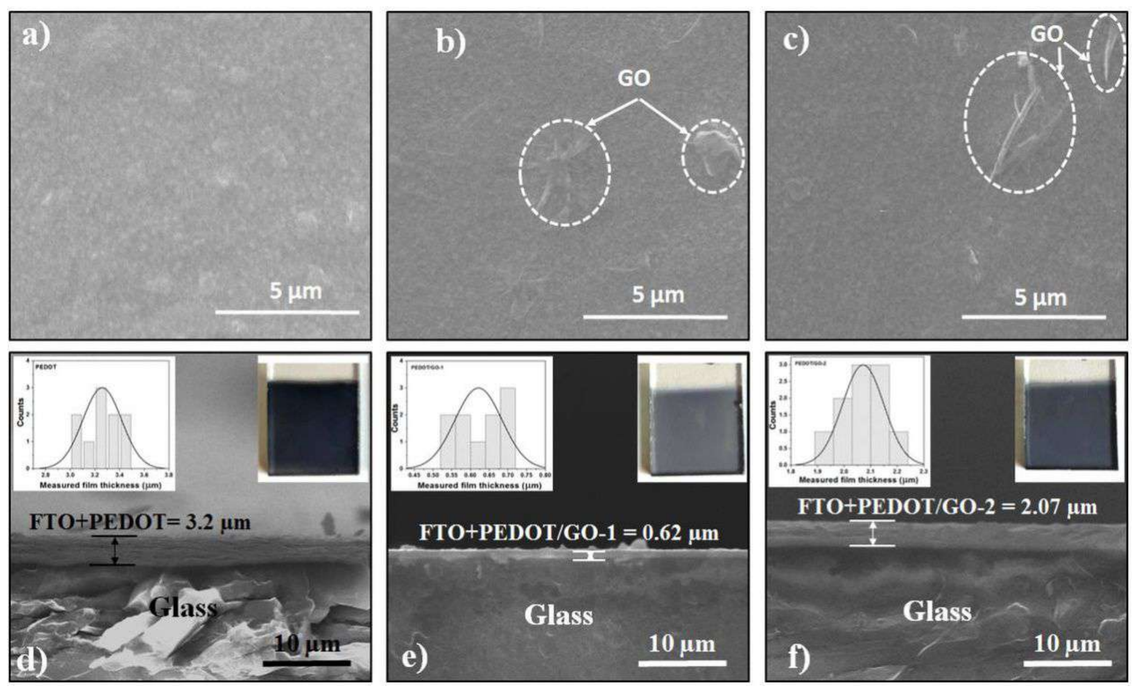
- With increase the standards of living for people due to the modernization population globally and rapid industrial transformations, lead to an explosion of Internet of things (IoT) devices, which have according to IoT Analytics already reached 14.4 billion devices. Dye-sensitized solar cells (DSSCs) are highly effective for indoor photovoltaics (IPV) due to superior performance under low-intensity (up to 34% under 1000 lux), ambient light compared to silicon, often powering IoT devices.
- The most indispensable components in DSSCs is the counter electrode (CE) which catalyzes the reduction of to after electron injection, influences the charge transfer resistance (Rct), and affects the fill factor (FF) and efficiency of solar cells.
- The invention relates to the process of obtaining sustainable CE based on PEDOT decorated with graphene oxide (GO) for DSSC using artificial light, avand o crestere a efficientei from 13.35% for PEDOT-based CE to 19.75% for PEDOT/GO-based CE under 2700K LED illumination
- Fabrication of PEDOT/GO-based CE overcomes the disadvantages of Pt-based CE, in that the use of Pt as a CE in large-scale fabrication and commercial application of DSSCs is significantly limited due to its inherent rarity, high cost, and susceptibility to decomposition into PtI_4 when exposed to iodine-based redox electrolytes.



Transmittance spectra of CE based on PEDOT, PEDOT/GO-1 and PEDOT/GO-2



The photovoltaic performances of DSSCs using CE based on PEDOT, PEDOT/GO-1 and PEDOT/GO-2 under 1000 lux



(a, b, c) SEM images of CEs based on PEDOT, PEDOT/GO-1, and PEDOT/GO-2 with high magnification shown in the insets; (d, e, f) SEM cross-sectional images with histograms displaying the thickness distribution, and images of the CEs included in the insets

I-V curves of DSSCs using CE based on PEDOT, PEDOT/GO-1 and PEDOT/GO -2 under 1000 lux illumination conditions using LED 2700 K

DSSC type	Light intensity	J_{SC} ($\mu A/cm^2$)	V_{OC} (mV)	FF (%)	η (%)
PEDOT	LED	174.3	461	49.8	13.35
PEDOT/GO - 1	2700 K	175.8	491	68.6	19.75
PEDOT/GO - 2	1000lux	164.4	491	66.4	17.88

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MINISTERUL EDUCAȚIEI ȘI CERCETĂRII

Wild Watch: Discovering Nature Through Camera Eyes

Student Project
Author/s: Friendship Team
Șoimuș Secondary School

A

Wild Watch is an educational project designed for 5th grade students that combines science, environmental awareness, teamwork, and digital skills. The project involves installing and monitoring two wildlife observation cameras in a natural area near the school to study local wild animals and their behavior.
Students begin by learning about local species such as deer, foxes, wild boars, birds, and hedgehogs. They explore animal habitats, behavior patterns, and the importance of protecting nature. Working in teams—Research, Technical, Observation, and Presentation—they take on active roles as young scientists.

Two motion-activated cameras are placed in carefully selected locations, such as a forest edge and a meadow or water source. The cameras capture photos and short videos day and night without disturbing wildlife. Each week, students review the recordings, identify species, analyze activity patterns, and document their findings in a Wildlife Journal.
Through observation and analysis, students create charts, reports, species posters, and even a “Local Wildlife Guide.” The project may also include a school exhibition and discussions with environmental specialists.

What Students Gain:
Knowledge of local wildlife and ecosystems, scientific observation and data collection skills, digital and technical experience, critical thinking and teamwork abilities, a deeper respect for nature and biodiversity.

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MINISTERUL EDUCAȚIEI ŞI CERCETĂRII

Wildlife Bridges: Safe Paths Above and Across

A

Student Project
Author/s: Friendship Team, Șoimuș Secondary School

Wildlife Bridges: Safe Paths Above and Across is an innovative educational project designed for 5th grade students. The project focuses on helping squirrels move safely between habitats by designing special bridges over roads and small rivers. It combines science, environmental protection, engineering thinking, and teamwork.

Students begin by studying local squirrel species, habitat fragmentation, and the risks animals face when crossing roads or waterways. Working in teams (Research, Design, Safety, and Presentation), they explore real examples of wildlife crossings and develop their own solutions.

The project includes designing two types of bridges:

- A rope or wooden canopy bridge installed between trees over a road.
- A lightweight suspended bridge connecting trees across a river or stream.

Students create small-scale models using recycled materials, draw technical sketches, test stability, and analyze safety and environmental impact. They also study squirrel behavior, identify high-risk crossing areas, and propose practical solutions to reduce danger.

Through awareness campaigns, reports, exhibitions, and possible collaboration with local specialists, students learn how infrastructure can become more wildlife-friendly.

What Students Gain:

Understanding ecosystems and habitat connectivity
Basic engineering and design skills
Critical thinking and problem-solving abilities
Environmental responsibility and empathy
Teamwork and communication skills

Currently in the concept stage, the project has established its educational framework and design ideas.

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COPPER-ZINC ALLOY SCRAPS VALORIZATION IN DUAL ELECTROCHEMICAL SYSTEM FOR WASTEWATER TREATMENT AND H_2 GENERATION

"Innovative Technological Approaches to Circularity and Urban–Industrial Symbiosis within the Water–Energy–Materials–Fertilizers Nexus (ECO NEXUS)", Smart Growth, Digitization and Financial Instruments Program, 2021-2027, MySMIS no. 336912

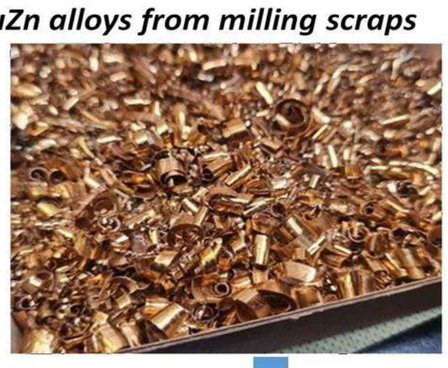
A

Authors: Florica Manea, Sorina Ilies, Mircea Nicolaescu, Corina Orha, Larisa Ivașcu

Description: This study is part of the activity regarding waste recovery in the development of innovative materials for water decontamination application using electrochemical systems. Cu-Zn alloy scraps wastes were considered for designing an innovative cathod in electrochemical system for wastewater treatment, considering simultaneous H_2 generation. In general, Cu-Zn alloys (brass) exhibit catalytic properties that cannot be achieved by using Cu or Zn alone. Alloying modifies the density of electronic states and adsorption energies of key intermediates, facilitating electrochemical hydrogen generation. However, partial dissolution or redistribution of Zn under reductive conditions further contributes to increasing the surface porosity and exposure of active sites, enhancing catalytic efficiency. Beyond their role in independent hydrogen-evolution processes, Cu–Zn alloys exhibit significant potential within integrated water–energy systems, where electrocatalytic hydrogen generation is directly coupled with water and wastewater treatment operations through electrochemical system.

Morpho-structural and electrochemical characterization

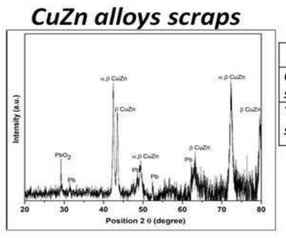
CuZn alloys from milling scraps



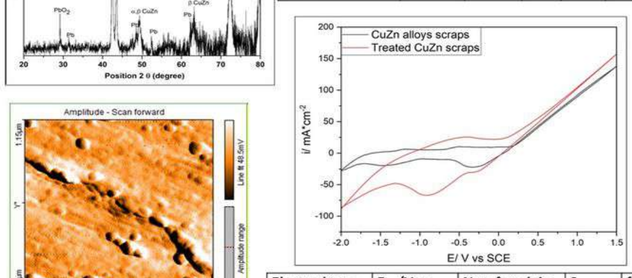
Chemical treatment 25°C/1h

Treated CuZn scraps

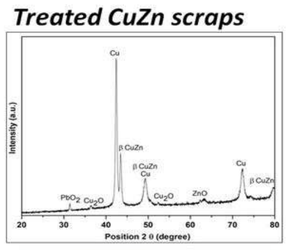
CuZn alloys scraps

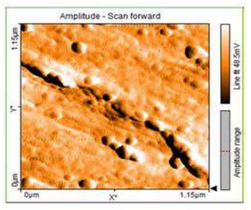


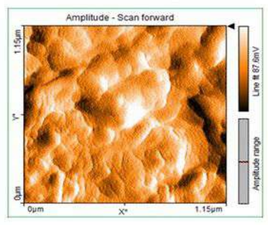
	αCuZn	βCuZn	Pb	Cu	Cu_2O
CuZn alloys scraps	30	68%	2%	-	-
Treated CuZn scraps	-	16%	-	58%	26%



Treated CuZn scraps

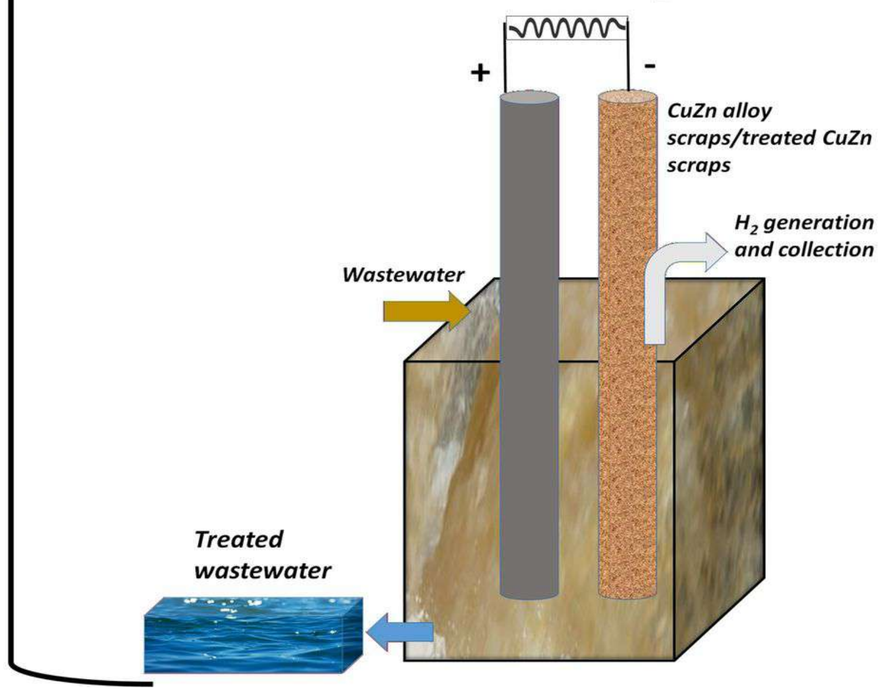






Electrod type	E_{H_2}/V vs SCE	Non-faradaic potential , E/ V vs SCE	$S_{electroactive}$/ cm^2	f_R
CuZn alloys scraps	-1.73	-1.0	0.53	7.50
Treated CuZn scraps	-1.30	-1.0	1.28	18.12

Application in dual electrochemical system for wastewater treatment and H_2 generation



Results: XRD rezults of CuZn revealed the presence of Cu, CuZn, Cu_2O (Cuprous oxide), CuO (Copper oxide), ZnO, PbO. By chemical treatment, a Cu_2O/CuO/ZnO/PbO mixed oxides system was generated that provides enhanced electroactive surface and lower overpotential for H_2 generation, showing a very promising cathod composition integrated within the electrochemical wastewater treatment.

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LOGISTIC SUPPORT CONTAINER MOBILE POWER PLANT FOR EMERGENCY

Author/s: Popescu Emil, Stroe Danut, Guiman Daniela, Jurba Mihai

Category: A

***MOBILE POWER PLANT FOR EMERGENCY** with a power of 500 kVA is designed to be used in emergency situations.*

The product is designed in a versatile, independent version with a whole range of distinct applications from : industry , telecom, oil&gas , emergency situation and can work as island power plant, back up , peak load for national grid etc.

Logistic Support Container allows the installation of a wide range of generator groups chosen and sized according to the energy supply needs of th evarious facilities.

It contains the fuel tank for a long time operation, command and control panel, cables and distribution boxes which can be used in various configurations.

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MINISTRY OF EDUCATION AND RESEARCH OF THE REPUBLIC OF MOLDOVA
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NATIONAL PUBLIC HEALTH AGENCY
NATIONAL RESEARCH AND DEVELOPMENT INSTITUTE FOR NUCLEAR PHYSICS AND ENGINEERING "HORIA HULUBEI" – IFIN-HH

RHIZOPUS STOLONIFER FUNGI STRAIN FOR BIODEGRADATION OF COBALT AND NICKEL COMPOUNDS

CORETCHI Liuba, PLAVAN Irina, Bahnarel Ion

A

REPUBLICA MOLDOVA
Agenția de Stat pentru Proprietatea Intelectuală

BREVET DE INVENȚIE

Nr. 4486

Eliberat în temeiul Legii nr. 50/2008 privind protecția invențiilor

Titlul: Tulpină de fungi *Rhizopus stolonifer* pentru biodegradarea compușilor cobaltului și nichelului

Titular: CENTRUL NAȚIONAL DE SĂNĂTATE PUBLICĂ AL MINISTERULUI SĂNĂTĂȚII AL REPUBLICII MOLDOVA, MD

Data depozit: 2016.01.21

Descrierea invenției, revendicările și desenele constituie parte integrantă a prezentului brevet de invenție

Director General

CHIȘINĂU

Patent no. 4486

The invention relates to Biotechnology and Environmental protection. The novelty consists in developing a new biotechnological process to reduce the risk of environmental pollution, based on the use of non-pathogenic microorganisms. It is proposed **fungi *Rhizopus stolonifer* 67 CNMN-FD18**, which possesses the biodegradation of toxic compounds (cobalt and nickel) in the soil.

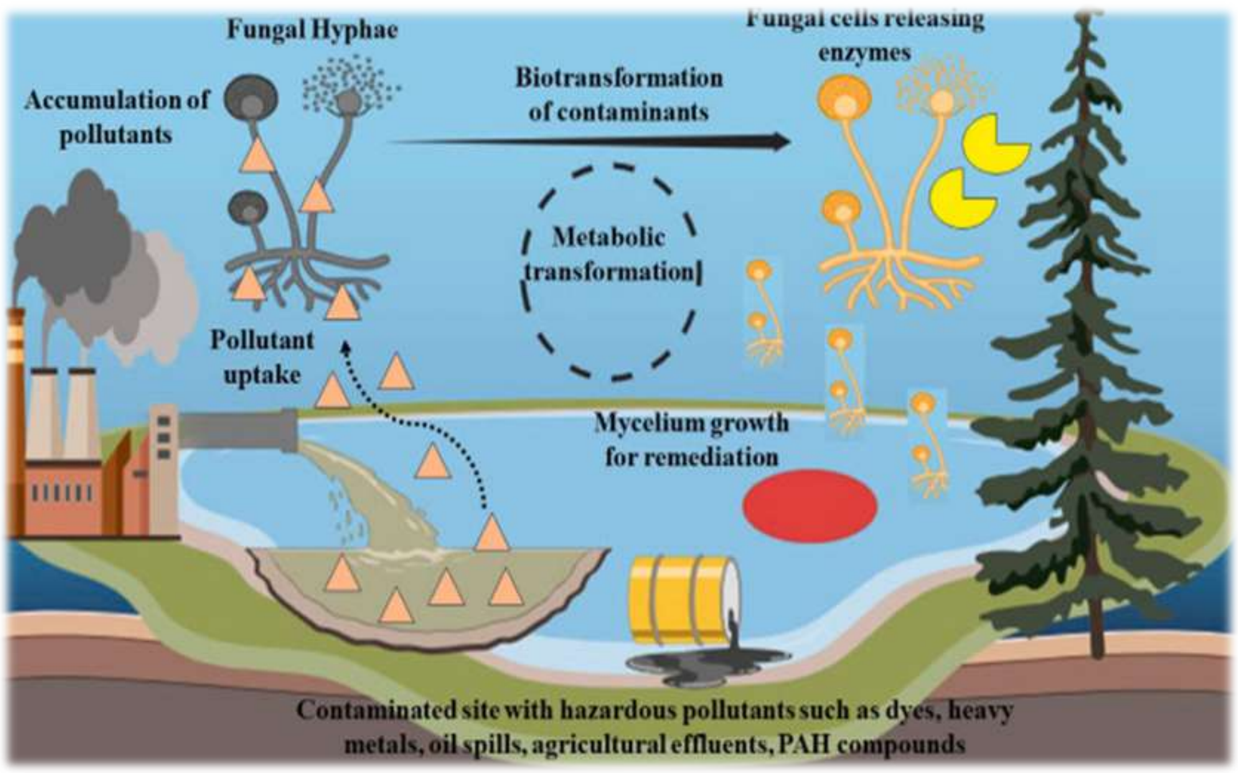
The problem of the invention consists in increasing the efficiency of biodegradation of cobalt and nickel compounds in the soil. The invention solves the problem by proposing the fungal strain ***Rhizopus stolonifer CNMN-FD-18*** for the biodegradation of cobalt and nickel compounds, namely cobalt phosphate and nickel nitrate.

The strain ***Rhizopus stolonifer CNMN-FD-18*** synthesizes extracellular proteolytic enzymes, organic acids, which contribute to the biodegradation of heavy metal compounds, for example cobalt phosphate and nickel nitrate with their transformation into hydroxides, oxides or other compounds with low solubilization, expressed by the formation of the solubilization zone around the strain colony under laboratory conditions and established by changing the color of the medium, in the case of cobalt phosphate from pink to colorless, and in the case of nickel nitrate from white to transparent.

The biodegradation of cobalt phosphate and nickel nitrate occurs under the action of organic acids produced by the ***Rhizopus stolonifer strain CNMN-FD-18*** with subsequent reprecipitation in the form of oxalates, which present organic compounds and are further biodegraded by associated microorganisms, spread in contaminated areas.

The isolation of the fungal strain was carried out from the soils of the Republic of Moldova.

Applications: *Environment – ecology, ecological management, environmental protection and monitoring*



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MINISTRY OF EDUCATION AND RESEARCH OF THE REPUBLIC OF MOLDOVA
MINISTRY OF HEALTH OF THE REPUBLIC OF MOLDOVA
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NATIONAL RESEARCH AND DEVELOPMENT INSTITUTE FOR
NUCLEAR PHYSICS AND ENGINEERING "HORIA HULUBEI" – IFIN-HH

Determination of radon concentrations in the air inside buildings (homes, workplaces), soil and water

CORETCHI Liuba, ABABII Aurelia, APOSTOL Ion, ROMANCIUC Parascovia, BAHNAREL Ion, BOGDAN Marina, ȘARGU Valentin, CAPAȚÎNA Angela, RĂDULESCU Ileana, CALIN Romeo, LINCA Bianca, BORSOS Andrei

A

The research is supported by the Ministry of Health and the Ministry of Education and Research of the Republic of Moldova in the framework of the sub-project *"Monitoring the ionizing radiation exposure to the professionally exposed personnel and the public with the development of radioprotection measures" (2024-2027)*, no. 13.01.02 and the Bilateral project with Romania 2024-2026 *„Increasing the digital capacity of data flow between Romania and the Republic of Moldova regarding the monitoring of soil radioactivity and radon",* Project code: PN-IV-P8-8.3-ROMD-2023-0241.

According to the EURATOM Directive No. 2013/59/ each country develops a national plan for the control of radon exposure, which stipulates the reference level of radon and the measures (actions) to be taken in case these values are exceeded. The requirements for measuring the concentration of radon activity in the air in homes, at workplaces, in soil and water are carried out in accordance with the elaborations of national (ANSP) and international bodies (IAEA, WHO, EU (Joint Research Center).

In this regard, it is necessary to know and implement several activities that are described in the paper:

- methods for measuring radon concentration in rooms and the main environmental factors;
- requirements for measuring radon activity concentration in workplaces;
- requirements for placing radon detectors;
- principles of radon measuring in homes and factors that influence the radon concentration when exhaled from the soil;
- recruitment of participants;
- communication with potential study participants;
- conducting an investigation into indoor radon levels;
- distribution and collection of detectors.

The paper is intended for laboratories that monitor radon in indoor air (homes and workplaces), water and soil. Methods and equipment for detecting radon concentrations in indoor air (homes and workplaces), water and soil are presented. The methodology for rapid detection of the named radioactive gas is proposed, as well as modern technologies for reducing the population's exposure to the health risk caused by radon.

- ✓ National radon measurement laboratories are accredited at the national level by the regulatory body for nuclear and radiological activities and develop methods for measuring radon concentrations in accordance with the national law in the field, the requirements of the EURATOM Directive 2014/53 and the WHO.
- ✓ Specialists in the field from the Ministry of Health, the Ministry of Environment, the Ministry of Infrastructure and Regional Development (Office of Territorial Development, Urbanism, Construction and Housing) will map radon concentrations based on the measurement results obtained in the national laboratory to identify localities with increased risk of exposure to radon are identified.

Certificate of registration of the object of copyright or related rights Serial OȘ no. 8118 of 11.02.2025 issued by State Agency for Intellectual Property of the Republic of Moldova

RadonEye Plus2

AlphaGUARD

MARKUS 10

Contact: liuba.koretski@ansp.gov.md

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National Agency for Public Health webpage:
https://ansp.md/control_radon/

FaceBook page:
https://www.facebook.com/profile.php?d=100082203806764

OCCUPATIONAL HEALTH AND SAFETY STUDY FOR THE WORK ENVIRONMENT OF AN EQUIPMENT DISTRIBUTION OPERATOR

A

Scientific Research Project

Authors: **Oana Roxana CHIVU, Claudia BORDA, Marilena GHEORGHE**

DESCRIPTION

The study presents the occupational risks within SC AC BONT TOOLS SRL, a company specialized in the distribution of industrial equipment.
The main hazards associated with the activity are identified, such as handling heavy equipment, ergonomic risks, exposure to chemicals and transport safety.
Solutions are proposed for the findings, creating work safety, highlighting the importance of periodic training, equipment modernization and optimization.

THE PROPOSED SOLUTION

- IDENTIFICATION AND REDUCTIONMOF OCCUPATIONAL RISKS
- OPTIMIZATION OF WORK PROCESSES
- IMPROVEMENT OF LEGAL COMPLIANCE
- INCREASE IN EMPLOYEE SATISFACTION AND PRODUCTIVITY

RESULTS AND DISCUSSIONS:

The conclusions of this study highlighted that SC AC BONT TOOLS SRL had a solid infrastructure in terms of occupational health and safety, but the challenges identified imposed the need for a proactive approach and strategies to optimize internal processes.

In addition, the analysis showed that implementing modern ergonomic solutions could have significantly contributed to reducing musculoskeletal disorders associated with repetitive activities or prolonged work positions. In this regard, the company was recommended to invest in adjustable furniture, anti-fatigue mats and auxiliary equipment that would help evenly distribute weight during cargo handling.
Thus, it was concluded that occupational health and safety were not only legal obligations for SC AC BONT TOOLS SRL, but also essential factors in ensuring an efficient and sustainable activity in the long term. Through a proactive approach and by implementing continuous improvement strategies, the company could have significantly reduced the risks associated with the activity carried out and would have contributed to the general well-being of its employees.

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Internal

Environmentally friendly recovery of use vegetable oil

Student project

Authors: **Ariana SÂRBU, Alexandru RUSU, Raluca PLĂINICEANU**

Coordinator: **Ioana FĂRCEAN, Laura STRUGARIU**

A

Used vegetable oil recovery is the process by which this waste is collected, treated and transformed into reusable products, reducing the negative impact on the environment. The stages in the process of used vegetable oil recovery are: collection and storage, filtration and purification, transformation and reuse. The recovery of waste vegetable oil has a significant impact on environmental protection, circular economy and energy sustainability, offering solutions to reduce pollution and use resources more efficiently.

This project presents the application of the cold process method for the transformation and valorization of used vegetable oil into homemade soap. A method based on the saponification reaction, in which oils or fats (usually vegetable oils) react with a strong base (sodium hydroxide) to produce soap and glycerin. In addition to this method, we note that soap can also be made using the hot process, which is accelerated by heat, or through reprocessing, which revitalizes old soap. For the practical, there is the melt and pour method, and in the world of mass production, the industrial method reigns supreme with its repetitive perfection.

Experimental aspects during the process of waste oil recovery

During the experiments, various recipes were tested by adjusting the specific quantities of the main components (used oil, NaOH, and glycerin). The recipe quantities were accurately calculated using specialized platforms that ensure precise measurements (e.g., SoapCalc and Savvy Homemade Soap Calculator). Accurate quantity calculation is essential in the recovery process, as an excess of sodium hydroxide can produce an overly alkaline, irritating soap that is unsuitable for use. In the recipes we incorporated essential oils (vanilla, pine, lavender, rose) for their aromatic and therapeutic benefits, along with non-toxic colorants to improve aesthetics while maintaining skin safety.

Final by-product obtained after 3 days

Thus, through this student project we want to contribute to raising awareness on the reuse of used vegetable oil by applying a simple method of recovery that can be carried out in the comfort of your home and has beneficial results on the environment

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COMPOSITE MATERIAL FOR DENTAL RESTORATION BASED ON METAL OXIDE NANOPARTICLES AND PHOSPHATE MATERIAL WITH IMPROVED ANTIMICROBIAL PROPERTIES AND METHOD OF OBTAINING IT

B

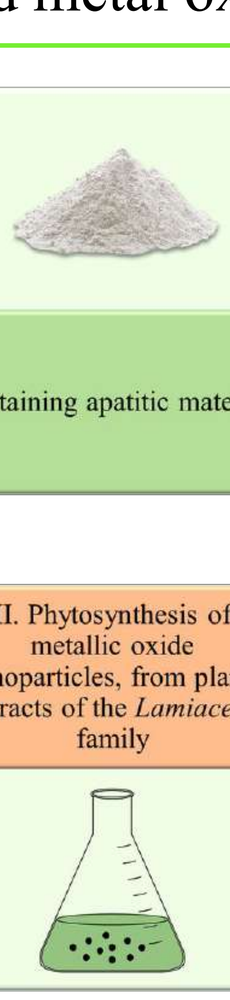
Patent/project number: A00727/2024

Radu Claudiu Fierascu, Roxana Ioana Brazdis (Matei), Irina Fierascu, Toma Fistos, Anda Maria Baroi, Lia Mara Ditu

The present invention relates to a composite material with improved antimicrobial properties, compared to the base material (glass ionomer cement) without negatively affecting the physical and mechanical properties, intended for use in dental applications, consisting of the solid phase - aluminofluorosilicate glass with particle size below 25 μm and a material with strong antimicrobial character, namely phosphate material of the hydroxyapatite type in which calcium is substituted with copper or zinc (in ratios Ca : substituted metal 1..5:0..4) previously decorated with phytosynthesized metal oxide nanoparticles using plant extracts from the *Lamiaceae* family.

The process of obtaining the composite material consists of 5 steps

I. Otaining apatitic material



II. Phytosynthesis of metallic oxide nanoparticles, from plants extracts of the *Lamiaceae* family

III. Decoration of apatitic material with metal oxide nanoparticle solutions

IV. Mixing with aluminofluorosilicate

V. The liquid component of the glass ionomer cement is added

Obtaining obturation material, intended for use in the direct restoration of dental cavities

ADVANTAGES OF THE INVENTION

- Obtained by known processes, without requiring high production costs
- Does not use reagents hazardous for the environment or human health for synthesis
- Has superior antimicrobial properties
- Has mechanical properties (compressive strength) similar to or superior to the unimproved material
- Reproducible – considering the physical-structural properties
- Has the potential to increase the lifespan of dental treatments, through the presence of superior antimicrobial effect and improved mechanical properties.

ACKNOWLEDGEMENTS

This work was supported by the Ministry of Research, Innovation and Digitization, CCCDI—UEFISCDI, project number PN-III-P4-PCE-2021-0292, within PNCDI III.

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BLACK SOLAR

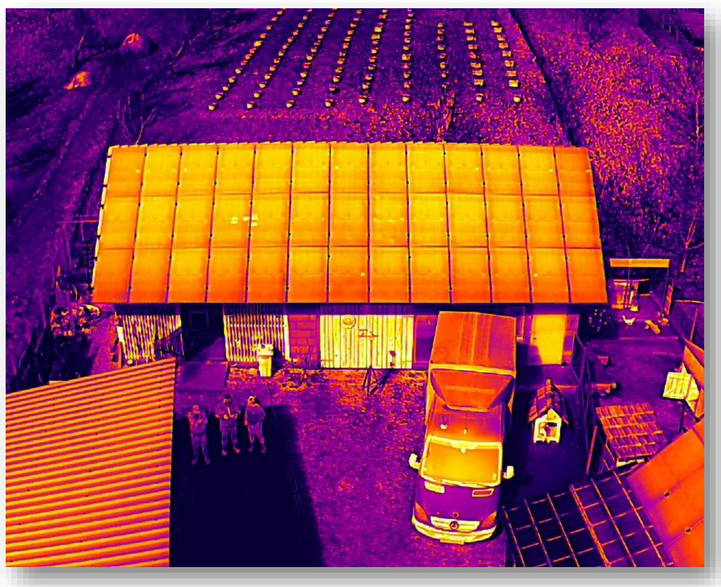
INNOVATIVE GREEN ENERGY SOLUTIONS FOR A HEALTIER FUTURE

Green Energy Project

Authors: Razvan MARCUS, Nicoleta MARCUS

Black Solar is dedicated to pioneering the future of renewable energy through cutting-edge technology and innovation. Our mission is to harness the power of advanced technologies, including drone thermal imaging and 3D scanning, to provide our clients with the most efficient, reliable, and sustainable energy solutions available.

By integrating these innovative tools into our services, we aim to optimize energy consumption, reduce environmental impact, and lead the transition towards a more sustainable and energy-efficient world. Our commitment to excellence and innovation drives us to continuously explore new horizons in renewable energy, ensuring that we offer the best solutions that meet and exceed the evolving needs of our clients and the planet. We strive to lead by example in the transition towards a greener planet, ensuring reliability, efficiency, and excellence in all our projects.



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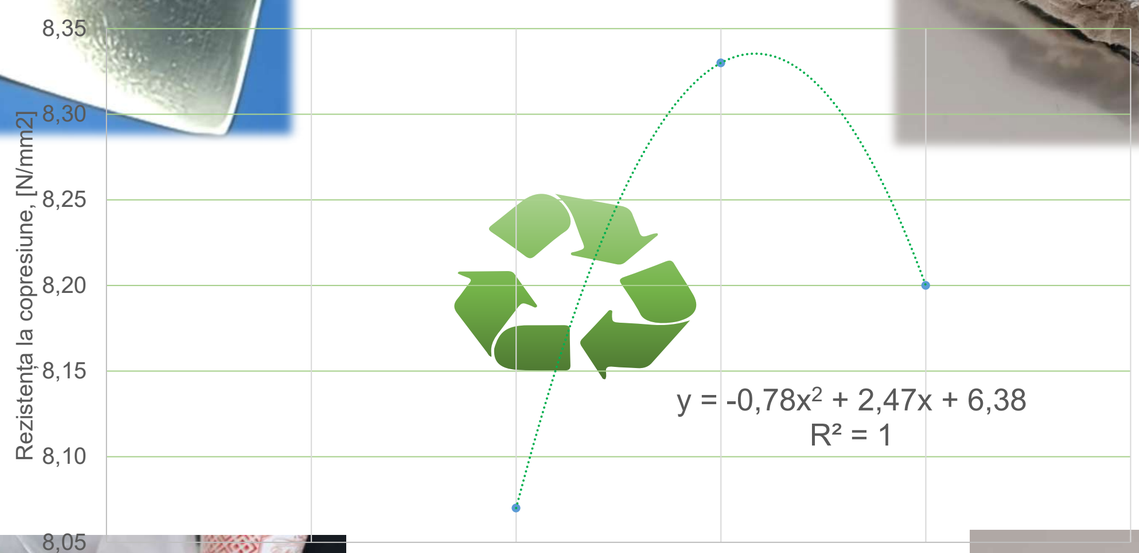
PRACTICAL SOLUTIONS FOR INCORPORATING LOW-VALUE PLASTICS INTO BUILDING SYSTEMS

Student Project
Author: Andreea-Ioana CIURAR

A

In the context of the circular economy, practical and economical solutions are being explored for the reuse of plastics as a potential material. The valorization of plastics in construction is based on several practical applications with potential for development in the transition to the green economy.



The experimental determinations examine: bricks made from molten plastic and sand as a low-cost construction material; PET fibres used as reinforcement in concrete/cement structures; galvanization of plastic for decorative chrome-type finishes; and RPET synthetic fibres as a thermal insulation material in temporary construction.

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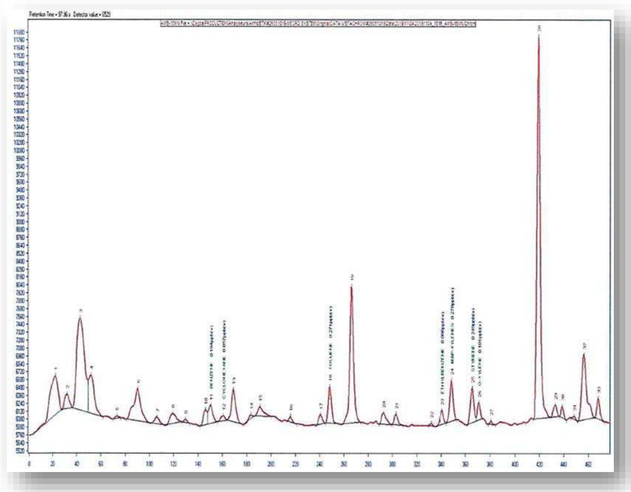
FIELD METHOD FOR ASSESSING THE IMPACT OF VOLATILE ORGANIC COMPOUNDS ON HUMAN HEALTH

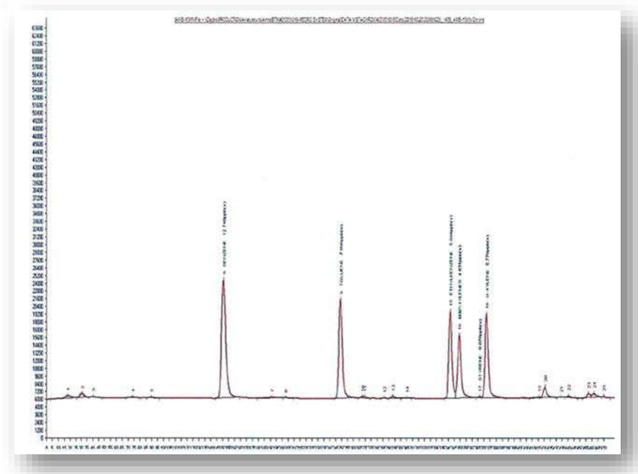
Patent/project number: CBI A 2022 00606

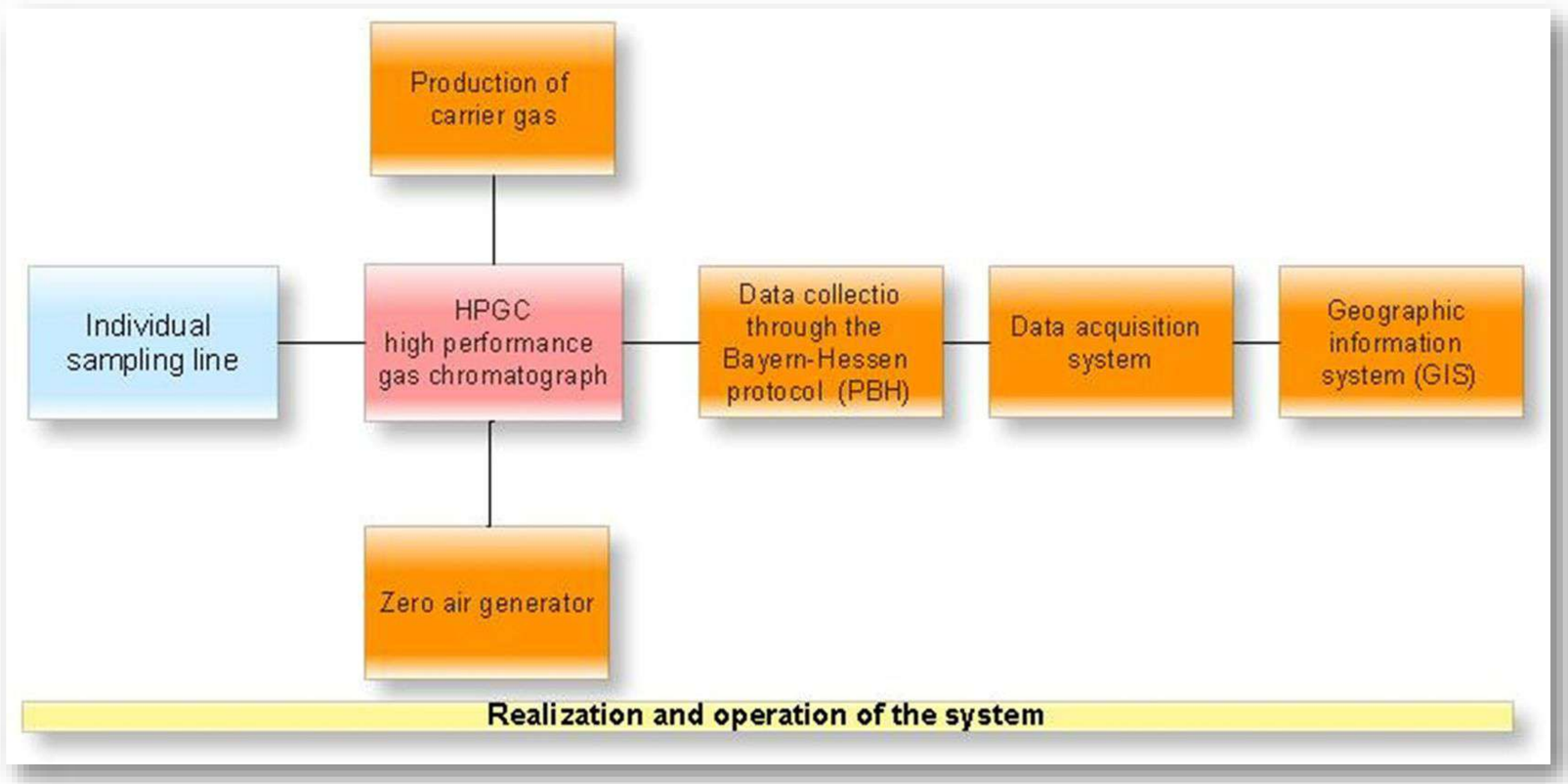
Authors: Găman Angelica Nicoleta, *Găman George Artur, Ghicioi Emilian, Pupazan Daniel, Toth Lorand, Prodan Maria, Kovacs Marius, Simion Sorin, Simion Alexandru, Șuvar Niculina Sonia*

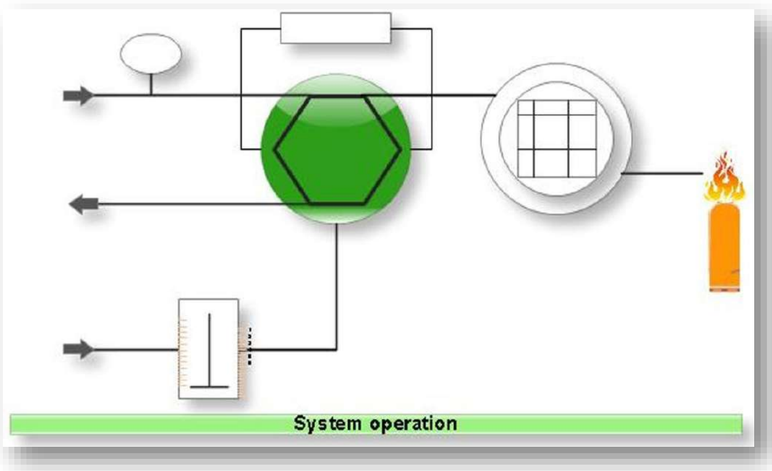
A

The mobile real-time measurement system of volatile organic compounds (BTEX) consists of applying a method to determine the concentration of benzene and organic compounds (BTEX) in the surrounding environment (emissions) using high-performance gas chromatography with FID detector in ambient air from areas classified as rural and urban zones, traffic locations, and locations influenced by industrial sources, through a mobile unit that allows continuous measurements during movement.









Understanding the concentrations of volatile organic compounds in a triaxial system of coordinates (concentrations / space / time) makes it possible to characterize / quantify the impact generated by BTEX pollutants on human health by measuring the pollution level, managing / processing data, and integrating them into an active mapping system using GIS computational environment.

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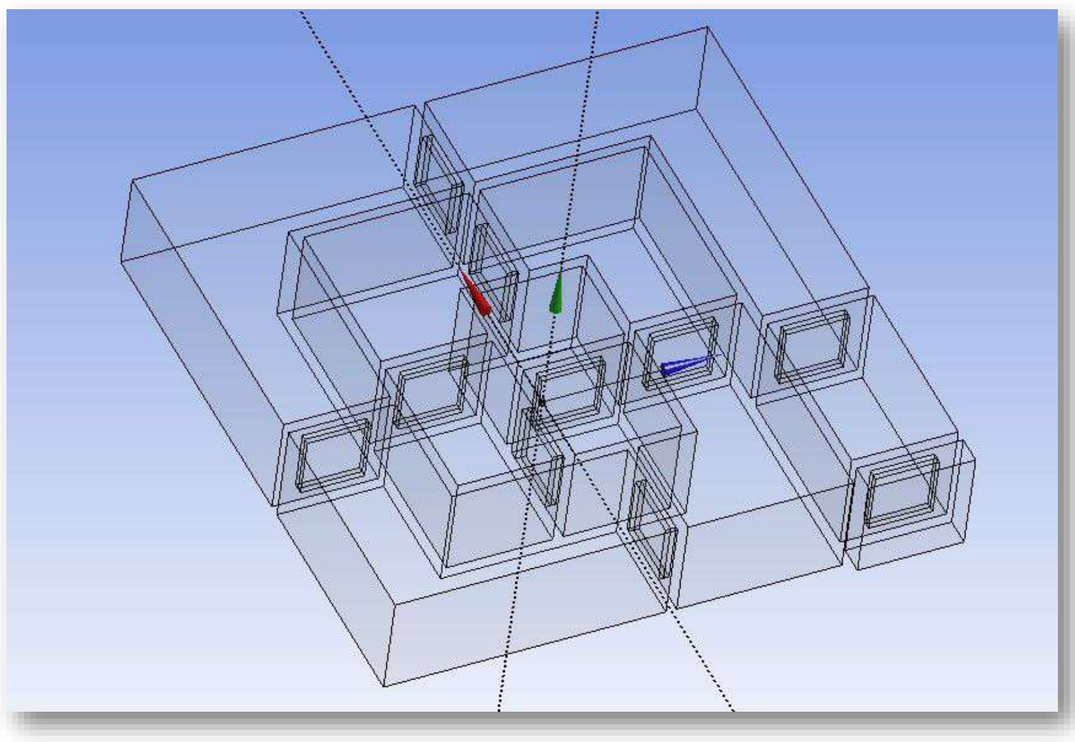
STAND FOR DETERMINING PRESSURE VARIATIONS WHEN CHANGING THE DIRECTION OF PROPAGATION OF GASEOUS EXPLOSIONS IN INTERCONNECTED SPACES.

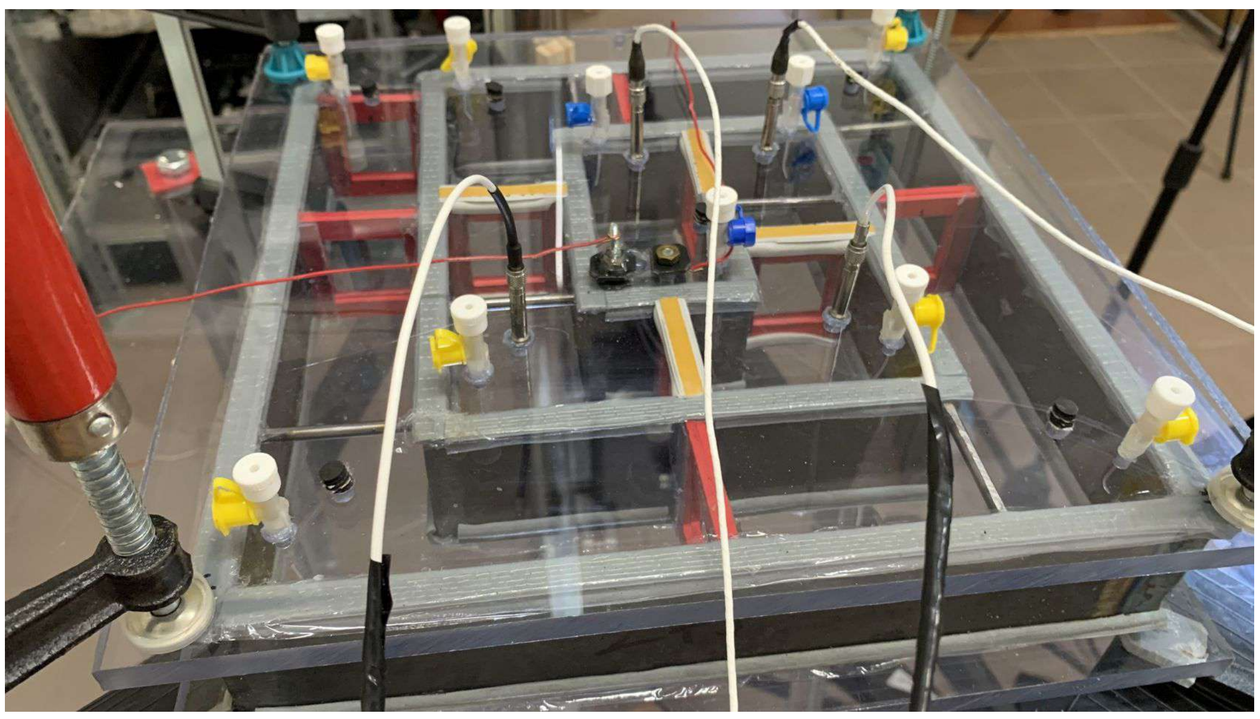
Patent/project number: CBI A 2022 00705

Author/s: Vlasin Nicolae Ioan, *Găman George Artur, Ghicioi Emilian, Pupăzan Gheorghe Daniel, Găman Angelica Nicoleta, Păsculescu Vlad Mihai, Simon-Marinică Adrian Bogdan, Florea Gheorghe Daniel, Tuhuț Ioan Ligia, Prodan Maria, Șuvar Marius Cornel, Vass Zoltan, Munteanu Laurentiu, Chiuzan Emeric, Nicolescu Cristian, Manea Florin*

A

The invention provides the possibility of recording and complex analysis of gas explosion phenomena on geometries with interconnected and volumetrically individualized spaces through different configurations of obstacle arrangements with membrane openings, the analysis of pressure and velocity variations with the modification of the direction of gas explosion propagation, and the study of chain explosions in atmospheres containing the same combustible gas or different combustible gases at different concentrations. The obtained data are useful both for explaining the phenomenon of rapid combustion in interconnected spaces and as a basis for validating computer simulations conducted on the same topic.





The advantages of the system are as follows:

- ✓ - allows the configuration of the volumes of the rectangular spiral through the number and placement of obstacles with membrane openings;
- ✓ - allows the use of membranous obstacles with openings of different shapes (circular, square, rectangular, elliptical, etc.) and with membranes of different thicknesses;
- ✓ - through Schlieren techniques, it ensures continuous monitoring and recording of the rapid combustion process, from the appearance of the effective ignition source of the explosive atmosphere, the evolution of the explosion process through the consumption of fuel/oxidizer, to the retraction movement of the expanded gases as a result of their cooling;
- ✓ - ensures a higher degree of precision in measuring local/global speeds and accelerations;
- ✓ - ensures the recording of pressure values from each interconnected space;
- ✓ - allows the analysis of pressure variations when changing the direction of gaseous explosions and when breaching obstacles with different resistances;
- ✓ - allows the analysis of chain gas explosions;
- ✓ - allows the use of multiple types of combustible gases/fuels vapors within the same physical experiment;
- ✓ - allows testing of explosion effect suppression curtains (using nitrogen, water, etc.);
- ✓ - allows modification of the initiation source location.

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SMALL-SCALE EXPERIMENTAL STAND FOR RESEARCHING EXPLOSIONS OF FLAMMABLE GAS-IN-AIR MIXTURES

Patent/project number: CBI A 2022 00731

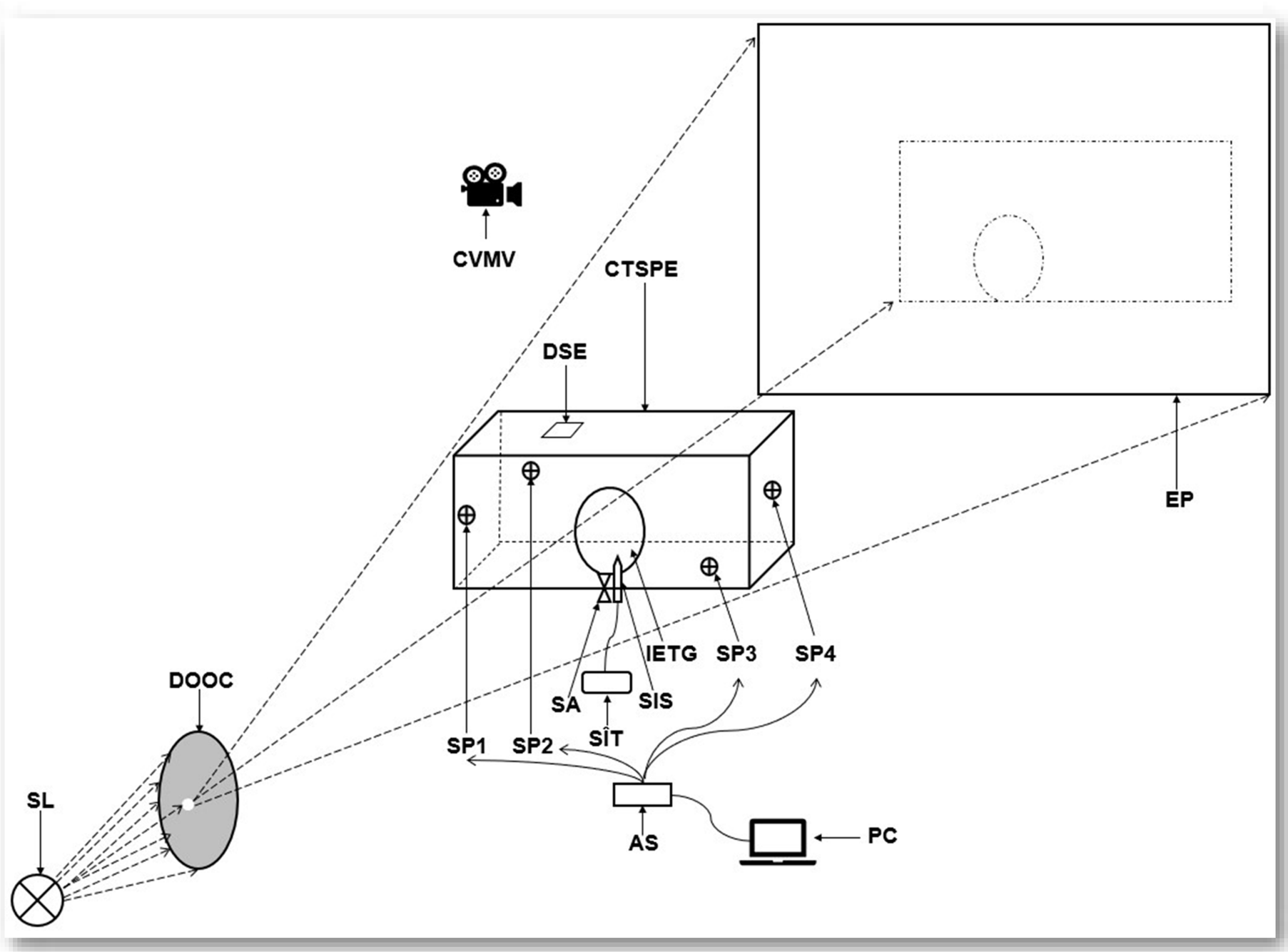
Author/s: Păsculescu Vlad Mihai, *Ghicioi Emilian, Găman George Artur, Pupăzan Gheorghe Daniel, Vlasin Nicolae Ioan, Șuvar Marius Cornel, Prodan Maria, Șuvar Niculina Sonia, Florea Gheorghe Daniel, Tuhuț Ligia Ioana, Șimon – Marinică Adrian Bogdan, Vass Zoltan*

A

The invention refers to a small-scale experimental stand for researching explosions of flammable gas-in-air mixtures, consisting of a transparent, inflatable explosion chamber equipped with an intake valve for volumes of flammable gas-in-air mixtures at pre-established concentrations within the explosive range of the substance.

It includes a spark ignition system, with the chamber enclosed inside a transparent case for studying explosion pressures and their propagation using shadowgraph techniques with a light source. An obturator disc with a central orifice allows the divergent conical light beam to pass through the transparent chamber for study, and the resulting projection is captured on a projection screen. The system is equipped with a recording system for the generated explosion pressure values.

The problem that the invention solves consists of using shadowgraph visualization techniques for laboratory research of flammable gas-in-air mixture explosions, with the purpose of analyzing the shock wave and the flame front of the explosion, from the point of initiation in the inflatable transparent explosion chamber, the propagation in the transparent chamber for studying explosion pressures and their propagation, and up to the release into the atmosphere.



The recording of the pressures developed by the explosion provides data that are useful for understanding explosion phenomena in flammable gas-in-air mixtures, contributing to the elucidation of the causes that generate such events and to the development of measures to prevent the occurrence of similar gas explosion phenomena

ADVANTAGES

- Uses shadowgraph techniques for visualization and analysis of explosions.
- The transparent, inflatable, and consumable chamber allows easy replacement after each test.
- Accommodates flammable gas-in-air mixture volumes between 0.25 and 0.75 liters at preset concentrations.
- The transparent chamber features a pressure relief valve for safety and repeatability.
- The top part of the chamber is detachable for quick adjustments.
- Pressures are monitored by 4 sensors, connected to a computer through a charge amplifier.

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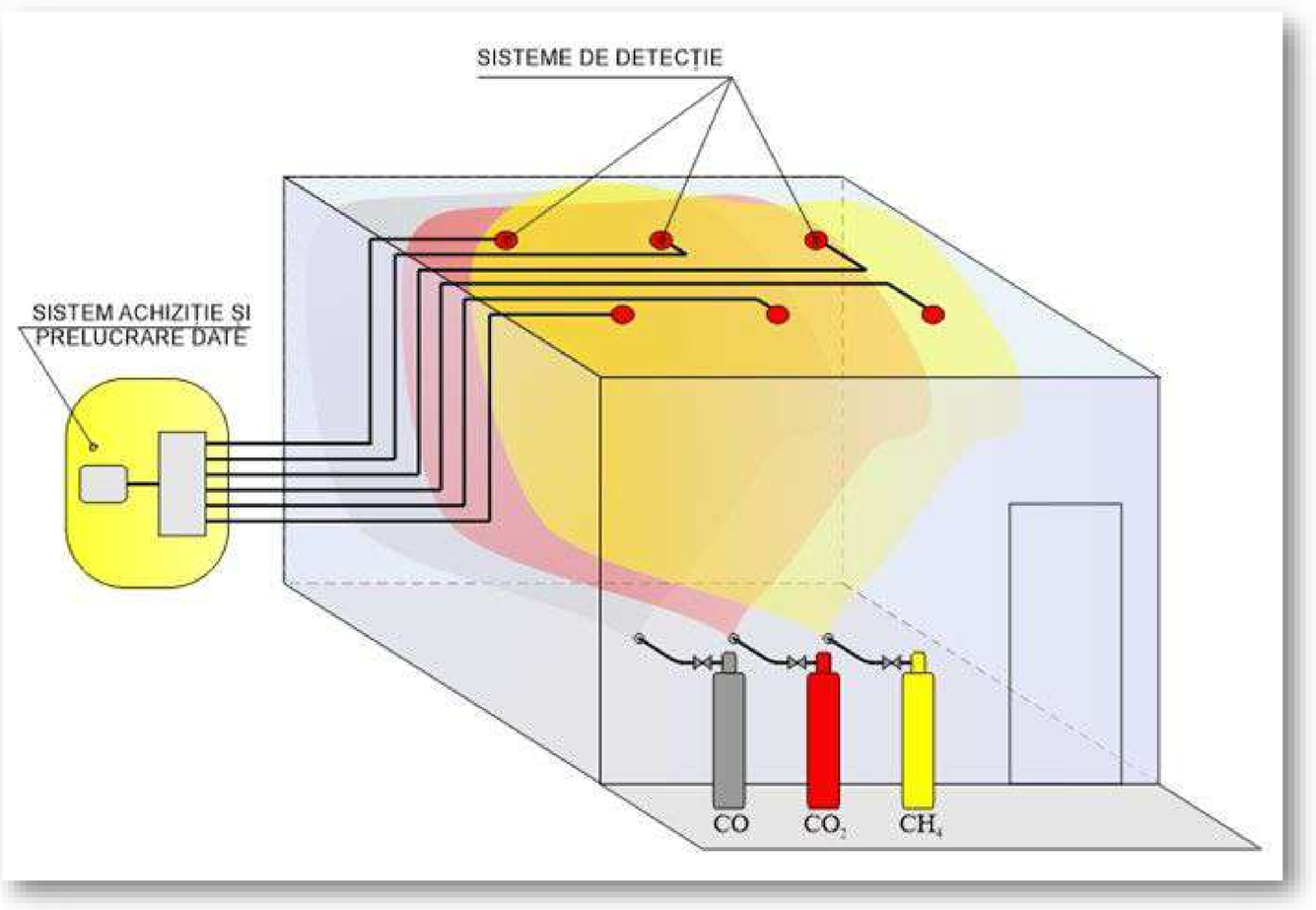
SYSTEM FOR DETERMINING THE DYNAMICS OF EXPLOSIVE ATMOSPHERE FORMATION

Patent/project number: CBI A 2023 00336

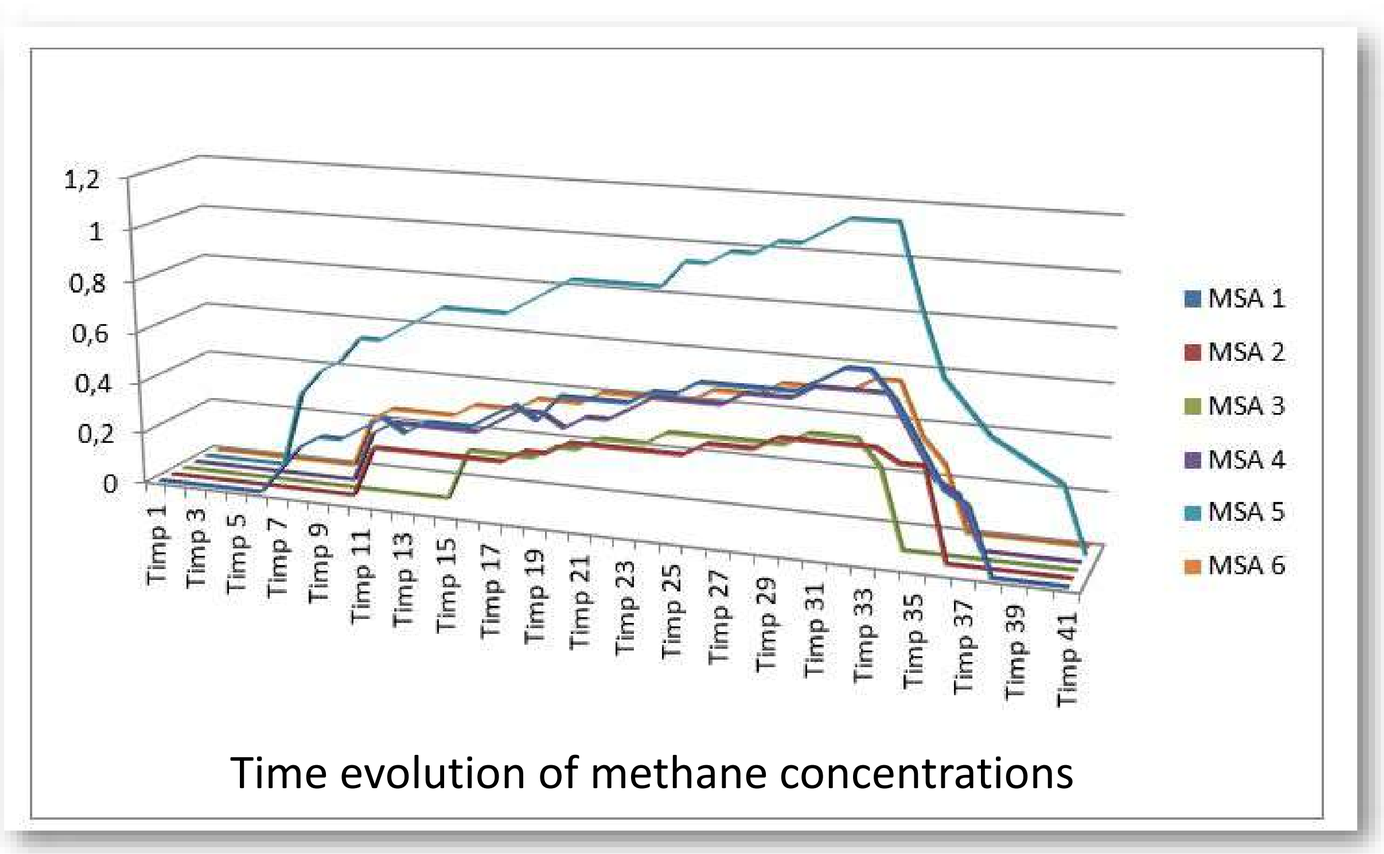
Author/s: Cioclea Doru, *George Artur Găman, Ghicioi Emilian, Gherghe Ion, Ianc Nicolae, Rădoi Florin, Boantă Corneliu, Chiuzan Emeric, Tomescu Cristian, Matei Adrian, Drăgoescu Răzvan, Cămărășescu Alexandru, Vlasin Nicolae-Ioan, Șimon Marinică Adrian*

A

The invention is based on a system that allows the determination of the dynamics of the formation of explosive atmospheres, respectively that takes into account the variation of gas concentrations in relation to time, by choosing a closed enclosure that meets the safety conditions, several pulleys with supporting role, more equipment for measuring gas concentrations, an explosive gas source, a pressure reducer, a rotameter-type explosive gas flow control system, a hose for introducing explosive gas into the enclosure closed, a directed gas purge system, a ventilation system for the evacuation of the created atmosphere, the data resulting from the measurements are collected, finally the dynamics of the formation of explosive atmospheres are determined graphically and numerically.



Equipment used to determine the dynamics of formation of explosive atmospheres



Time evolution of methane concentrations

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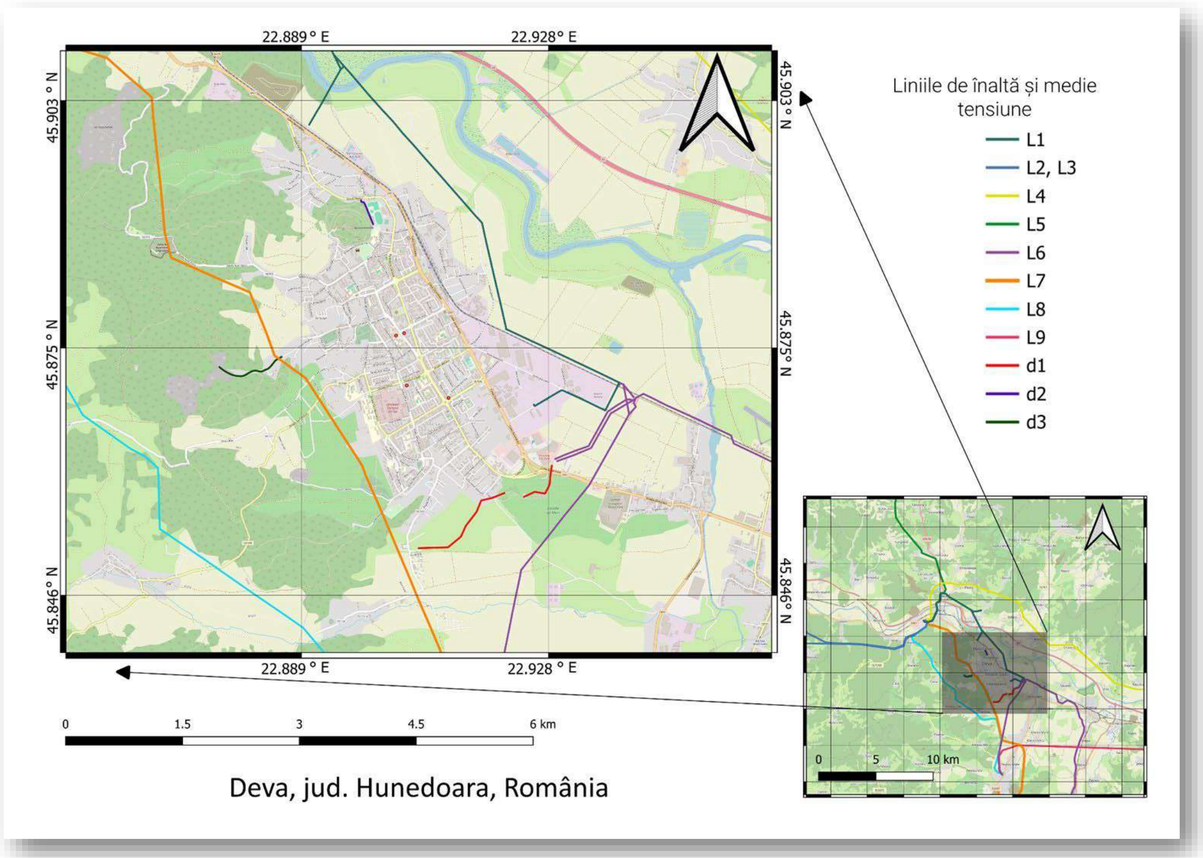
Electromagnetic Radiation in Everyday Life

Measurements and Analyses

Author: Ana-Maria IORDACHE

A



Exposure to low-level electromagnetic radiation is considered safe, but it can have negative health effects such as oxidative stress and cellular changes. **IARC classified radiofrequency fields as „possible carcinogen" (Group 2B)**, with a possible link to glioma. Prolonged exposure can influence neural activity, hormonal regulation, and immune responses. Although research is ongoing, it is recommended to reduce direct exposure to sources of electromagnetic radiation.

Thus, through this study I set out to create a map of electromagnetic radiation in the city of Deva, in order to identify risk areas or areas that do not comply with the rules imposed by the World Health Organization and to test different materials to identify a potential insulating material of electromagnetic radiation.

The results of the research reveal a significant correlation between the presence of high and medium voltage lines and electromagnetic radiation levels in certain areas of Deva and its surroundings.

Measurements made at various locations indicated that the intensity of electromagnetic radiation exceeds the safety threshold (**being higher than 2000 V/m**) in several areas, signalling a potential health risk to the inhabitants of those regions.

To evaluate the insulation properties of electromagnetic radiation of aluminum, I used a cardboard box with dimensions 30 cm x 18.5 cm x 10 cm, which I covered inside with two layers of aluminum foil. The test was carried out on Orizontului Street in Deva, Hunedoara County, in the area where it intersects with a high voltage line.

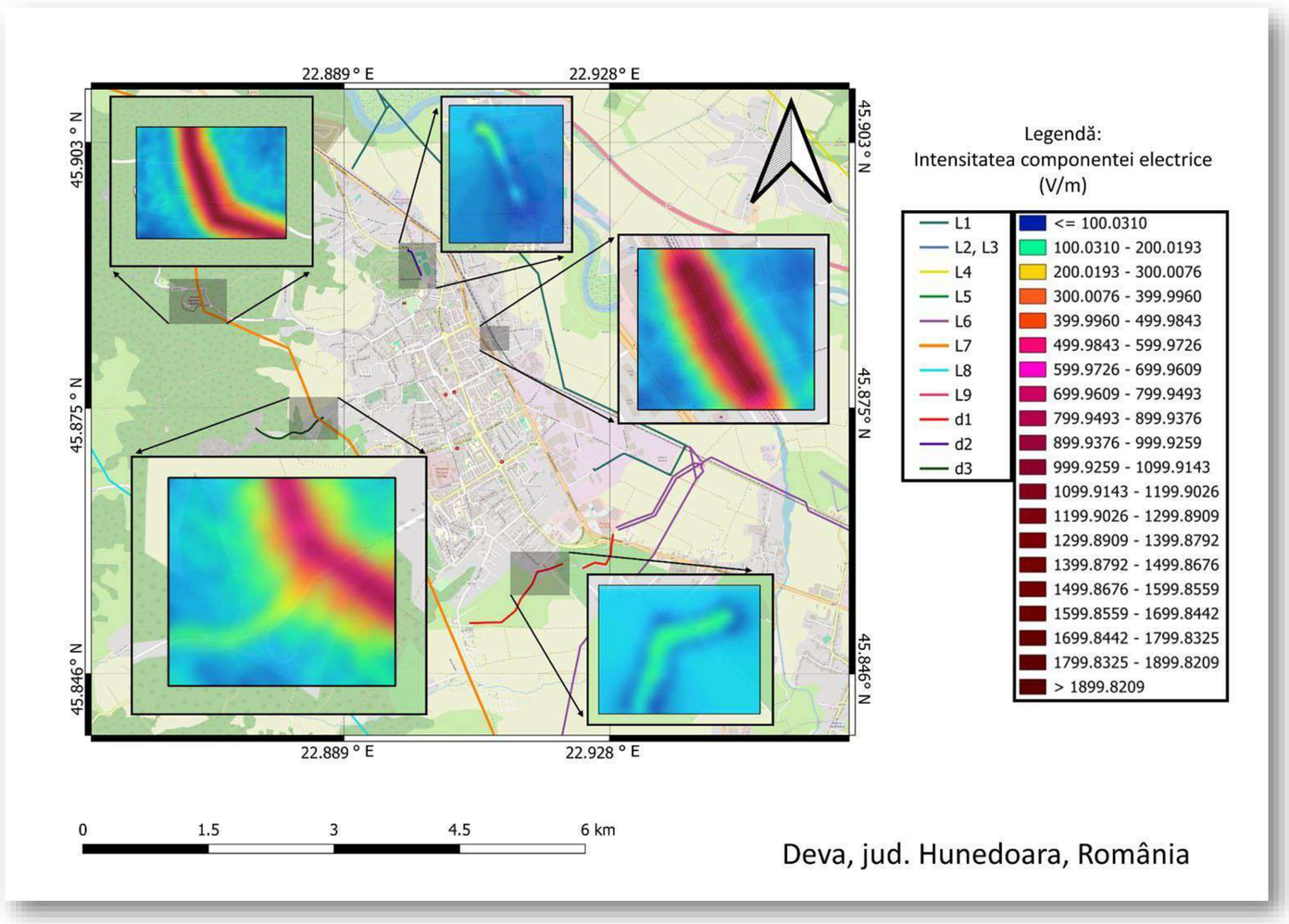
In the first stage of the experiment, I measured the electric field strength generated by the high-voltage line, recording an **initial value of 965 V/m.** In the next step, I placed the box lined with aluminum foil above the measuring device and observed a significant decrease in the value of the electric field intensity, **up to 0 V/m.** The experiment was repeated several times, and the results obtained were consistent, confirming the observed effect.

The experiment was a success due to the high electrical conductivity of aluminum, the Faraday cage effect and the high coefficient of reflection for a wide range of electromagnetic radiation, including radio waves, radio waves, microwaves and infrared radiation.

Identified risk areas:

1. **Recreational area Căprioara (>2000 V/m)**
2. **Stadion Street (~180 V/m)**
3. **Area through which the railway passes (>2000 V/m)**
4. **Mihail Sadoveanu Street (~165 V/m)**
5. **Călugăreni Street (~1030 V/m)**

Further, it is important to conduct further studies to assess the long-term effects of exposure to electromagnetic radiation in these areas and to develop recommendations for protecting public health.



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Development and validation of a combined tri-component integrated system for wastewater treatment (3treat)

Project: The publication of the scientific paper is funded by the Ministry of Research and Innovation, within National Project PN-IV-P7-7.1-PED-2024-1337, contract 62PED/2025 (*3treat*).

Author/s: Ovidiu Iordache, Ioana Corina Moga, Bogdan Cazan

A

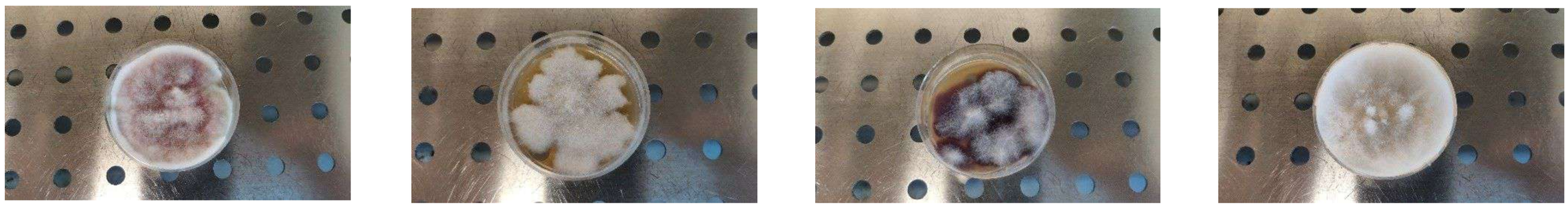
Context

Textile and leather industrial activities are responsible with the generation of large quantities of process waters that are characterized by high industrial chemicals content, that when discharged into public waters or refluxed into environment components, lead to ecosystemic hazards. The treatment of tannins containing wastewater is difficult, due to their high solubility in water, which is a limiting factor in conventional biological treatment methods, as it inhibits microbial growth in activated sludge.

Project scope

The development of a combined wastewater (specific to textile and leather industry) treatment method, coupled with the execution of a customized treatment installation, with high efficiency and versatility, overcoming the disadvantages of currently used physical-chemical treatment. The technology relies on complementarity between three key components for reduction and breaking down of main pollutants in the treated wastewater volume. The three components refer to macromycetes strains, MBBR specific HDPE carriers and sonication treatment.

Macromycetes strains will be immobilized on biofilm carriers, for mechanical biomass fixation. High yields of biomass will be targeted, by macronutrients enhancement of growth rates. Several strains will be taken into consideration, such as: *Trametes versicolor, Pleurotus pulmonarius, Pleurotus ostreatus, Morchella importuna, Pleurotus eryngii, Pleurotus djamor, Pholiota nameko, Pholiota adiposa, Lentinula edodes, Ganoderma lucidum,Ganoderma lingzhi, Flammulina velutipes, Fusarium oxysporum, Cerioporus squamosus* etc.



The **MBBR** technology utilizes free-moving biofilm carriers, which represents a future evolution of the activated sludge process that allows a greater pollutant removal degree in smaller systems (i.e., bioreactors). The biofilm grows protected within small plastic carriers, which are carefully designed with high internal surface area. These biofilm carriers are suspended and mixed throughout the water phase.

Biotreatment will be closely followed by **sonication process** that beside the effluent sterilization role (due to pressure variation and cavitation), will disrupt microbial cell walls, and release iso-enzymes, that will further act as biocatalysts, mediating hydrolytic reactions. Sonication treatment stage will be used for destruction of both microbial load in the treated wastewater, yielding a post-sterilizing effect after the first treatment stage, and disruption of organic matrixes that are difficult to degrade.

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Enhanced Indoor Conversion Efficiency of Dye-Sensitized Solar Cells by Optimizing Ball- Milling Process of TiO_2 Paste

Project number: *PN 23 27 01 03*

Daniel Ursu, Cristian Casut, Melinda Vajda, Marinela Miclau

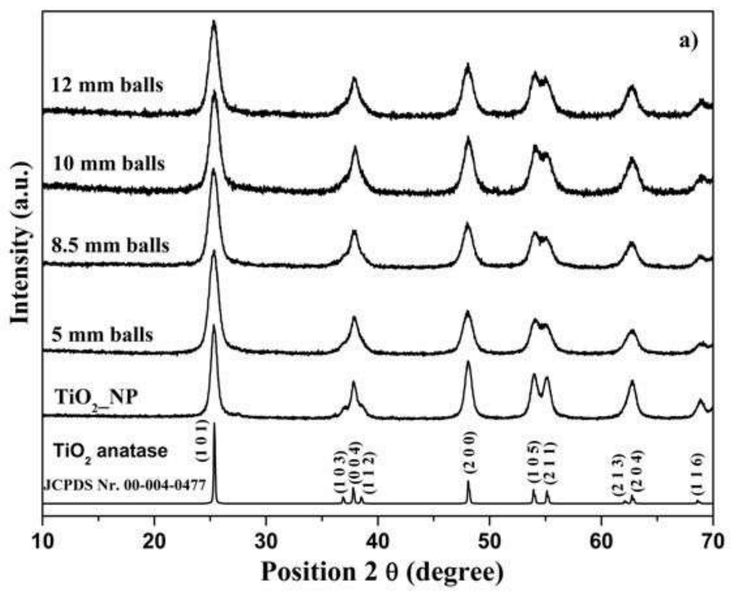
A

The rapid spread of the Internet of Things (IoT) along with the development of innovative low-power electronic devices has also driven the development of indoor photovoltaic. In this paper, we propose a simple and economically feasible solution that can improve the efficiency of dye-sensitized solar cells (DSSCs) under indoor light conditions by ~112%, without requiring a complex TiO_2 photoanode architecture or the design of new dyes.

Therefore, the obtained results revealed that the DSSC obtained from the TiO_2 paste mortared for 3 h with 12 mm balls highlighted an efficiency increase of ~37.5% (21.15% PCE) compared to the paste obtained with 5 mm balls (15.38% PCE) and 112.3% compared to the untreated paste (9.96% PCE), respectively, at 1000 lux.

The ball milling process of the TiO_2 paste was optimized for indoor light conditions for the first time, both in terms of efficiency and production costs, by developing a rapid preparation method that can be used industrially for the application of DSSCs.

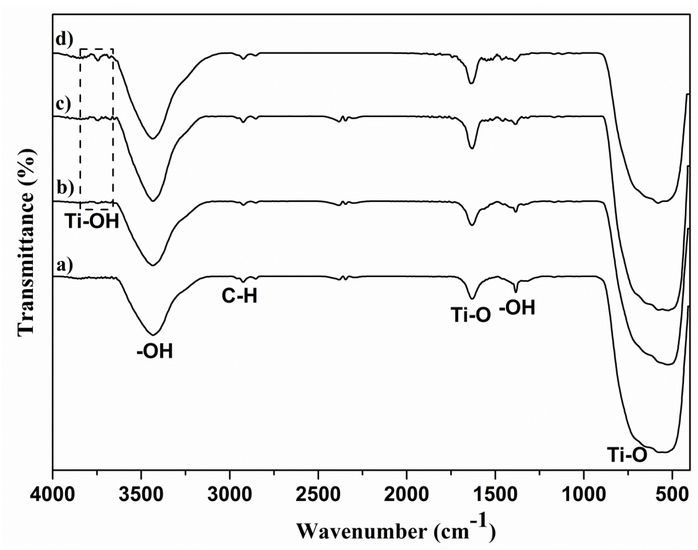
A simple use of 12 mm diameter balls caused beneficial structural modifications, decreasing the size of the crystallites, and leading to a high OH generation on the TiO_2 surface responsible for the improvement of energy conversion efficiency.



X-Ray diffraction patterns for Ti_NP and pasta using 5mm, 8.5 mm, 10 mm and 12 mm balls at 3h rotation time

Peak (101) intensity and crystallite size for Ti_NP and pasta using 5mm, 8.5 mm, 10 mm and 12 mm of balls

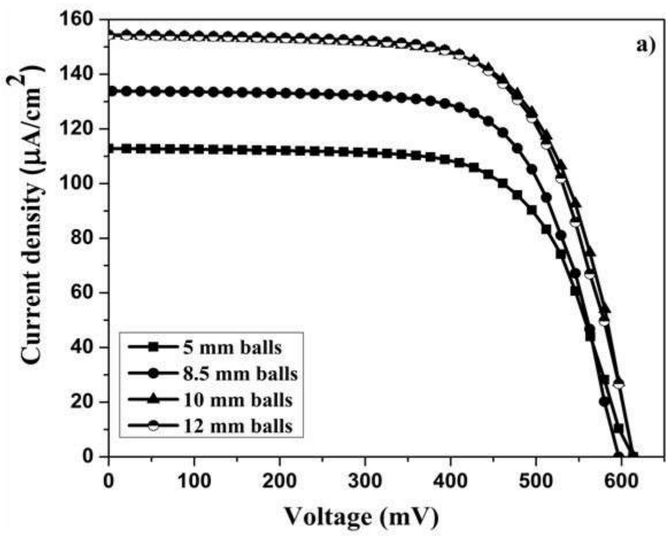
Sample	Peak (101) intensity 3h [%]	Crystallite size 3h [nm]
Ti_NP	100	16.3
5 mm balls	89	13.4
8.5 mm balls	77	11.7
10 mm balls	45	11.3
12 mm balls	45	10.3



FT – IR spectra of pasta using a) 5mm balls, 8.5 mm balls, 10 mm balls and 12 mm balls at 3h rotation time

Photovoltaic performances of DSSC using different size of ball (5mm, 8.5 mm, 10 mm and 12 mm) to preparation of pasta under 1000 lux illumination conditions

Nr. crt	Time	Materials	Isc [μA]	Voc [mV]	FF	η [%]
1		5 mm balls	112	613	62.7	15.36
2	3h	8.5 mm balls	133	596	68.6	18.13
3		10 mm balls	154	613	67.3	21.00
4		12 mm balls	154	613	66.7	21.19



The J-V measurements of DSSCs obtained from pasta using 5mm, 8.5 mm, 10 mm and 12 mm balls at 3h rotation time, under illumination of 1000 lux

Contact: Daniel Ursu danielhoratiu@yahoo.com

National Institute for Research and Development
in Electrochemistry and Condensed Matter, Timisoara, Romania

Selective resource recovery from kitchen waste by integrated dark fermentation-microbial electrolysis cell and ion substitution electrodialysis

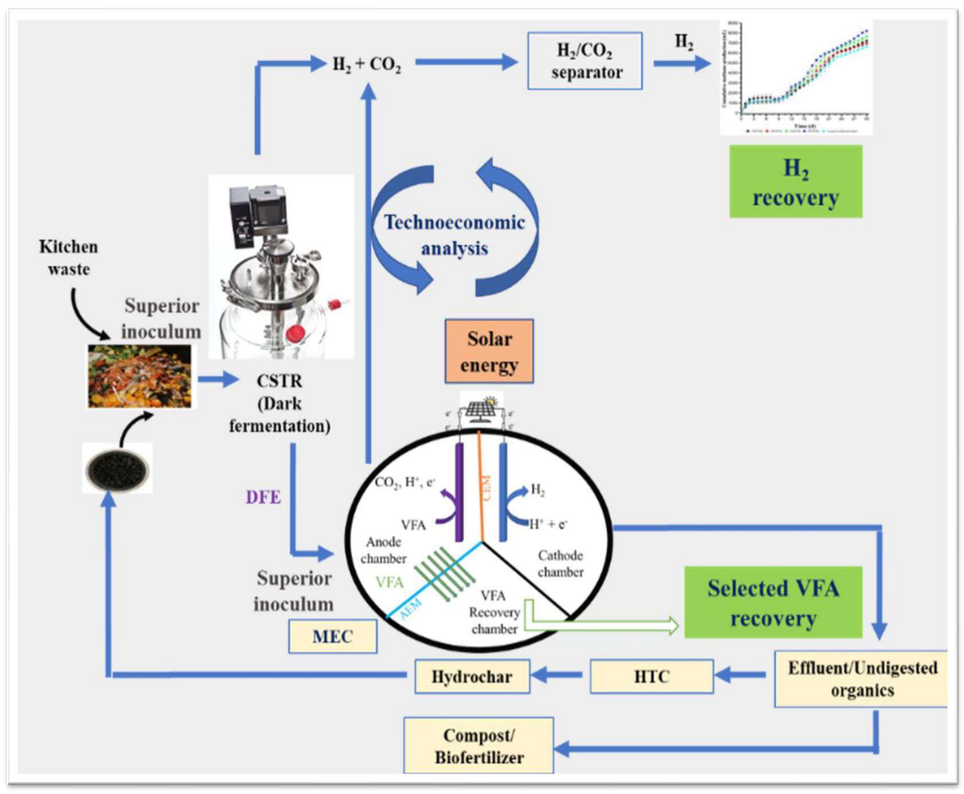
A

Project number: CF 39/28.07.2023, PNRR-III-C9-2023 I8
Authors: *Debkumar Chakraborty, Narcis Duteanu, Ionel Balcu, Gorakhanath Jadhav, Corina Macarie, Anil Dhanda, Doru Buzatu, Paula Sfirloaga, Makarand Ghangrekar*

In current project, technological constraints, such as pretreatment requirement of kitchen waste, inoculum preparation, and low H_2 generation efficiency will be addressed. Further, volatile fatty acid (VFA) recovery from fermentation media during acidogenesis and process optimization for a cost-effective zero discharge technology implementation will be carried out. Finally, the project aims to demonstrate H_2 production and VFA recovery from kitchen waste over a pilot-scale (100 L) reactor.

Microorganisms that are known to be capable of producing hydrogen through anaerobic fermentation processes include species from the classes: Enterobacter, Bacillus and Clostridium. The preferred raw material of these hydrogen-producing bacteria is represented by the different carbohydrates – glucose, the different isomers of hexose, bio-polymers such as starch and cellulose respectively.

The amount of hydrogen produced following these fermentation processes is dependent on the fermentation process. Thus, in the process of producing hydrogen through anaerobic fermentation it is desirable that the final product is acetate. However, a real progress would be represented by the possibility that the acetate produced in this stage can be used as a carbon source for further hydrogen production. Considering the fact that the waste resulting from the food preparation process in the kitchen has a complex, but also seasonally variable structure, it is necessary to prepare a microbial consortium that is capable of producing hydrogen by using these varied carbon sources.



Schematic illustration of integrated zero discharge model (DF-MEC-ED) for enhanced hydrogen production and VFA recovery

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NEW POSSIBILITIES FOR PATHOGEN INACTIVATION USING QUASI PERIODIC OPTICAL STRUCTURES PACKED IN THE FORM OF SCREW-SHAPED ROTATION CHANNELS UPON PROPAGATION OF UV-C RADIATION THROUGH THEM

PROJECT NUMBER: # 011206

AUTHORS: Ion MUNTEANU, Marina ŢURCAN, Nellu CIOBANU, Elena STARODUB and Nicolae ENACHI

APPLICATION FIELDS: Medicine – Food – Health – Hygiene.

AIM: Our investigation focuses on the application of different geometries of the packing elements that create the screw channels for pathogen acceleration through the elements of this metamaterial. The decontamination efficiency is related to the rotation of contaminated liquids and gases through the screw channels of the metamaterials, prepared from quartz optical fibers (or spherical elements tightly packed by the metamaterial) in the torsion configuration.

SOLUTION: Expanding the range of devices designed to inactivate pathogens using of different geometries of the packing elements (quartz balls and fibers) that create screw channels for pathogen acceleration through the elements of this metamaterial leads to an increase in the efficiency of the decontamination rate of the infected fluid.

Viruses and bacteria can enter the body not only through traditional transmission mechanisms (direct contact with other people), but recently a positive correlation has been observed between the spread of the virus and the pollution of fluids (water or air). The main idea is related to the rotation of contaminated liquids and gases through screw channels prepared from optical quartz fibres in the torsion configuration represented in fig. 1. Contaminated liquids are rotated along the flow direction. Given that the density of viruses and bacteria (or droplets, aerosols they contain) is higher than the density of liquids, the adhesion of pathogenic carriers to the rotation channels increases depending on the degree of torsion of the channels. Since the relative number of such channels in the proposed meta-material is large, the total surface area consists of the sum of the flow channel area between the fibres.

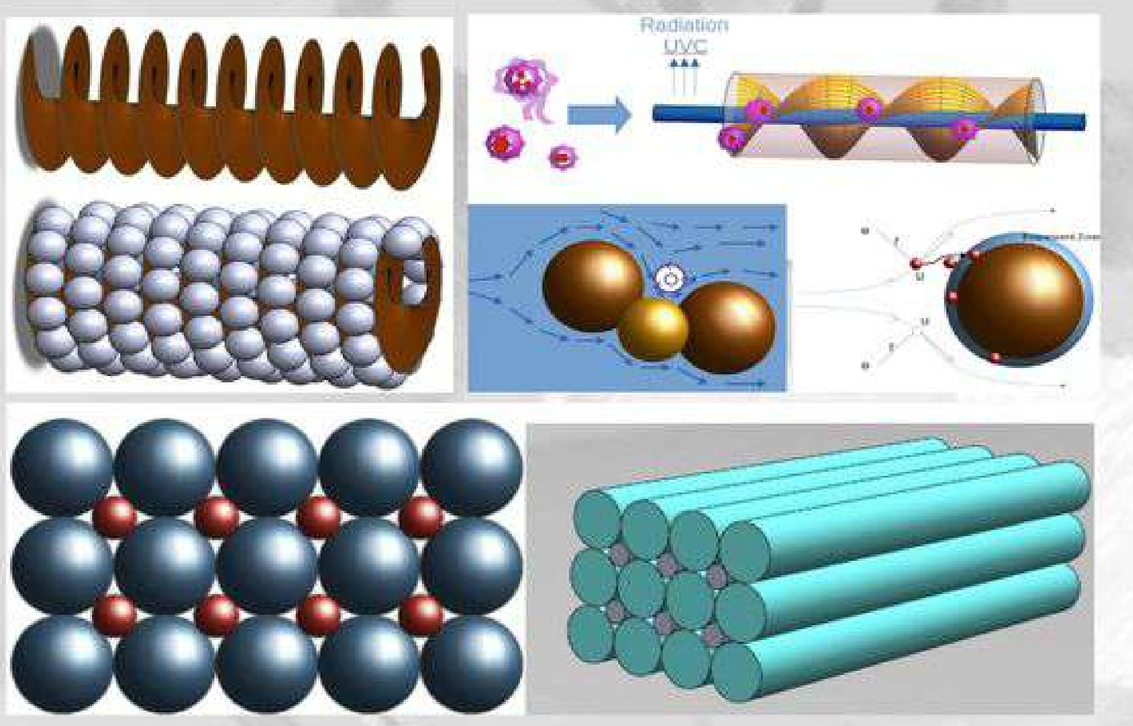

Figure 1. *Shows a new method of decontamination using spheres and quartz fibers. Acceleration of pathogens around the metamaterial elements and possible turbulent flow with acceleration of pathogens in circle or screw channels in the three-dimensional case. Achieving the evanescent zone of UVC radiation of each fiber or sphere, the pathogens can be effectively inactivated.*

ADVANTAGES: The advantages of this procedure consist in manipulating pathogens in the area of increased intensity of UV-C radiation which is due to the quasi-periodic optical structure packaged in the form of screw-shaped rotation channels where pathogens fall into areas of increased evanescence, therefore high doses of radiation received lead to their efficient inactivation.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: This research was supported by the *research project,* Subprogram code 011206 and 24.80012.5007.26SE

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HR EXCELLENCE IN RESEARCH

UV-C STERILIZING DEVICE

PATENT APPLICATION: Patent granted by decision10562 / 2025.01.10; MD s 2024 0049 / 2024.05.07

AUTHORS: Ion MUNTEANU, Marina ŢURCAN

A

APPLICATION FIELDS: Medicine – Food – Health – Hygiene.

AIM: The invention refers to the decontamination and annihilation of pathogens, frequently present on objects with irregular surfaces (for example: laboratory instruments, dental, surgical instruments and equipment, measuring devices, various devices), as a result of the action of ultraviolet radiation type C applied, which can be applied in the disinfection of various objects with irregular surfaces within medical, secondary and higher education institutions, the food industry, public health, etc...

SOLUTION: The particularity of the proposed device is the introduction of a set of quartz rods of different diameters that play an essential role of radiation diffusion to increase the decontamination rate of shaded areas of bodies with uneven surfaces.

The main idea of the proposed device are the increase in the radiation dose in the shaded areas of objects with irregular surfaces where direct radiation does not reach, and as a result of the physical effects obtained such as the reflection/refraction of UV-C radiation due to the quartz rods inserted inside the decontamination chamber, the dispersion of these radiations takes place to the entire surface of bodies with irregular shapes, as a result of which the pathogens are subjected to these high doses of radiation and effectively inactivated. At the same time, around these quartz rods the so-called evanescence zone appears which is a very effective area for decontamination of pathogens that are found at the contact between the object and the rod.

So, a bactericidal device is proposed, simple in construction, but which allows the disinfection of the surfaces of various irregular objects much more effectively compared to other devices, and due to the appearance of a microwave oven, it is very convenient to use.

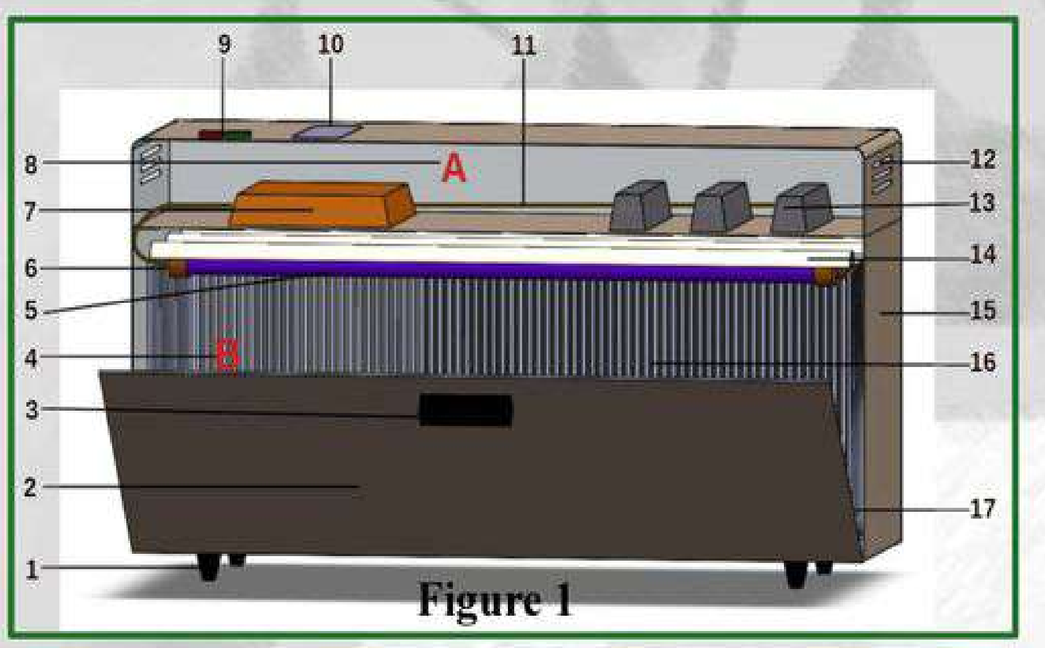


Figure 1

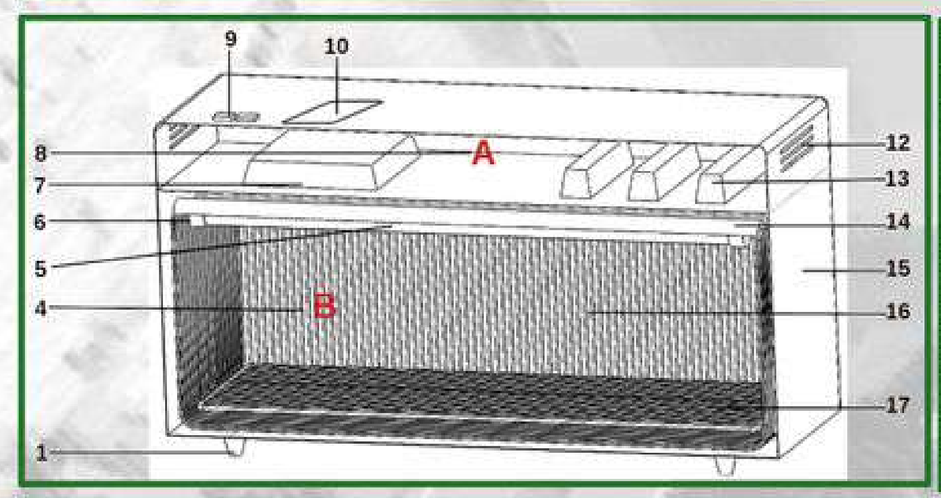


Figure 1. The UV-C sterilizing device includes the housing (15), the legs (1), the door (2), respectively the handle (3), the objects subject to decontamination are placed on the support (17) in compartment B (4), where the internal walls of this compartment are covered with reflective material, i.e. quartz rods (16) with diameters of 3 mm and 5 mm are regularly placed over the cover, and compartment A (8) is protected by the reflective screen (14) from ultraviolet radiation, it contains the electrical part such as: the switch (9), ballasts (13), the electric wire (11), to the connector (6), provides the UV-C source (5) with the necessary current, the control module (7) provides information to the screen (10), the ventilation of compartment A takes place through the holes (12).

ADVANTAGES: The advantages of this device are the significant reduction in the exposure time under the action of UV-C radiation of various objects with irregular surfaces by increasing the efficiency of the disinfection rate due to the dispersion of radiation in the decontamination chamber.

IMPLEMENTATION STAGE: : At the laboratory level.

ACKNOWLEDGMENTS: This research was supported by the *research project:* Subprogram code **011206** and **24.80012.5007.26SE.**

Method for automating the take-off and landing phase of a collapsible textile wing

Patent application: A/00540/03.10.2023
Core Program TEX-PEL-CHALLENGE 2026, PN 23 26 02 01 (THORR)
Author: Adrian Sălişteanu

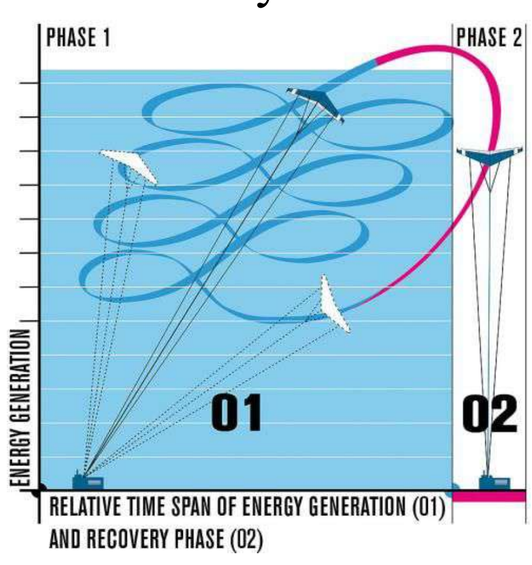
A

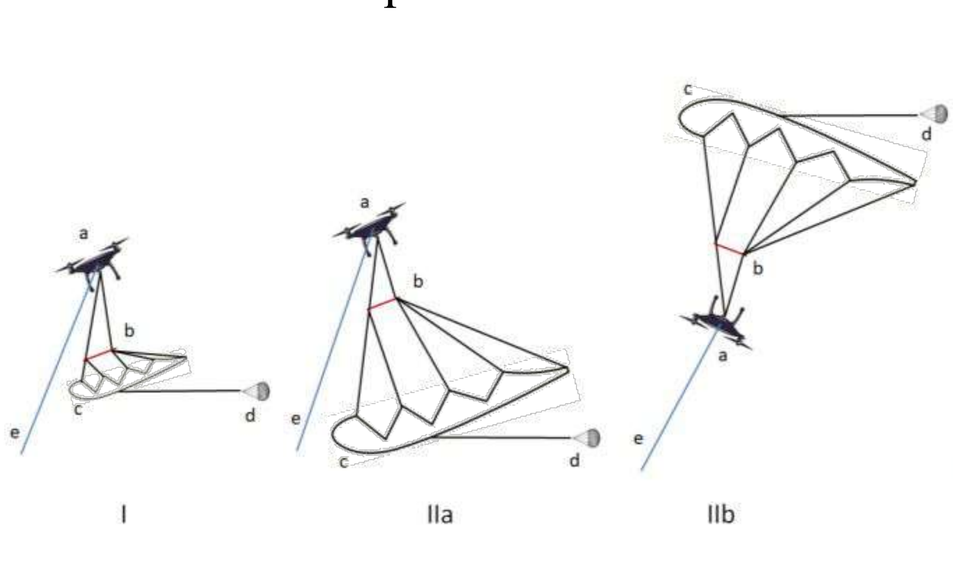
The invention relates to a method for the automatic control of the take-off and landing phase of a collapsible/inflatable textile wing or to put it simply and airfoil kite. The control method is applicable in the context of an automatic control system for a high-altitude wind power generator of the ground-gen type, which uses a textile wing to capture wind energy at high altitudes. Thus, the control of the captive wind wing is achieved through a self-propelled WCU (Wing Control Unit) module attached to the cable near the wing. The module integrates active control elements to automate the launch/retraction of the captive wind textile wing when wind conditions are unfavourable, such as when the wind is too weak, too strong, or during high-intensity storms.

As per invention description, the WCU is a small, remote-controlled quad-copter drone suspended a few meters below the kite and is integral part of the launch/landing system. The WCU have propeller guards to prevent accidental collision of the propellers with the kite risers or the kite tether. The picture bellowexplains the launch/landing sequence, were the kite (c) in collapsed/flaked position hangs bellow the WCU (a), a drogue chute (d) is used to position the kite canopy into wind and maintain the wind facing direction. The slider (b) is used to smooth line deployment and prevent line entanglements. A drum inside the WCU starts to un-reel the kite lines (stage I) causing the kite to catch more wind and consequently inflate until the actual drag cause by the kite equals the WCU lift (stage IIa). At this moment the WCU initiates a roll motion until the system positions upside down (stage IIb). From this time forward the WCU start to depower completely in order to permit the kite to fully inflate and slider to get in the lowest positon just above WCU (stage III).

The landing phase will be done in reverse, starting with the lines reeling by the WCU; this will cause a decrease in kite surface area till it reaches the size were the reverse rolling action can be achieved followed by further reeling of the lines inside WCU until the kite is fully flaked bellow and thus the airborne unit can park in a specially designed area next to the ground station.

The novelty of the system, and author's contribution, resides in this WCU unit concept and its ability to automatically launch and land the kite if so required.





This patent in part of an ongoing research project, a digital model was developed that reflects the behaviour of the torque, speed and power of the transmission designed for the ground station as expected from the claim. In the current stage a small scale experimental model was developed to test and refine the control method described in this patent application. The experimental model uses a small 500w motor/generator and is towed by a 7.5m^2 inflatable kite. The demonstrator model of the kite power unit will be scaled up for a nominal power of 20 kVA using separated retract motor and generator with a full-size 25m^2 kite.

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Presentation link: https://incdtp.ro/THORR/

Future of mycelium-based materials in construction industry

A

Project number: PN 23 26 01 02. Innovative, resilient digital solutions for the recovery and sustainable growth of terrestrial and aquatic natural resources, as well as for harnessing unconventional aerial energy resources (THORR).

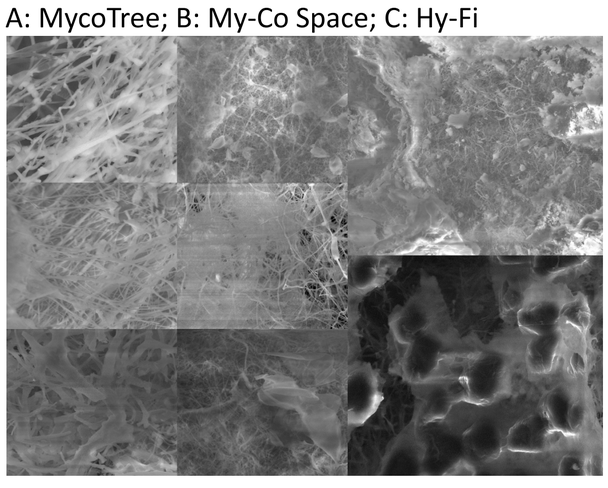
Authors: Cazan Bogdan, Iordache Ovidiu

Myco-materials are a novel class of materials that get attention due to their low production costs, properties, biodegradability and low environmental impact. Depending on the production process they can be used in different industries, including constructions. Fungi-based foams, panels and bricks are just a few examples of products that can be obtained from agro-industrial waste and fungal mycelium.

Although mycelium materials have low structural strength when compared to other traditional materials such as concrete or steel, large architectural projects can be built by achieving stability through geometry or reinforcements. The benefits of mycelium construction materials lays in their production costs (e.g. starting from 4$USD for a mycelium brick), low density, fireproofing and insulating properties.

This study presents prototypes of mycelium materials obtained from agro-industrial byproducts and waste such as paper, sawdust, wheat bran and straws combined with different fungal mycelium strains. Three fungal strains were tested to obtain foam-like panels; resulted materials being assessed through microscopic and macroscopic analysis.

A: MycoTree; B: My-Co Space; C: Hy-Fi



SEM images of myco-material prototypes

Mycelium brick
produced by Ecovative

Macroscopic analysis of myco-materials: A – *G. lucidum*; B – *T. versicolor*; C – *P. ostreatus*

Further developments of mycelium materials will solve their low structural strength problem. A solution to this is reinforcing myco-materials with natural or textile fibers. Current studies and products from companies shows the feasibility to create an all-purpose type of material to replace traditional materials.

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RENEWABLE MATERIAL FOR LEATHER DELIMING AND APPLICATION PROCESS

A

Patent number: A/200728 from 21.11.2024

Authors: Gaidău C. Carmen, Simion Demetra,
Berechet D. Mariana, and Alexe A. Cosmin

Description: The renewable material is made from hydrolysates of collagen or keratin with medium or low molecular weights, conditioned with organic acids, with complexing properties of calcium ions from leathers processed for hair removal and allows the replacement of ammonium salts. The materials made capitalize on leather waste or lower quality wool and ensure an efficient and ecological process of removing calcium ions from natural leathers, with beneficial ecological effects for the environment.

Innovation:

From leather waste (a, b) and low-quality wool (c) to protein hydrolysate (d, e) and ecological deliming products (f) for replacing ammonium salts in hide and skin processing (g, h), with the same efficiency of calcium ions releasing (i):

Advantages:

♦ Ammonium pollution elimination; ♦ cleaner workplaces; ♦ reduction of wastewater eutrophication; ♦ protein-based waste recovery-reuse-recirculation; ♦ organic waste reduction; ♦ new added-value products made from waste; ♦ creation of potential new jobs; ♦ improved carbon footprint of leather products; ♦ reduction of organic waste in leather industry and zootechnics; ♦ products complying with circular economy needs.

Acknowledgement:
The works were funded by the Ministry of Research, Innovation and Digitalization through Core Program Project 23.26, TEX-PEL-CHALLENGE 2026, project PN 23260302, BIO-LEATHER.

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National Research and Development Institute for Textile and Leather- Leather and Footwear Research Institute

Composition for polymer biocomposites based on butadiene-styrene block copolymer, polypropylene and coffee grounds

A

Patent A – 00726 / 2024

Project number: PN 23-26- 03-01 AVANS-COMP-POLYMER, Contract 6N/2023

Authors: Stelescu Maria Daniela, Berechet Mariana Daniela, Sonmez Maria, Georgescu Mihai

The invention refers to the production of polymer biocomposites based on butadiene-styrene block copolymer, polypropylene, coffee grounds and other ingredients, which are intended to obtain products with applications in: the footwear industry, the automotive industry, additive technologies, etc.

In the polymer biocomposites that are the subject of the present invention, a mixture based on butadiene-styrene block copolymer and polypropylene is used as the polymer matrix, and coffee grounds obtained as waste from coffee consumption are used as the filler. They are obtained by the dynamic vulcanization technique and melt mixing, using internal mixers or an extruder-granulator. To improve the compatibility between the phases of the biocomposite, polypropylene grafted with maleic anhydride (PP-g-AM) is used, and for dynamic vulcanization, an alkylphenolic resin and tin chloride dihydrate are introduced into the mixture, which can lead to the formation of a cross-linked structure through methylene/chromium ring bridges between macromolecules. In the process of obtaining the new materials, an additional pre-operation of processing the coffee grounds is required (Figure 1), to improve the compatibility between the polymer matrix which is hydrophobic and the organic filler (coffee grounds) which is hydrophilic. The obtained polymer biocomposites can be processed into finished products by methods specific to plastics (such as: extrusion, injection, compression).

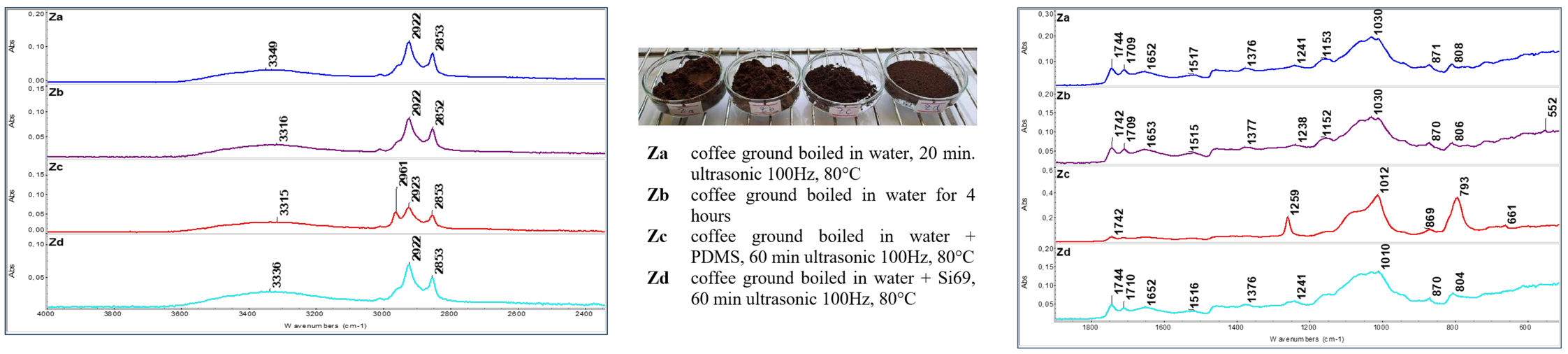

Figure 1. FTIR spectra of coffee grounds: in the range of 2400-4000 cm^{-1} and in the range of 550-1800 cm^{-1}

The new elasto-plastic materials have a pleasant smell of coffee, which persists over time, and a natural color, which no longer requires the addition of dyes. In addition, the products have good physical and mechanical properties (Figure 2), and no waste is produced in the technological process.

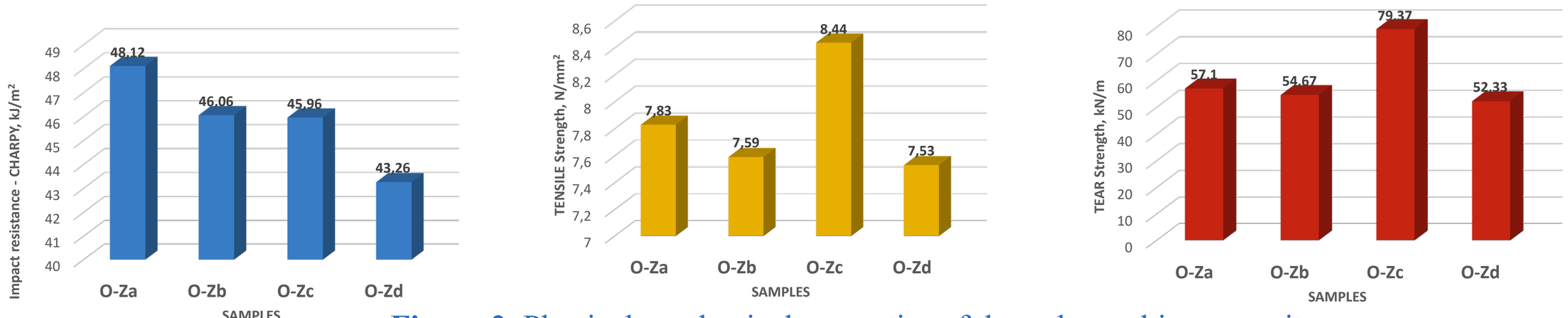

Figure 2. Physical-mechanical properties of the polymer biocomposites

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NATIONAL RESEARCH AND DEVELOPMENT
INSTITUTE FOR TEXTILE AND LEATHER

Antibacterial expanded thermoplastic polymer composite resistant to high temperature, based on styrene-butadiene-styrene elastomer, functionalized calcium carbonate waste and thermo-microcapsules

Patent/project number: *A/200176/12.04.2024*

Authors: Alexandrescu L., Sonmez M., Stelescu M. D., Georgescu M.,

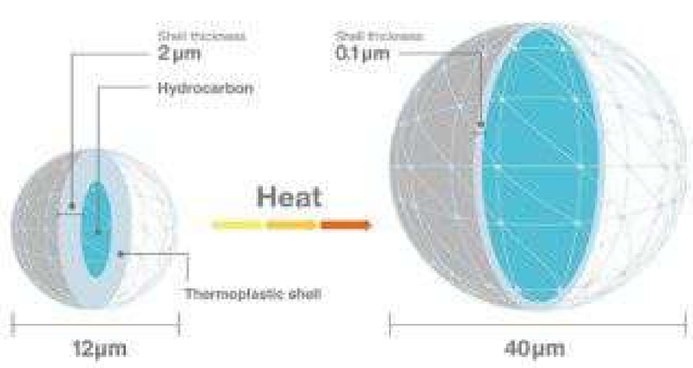
A

The invention relates to an antibacterial expanded thermoplastic polymer composite resistant to temperatures above 250^{0}C, based on styrene-butadiene-styrene elastomer, calcium carbonate waste from shells, marble and dolomite, functionalized with 3-aminopropyltrimethoxysilane, expanded with thermo-microcapsules. Waste is ground to sizes of 300-500 nm in a cryogenic mill at 10.000 rpm and compounded with polymer by mixing in a Brabender mixer, then tested in terms of melt flow indexes to establish optimal parameters of injection and extrusion, in order to obtain products with necessary characteristics for use in the food, medical, consumer goods and footwear industries.

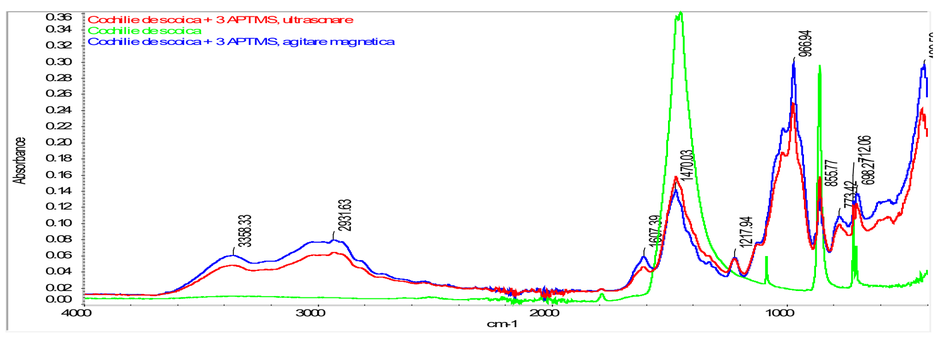
High-performance characteristics:

- High melt flow index (MFI).
- High flexibility to high hardness.
- High resistance to immersion in acids, bases and petroleum products at temperatures in the range 0-100˚C.
- High resistance to thermo-oxidative ageing (-40°C…..+250°C) over time under static and dynamic conditions, over a long period (168 hours).
- High resistance to impact, breaking, tearing and repeated deformations.

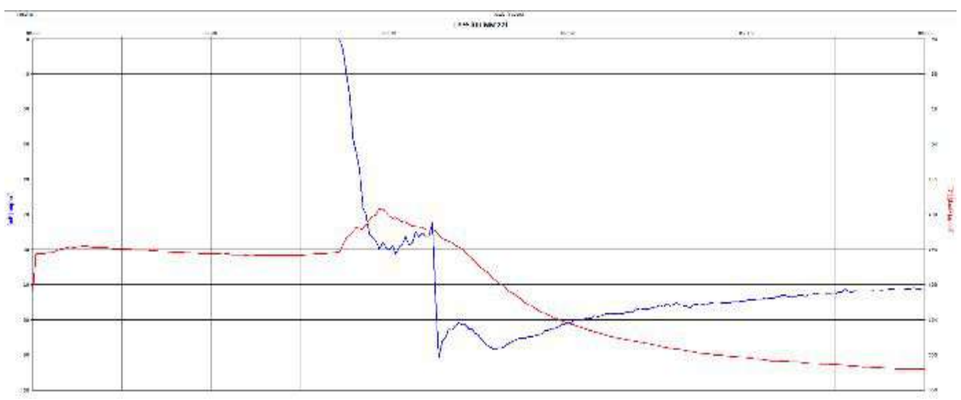
Waste from seashells



Aspect of a thermo-microcapsule (According to the Unicell technical specification by Akzo Nobel



FTIR spectra of seashell functionalized with 3-APTMS using the two methods and unfunctionalized seashell



Torque and temperature variations over time recorded on the Brabender Plasticorder for the copolymer based on styrene-butadiene-styrene and natural calcium carbonate waste (seashells, marble, dolomite) functionalized with 3-aminopropyltrimethoxysilane and 8% thermo-microcapsules.

Antibacterial composite granules

Products obtained according to the invention have the following advantages:

- **Environmental protection by recycling, reusing and converting waste from the footwear industry into new added value products;**
- **Protection of the human factor by reducing toxicity in the work environment;**
- **Less toxic finished products;**
- **Less pollution due to functionalization of waste;**
- **Optimal processability due to compatibilization with polyethylene-graft-maleic anhydride;**
- **Physical-mechanical properties are according to standards in force: resistance to abrasion, elasticity, hardness, etc.**
- **Increased turnover for the economic operator.**

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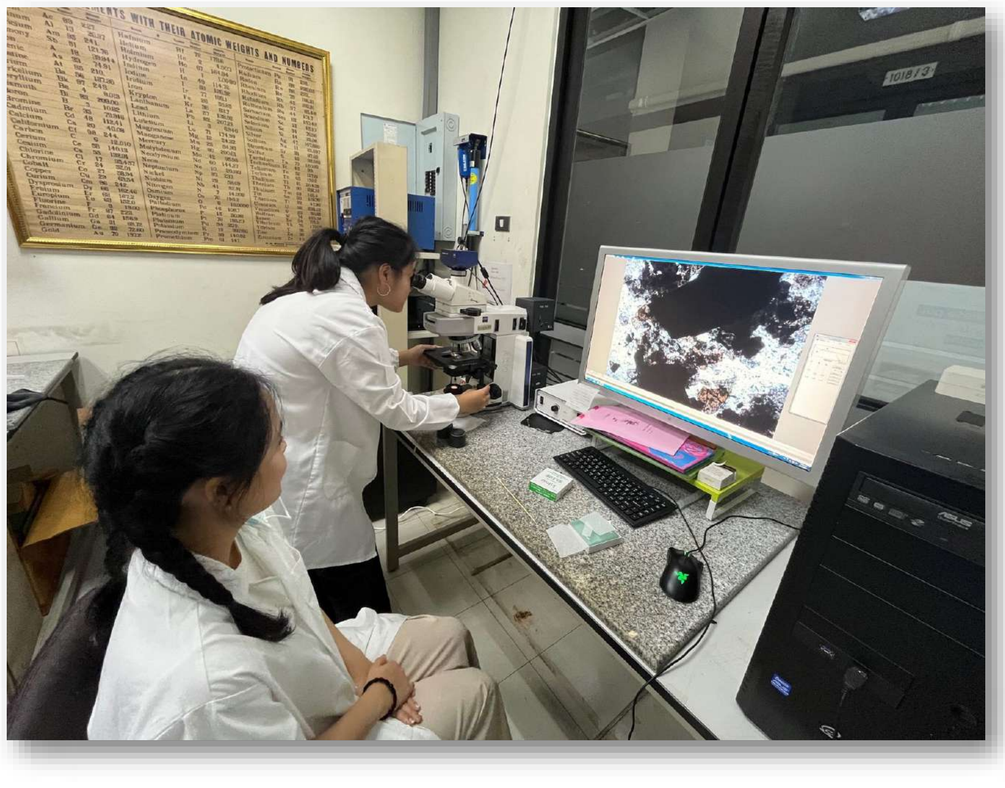
BeeFriend

Sirinda Chalermthiralert, Parinda Chalermthiralert
Advisors: Jeerasak Jitrotjanarak, Chutiparn Lertvachirapaiboon

A

This project develops a bee-friendly insecticide using waste from mussel shells and eggshells, addressing both agricultural and environmental challenges. The key ingredient, calcium carbonate ($CaCO_3$), acts as a natural pest deterrent by forming a physical barrier, altering pH, and creating a drying effect that disrupts pests without harming beneficial pollinators like bees. Unlike conventional insecticides, our solution is sustainable, reducing chemical pesticide use while repurposing problematic waste. By promoting pollinator-safe farming, this innovation enhances crop yields, supports biodiversity, and offers an eco-friendly alternative for pest control.



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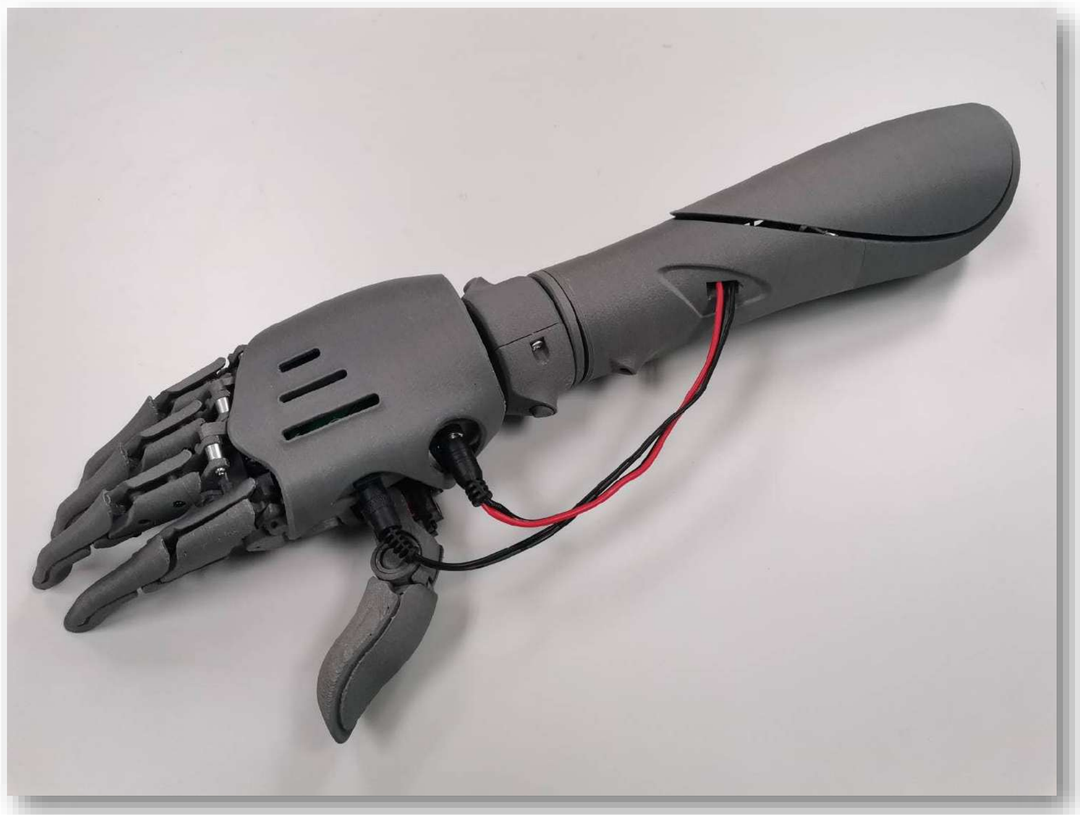
Wearable Muscle Control System for Open-Source Bionic Arms

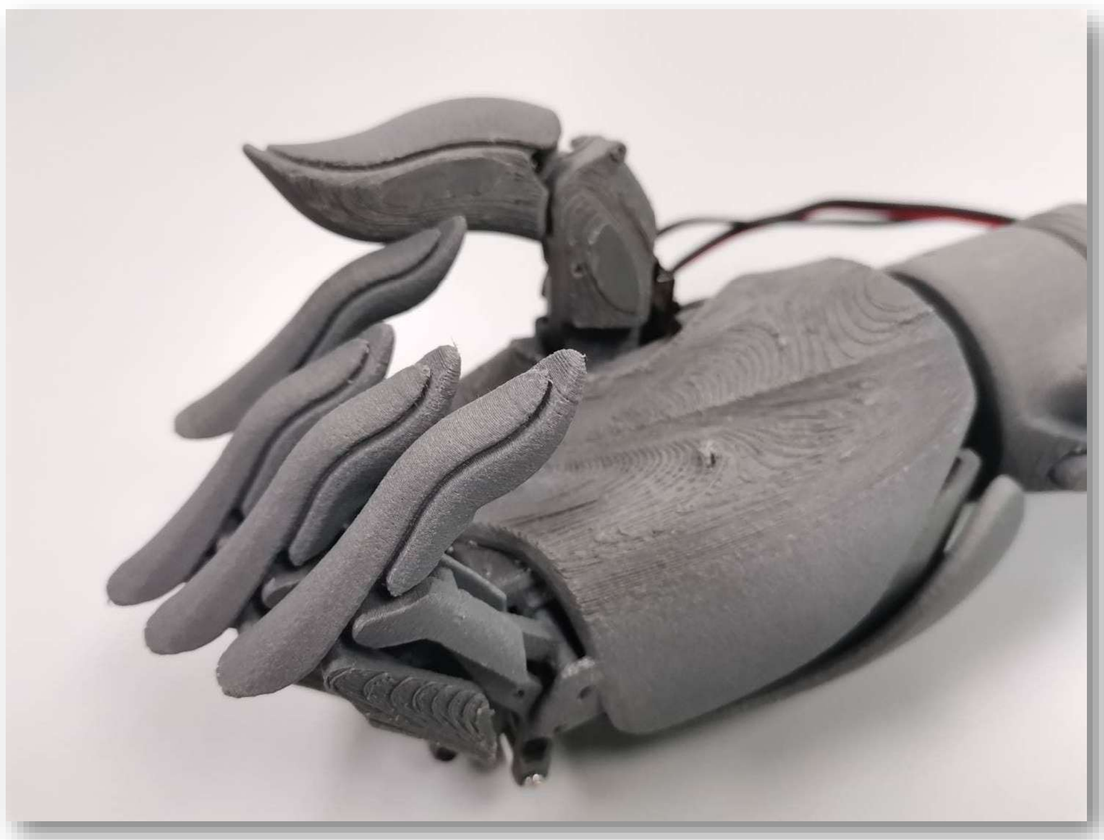
Thanaporn Pongphaew

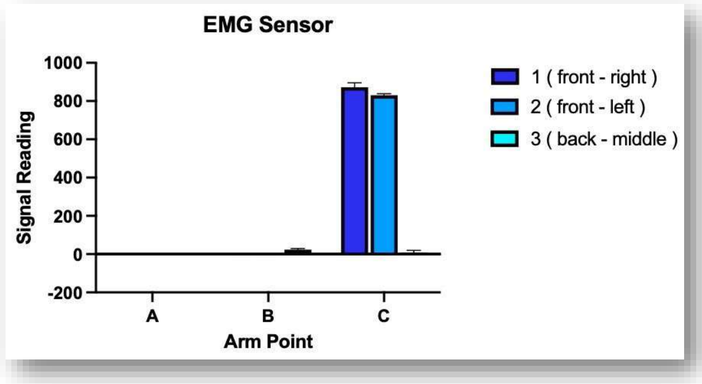
Advisors: Parinton Jangtawee, Kaewkan Yambangyang, Jeerasak Jitrotjanarak

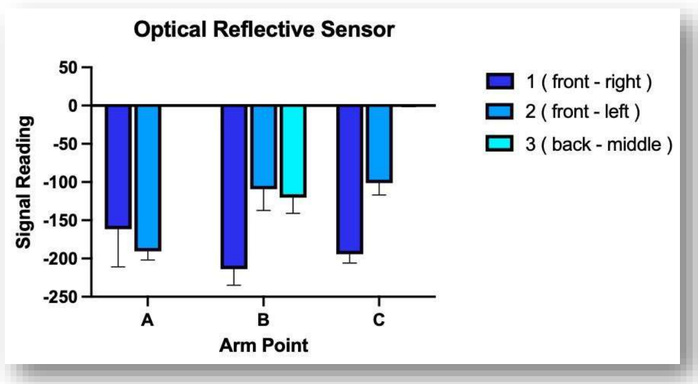
A

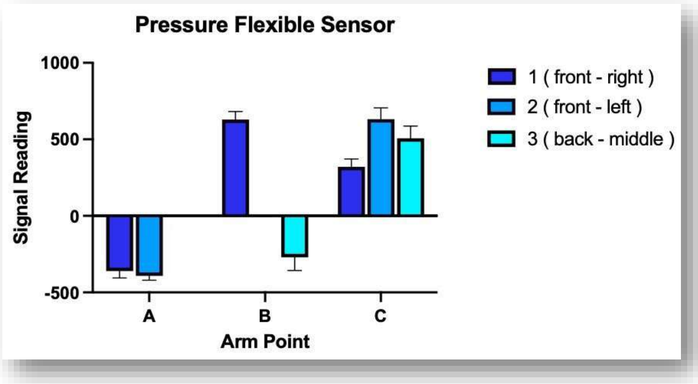
This project explores the effectiveness of EMG, optical reflective pressure, and pressure sensors in detecting muscle activity for bionic arm control. Sensors were tested at nine positions along the forearm muscles responsible for hand opening and closing. A healthy subject performed repeated gestures while signals were collected at 5ms intervals using an ESP32 microcontroller with 12-bit resolution (4096 levels). Data analysis focused on signal stability, gesture differentiation, and efficiency to identify the best sensor-position combination. The findings aim to enhance sensor selection and placement, improving the accuracy and responsiveness of prosthetic limb control.











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WASEN

100% bio-waste-to-coal energy for Environment Sustainability

Patent number: TH2403003955

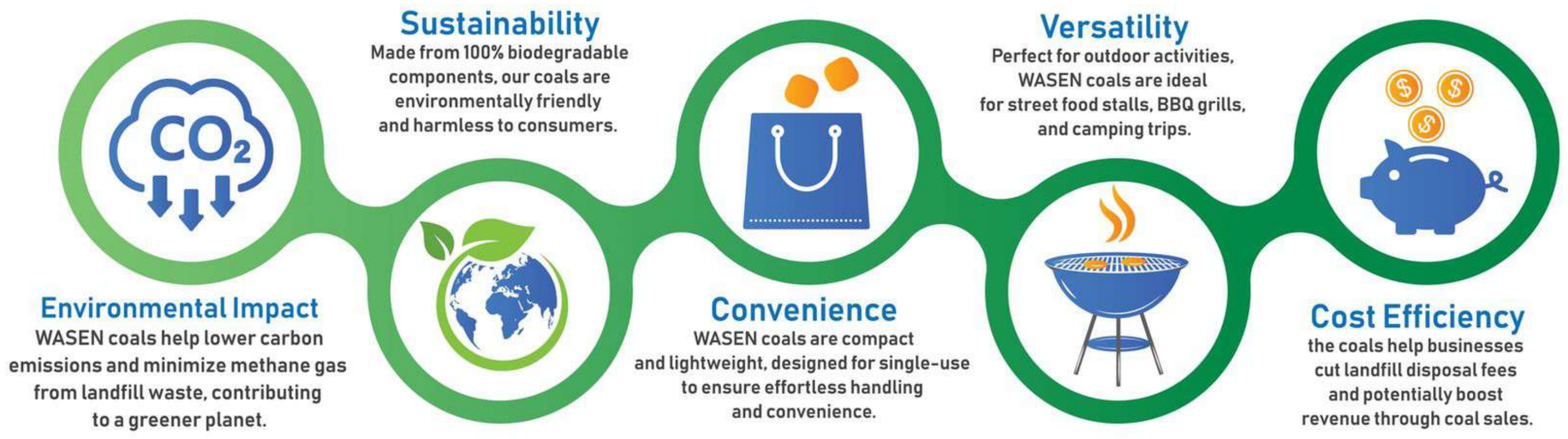
Ms.Piriya Vongpivat, Ms.Pirada Vongpivat,
Mr.Supphanat Koolhiran, Mr.Jade Koolhiran
Mentor : Mr. Jeerasak Jitrotjanarak

A

Food waste is a pressing global challenge, with approximately 1.3 billion tons discarded annually, contributing significantly to environmental harm. During our research at snack factories, we discovered that most food waste could be repurposed for animal feed or fertilizers. However, one particular food production line—popcorn waste—presented a unique challenge, as it could not be sold or reused in this way. In response, we developed WASEN Coals, a groundbreaking solution based on the waste-to-energy principle. WASEN Coals are created by grinding leftover popcorn, compacting it, and sun-drying it to preserve its natural qualities. We then enhance its efficiency by adding used vegetable oil, resulting in a sustainable, biodegradable product perfect for outdoor activities like barbecues and camping.

The benefits of WASEN Coals are manifold: they help reduce greenhouse gas emissions, offer lightweight portability, and provide a convenient solution for eco-conscious outdoor enthusiasts. More importantly, they contribute to reducing food waste in communities, turning what would be discarded into a valuable resource. Made from safe, eco-friendly ingredients, WASEN Coals not only serve the environment but also create an opportunity for additional revenue through sales.

By transforming food waste into a practical and sustainable product, WASEN Coals make a positive impact on both the planet and our communities.



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The Cyclone Skimmer (Aerator and Water Mixer)

Patent/project number: 2503000677

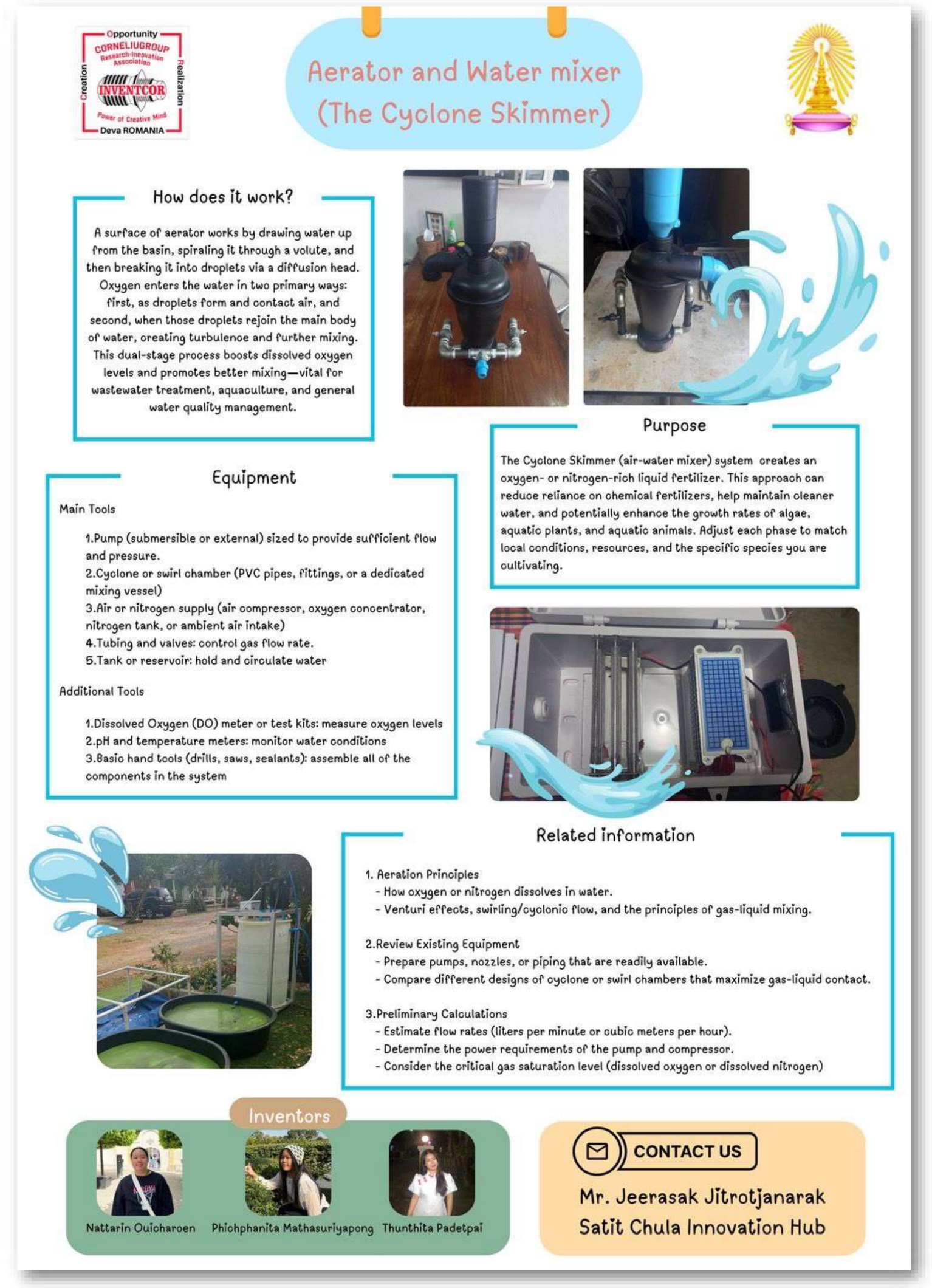
Nattarin Ouicharoen , Phichphanita Mathasuriyapong, Thunthita Padetpai

Mentor:Jeeasak Jitrotjanarak

A

The Cyclone Skimmer (air-water mixer) system to create an oxygen- or nitrogen-rich liquid fertilizer. This approach can reduce reliance on chemical fertilizers, help maintain cleaner water, and potentially enhance the growth rates of algae, aquatic plants, and aquatic animals. Adjust each phase to match your local conditions, resources, and the specific species you are cultivating.

A surface aerator works by drawing water up from the basin, spiraling it through a volute, and then breaking it into droplets via a diffusion head. Oxygen enters the water in two primary ways: first, as droplets form and contact air, and second, when those droplets rejoin the main body of water, creating turbulence and further mixing. This dual-stage process boosts dissolved oxygen levels and promotes better mixing—vital for wastewater treatment, aquaculture, and general water quality management.



Example: To enrich water with oxygen or nitrogen for cultivating algae, aquatic plants, or aquatic animals.

2. Research and Design

1.Review Existing Equipment

1. *Identify pumps, nozzles, or piping that are readily available.*
2. *Compare different designs of cyclone or swirl chambers that maximize gas-liquid contact.*

2.Preliminary Calculations

1. *Estimate flow rates (liters per minute or cubic meters per hour).*
2. *Determine the power requirements for your pump and/or compressor.*
3. *Consider the desired gas saturation level (dissolved oxygen or dissolved nitrogen).*

3. Equipment

1.Main tools

1. ***Pump (submersible or external): provide sufficient flow and pressure.***
2. ***Cyclone or swirl chamber (PVC pipes, fittings, or a mixing vessel)***
3. ***Air/nitrogen supply (air compressor, oxygen concentrator, nitrogen tank, or ambient air intake).***
4. ***Tubing and valves: control gas flow rate.***
5. ***Tank or reservoir: hold and circulate water.***

2.Additional Tools

1. *Dissolved Nitrogen (DN) meter or test kits: measure nitrogen levels.*
2. *pH and temperature meters: monitor water conditions.*
3. *Basic hand tools (drills, saws, sealants): assemble all the components .*

CONTACT :
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Satit Chula Innovation Society

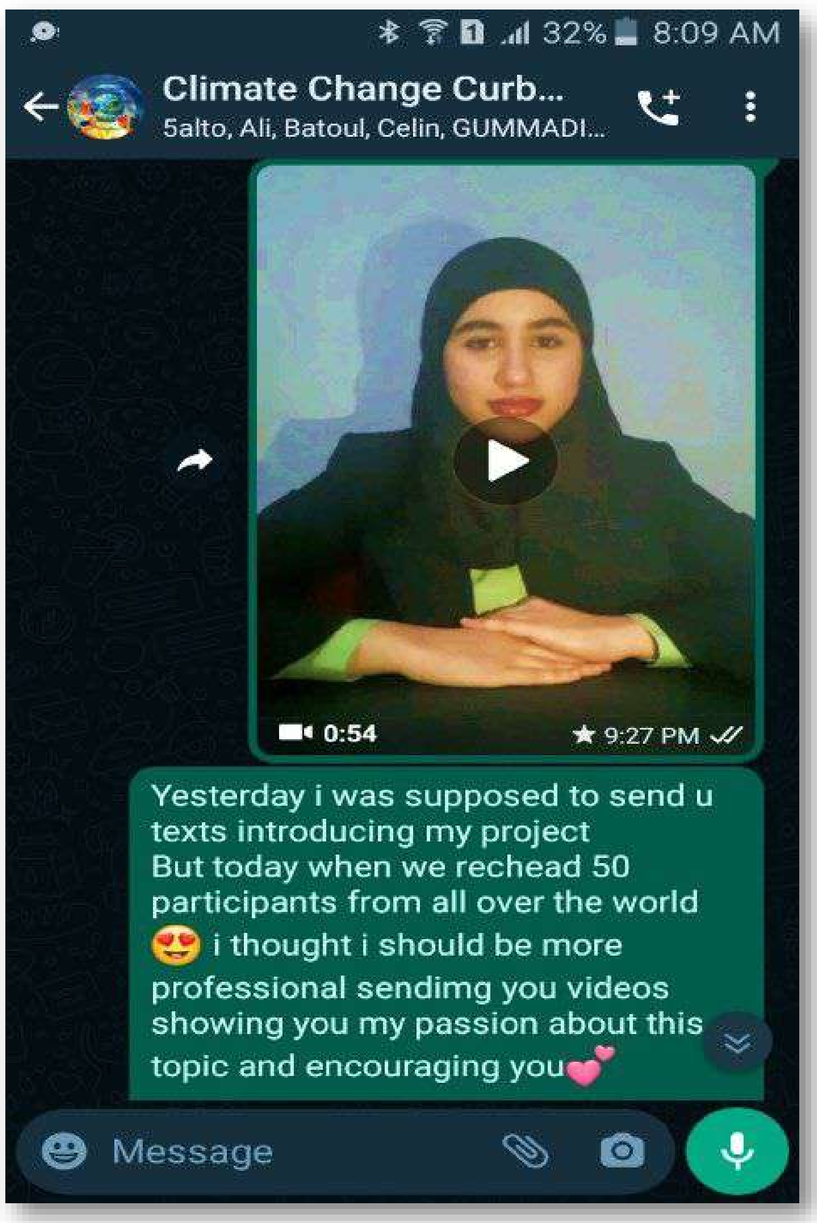
Climate Change Curb

Student Project

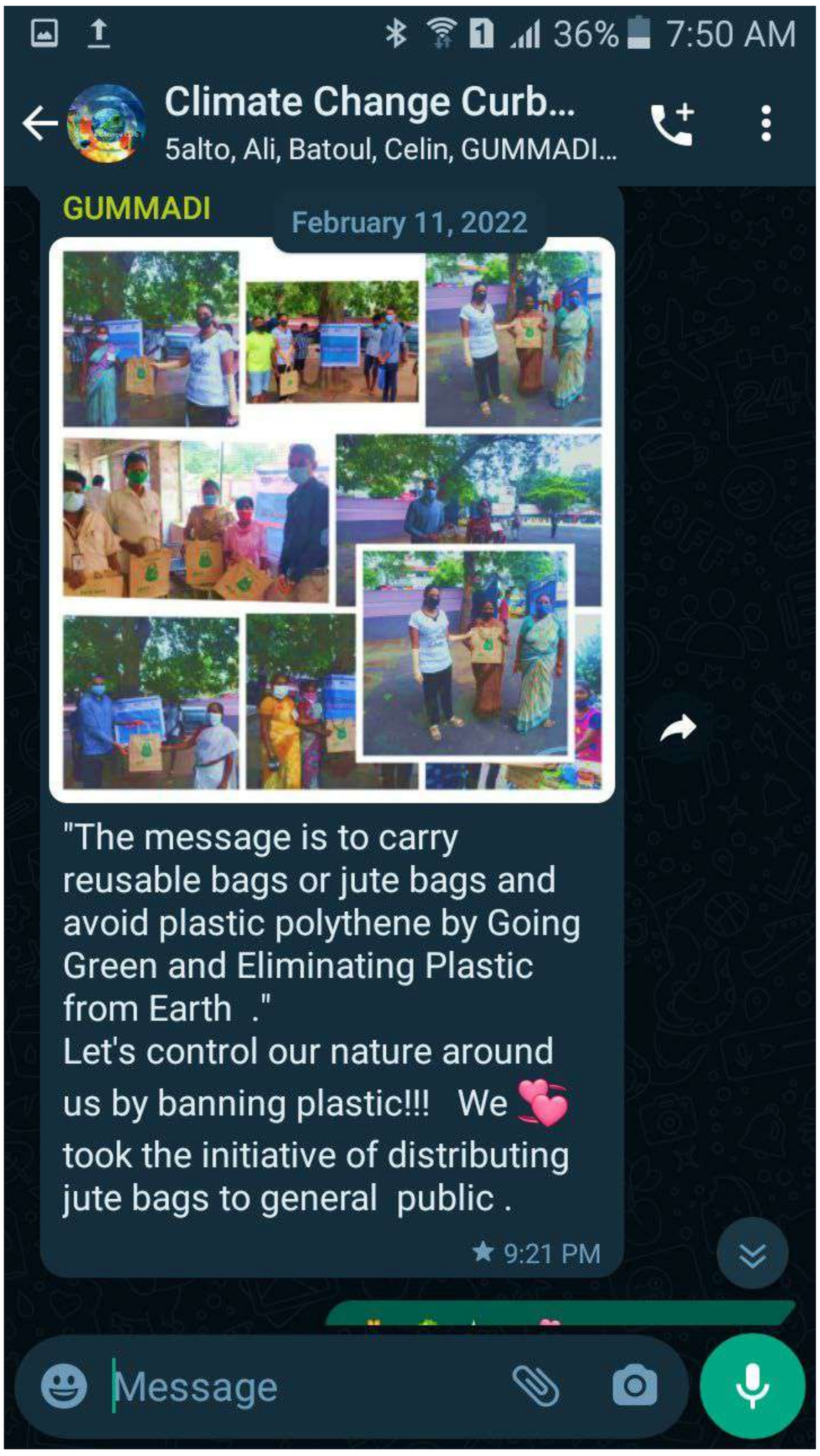
Author: Zainab Arzouni

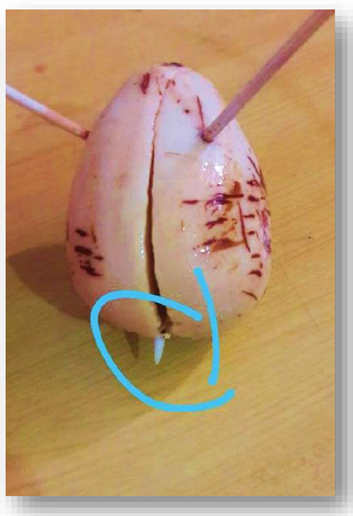
A

I was always passionate about protecting and saving nature, and when I joined some online webinars about Climate Change I was shocked with the threat our environment is exposed to. Then, I wanted to make a change, to make actions, not just to spread awareness by talking or writing. I knew that trees is the only cure for Climate Change as one tree can absorb 22KG of Carbon dioxide a year which is huge, since as we know that carbon dioxide is one of the poisonous gasses causing climate change. So, since I was a known international student, I took the advantage of making a whatsapp group and invited people from around the globe, when i had 70 people from more than 9 countries, I started sending them videos of me talking introducing them to Climate Change and spread awareness, then i planted lots of trees in my country and sent them the videos, this way they were encouraged and sent their contributions, so mision was accomplished.



Climate Change Curb VIDEO





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Worldwide Perspective on the Lighting Market

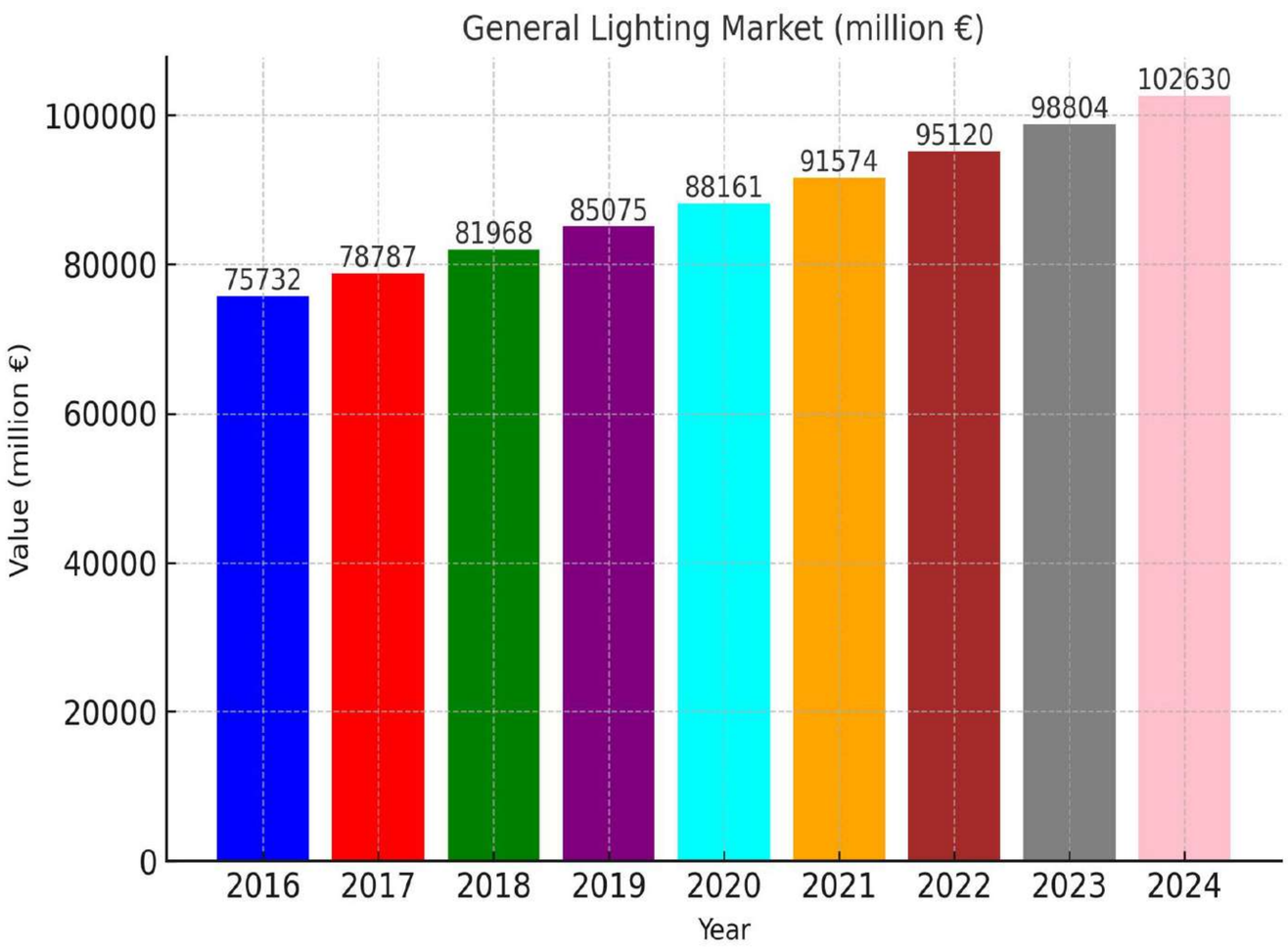
Research project

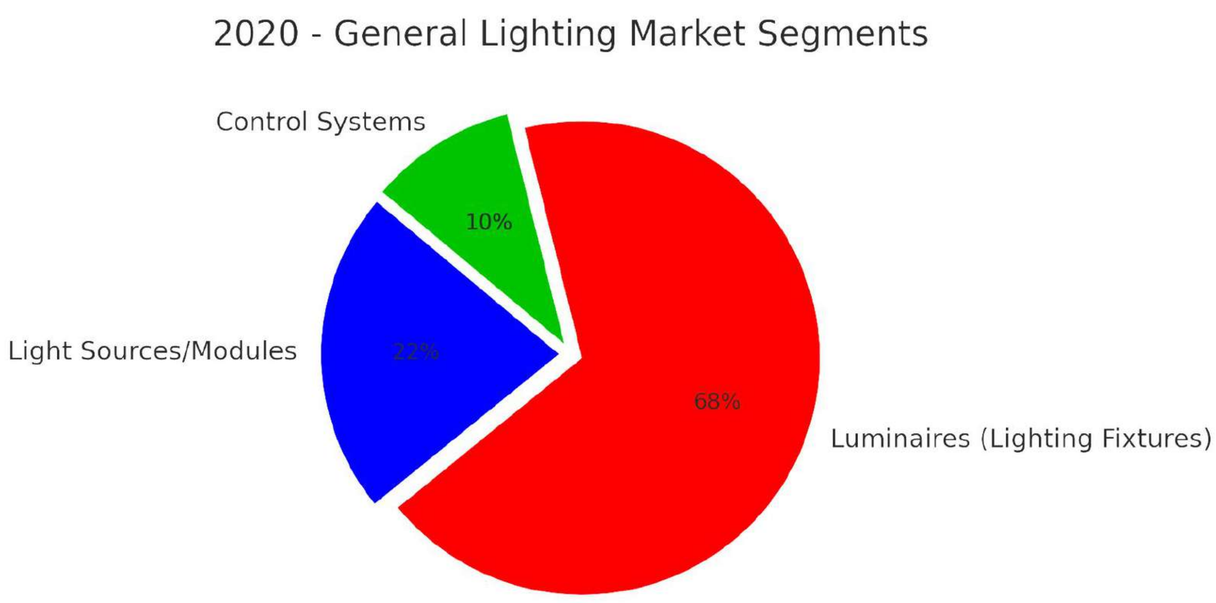
Authors: Mihaela ŞTEFAN, Ioana FĂRCEAN

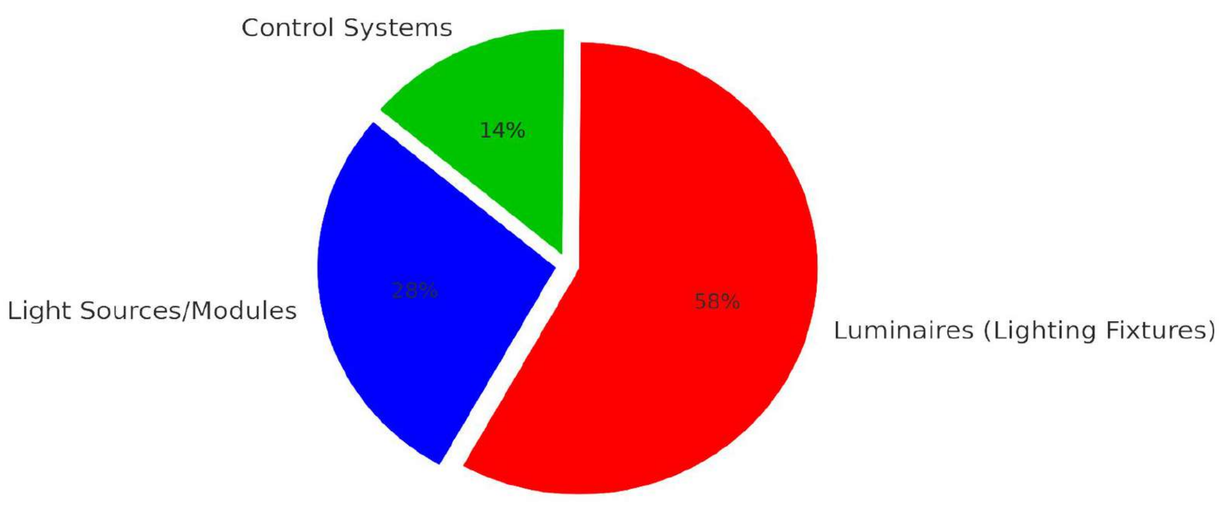
A

Currently, the lighting industry is undergoing a true revolution, marked by profound transformations at all analyzed levels. We are witnessing the emergence of new market segments, such as lighting control devices and backlight illumination, which are redefining the landscape of this industry. Phenomena are emerging that could lead to the disappearance of the traditional lighting industry, as it undergoes increasing reconfiguration and transformation towards the electronics sector.

The general lighting market has experienced steady growth between 2016 and 2024, increasing from 75,732 million EUR to an estimated 102,630 million EUR, marking a 35% expansion. The acceleration of this trend after 2020 is driven by the transition to LED technology, the rising demand for smart control systems, and regulations on energy efficiency.







Between 2020 and 2023, the general lighting market has undergone a shift in segment distribution. The share of luminaires (lighting fixtures) has decreased from 68% in 2020 to 58% in 2023, indicating a relative decline in dominance.

Meanwhile, light sources/modules have increased from 22% to 28%, and control systems have grown from 10% to 14%. This suggests a market trend toward more efficient and advanced lighting technologies, with a greater emphasis on modular solutions and smart control systems, likely driven by the demand for energy efficiency and automation.

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ST. PATRICK SCHOOL
of Quezon City

The Over -Well: An Energy -Efficient Solution for Water Debris Collection

A

-

This paper was personally funded by the authors below, in addition to the project being completely self funded by the authors

Authors: Anne TIU, Cristina CACHO, Janelle ESCASA, Joaquin NICHOLAS PEREJA, John David Reginald Sta Cruz ACEDILLO, Krister SERRANO, Paul TAN, Zack TEJEDOR

Mentors: Sir. Dary DACANAY, Sir. Raymundo Carlo HERNANDEZ

The Over -Well is an and energy -efficient device designed for the collection and sampling of plastic debris and microplastics in water bodies .

Inspired by the Seabin , this device aims to improve upon existing solutions by minimizing energy consumption and utilizing a simple yet effective construction . The Over -Well operates using a pulley system powered by a motor, allowing it to submerge into the water and passively collect floating waste . Its use of a mosquito net as a catch bag ensures that even microplastics , which are less than 5mm in size, can be effectively gathered for research and waste management efforts .

The significance of the Over -Well lies in its contribution to environmental sustainability and research on plastic pollution . Given the increasing concerns about microplastic contamination, consistent and accurate sampling is crucial to understanding the extent of pollution in different water bodies . The device addresses the need for an energy -efficient solution, as current alternatives, such as the Seabin , require a constant power supply, making them less viable in regions with energy limitations . The Over -Well operates more efficiently, with its motor active only 66 .1% of the time, reducing overall energy consumption by 33.9% compared to similar devices .

The Over -Well functions through a three -phase cycle : submersion, collection, and drainage . As the device is lowered into the water, a vortex is temporarily created, drawing in floating plastics and debris . Side holes allow water to enter a separate chamber, preventing it from toppling over while maintaining stability . One -way valves at the bottom facilitate drainage without requiring an additional motor, further enhancing energy efficiency .

Overall, the Over -Well provides a cost -effective and sustainable approach to tackling plastic pollution, aligning with global efforts to improve waste management and promote cleaner aquatic environments .

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Determining groundwater transmissivity through the analyses of physical properties and chemical composition from Svalbard fjord sediments

A

Research project

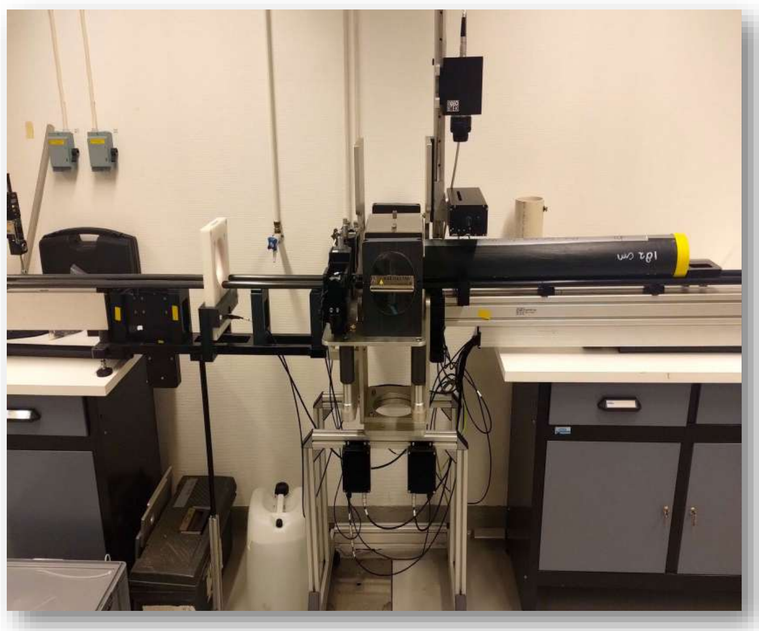
Author: Zaga Trišović

Throughout the two-week Short-Term Scientific Mission (STSM), a thorough evaluation of the physical and mechanical properties of soil and sediment cores from Svalbard was diligently carried out. These cores underwent meticulous measurements, analysis, and processing as outlined in the predetermined work plan, considering practical constraints and the available timeframe.

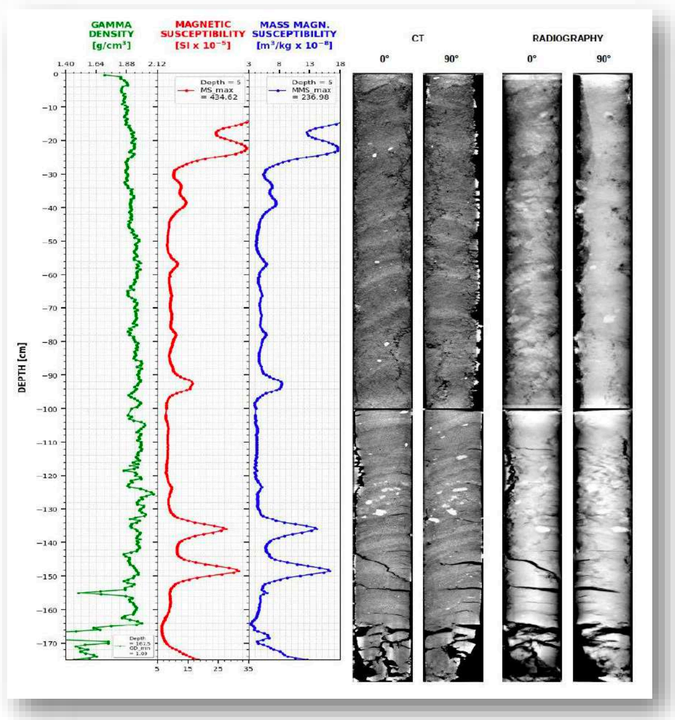
The culmination of these efforts resulted in meticulously examined and refined datasets and imagery derived from comprehensive analysis of the sediment cores. These valuable resources are set to be openly accessible to the public via esteemed Open Access data repositories. This deliberate transparency not only promotes scientific openness but also lays the groundwork for future research endeavors in the realm of Offshore Freshened Groundwater (OFG).

The next step involves further exploration and analysis of the amassed data and imagery, to be presented either at an academic conference or as part of a forthcoming scientific paper. This forthcoming documentation will detail the laboratory procedures, data analyses, and resulting insights, significantly contributing to ongoing discussions within this scientific field.

Rotating X-ray CT system - RXCT



The Multi-Sensor Core Logger - MSCL



Visual representation of the data obtained from RXCT and MSCL.

Although time constraints prevented examinations of split cores, collaborative efforts in the future are expected to facilitate additional analyses of these samples. Potential future endeavors may include further measurements of split cores, allowing for deeper characterization of groundwater transmissivity within Svalbard's fjords. Additionally, the prospect of developing numerical models and fostering collaborations within the COST Action network holds promise for future project undertakings within the broader framework of the COST Action.

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Plastic Recycler

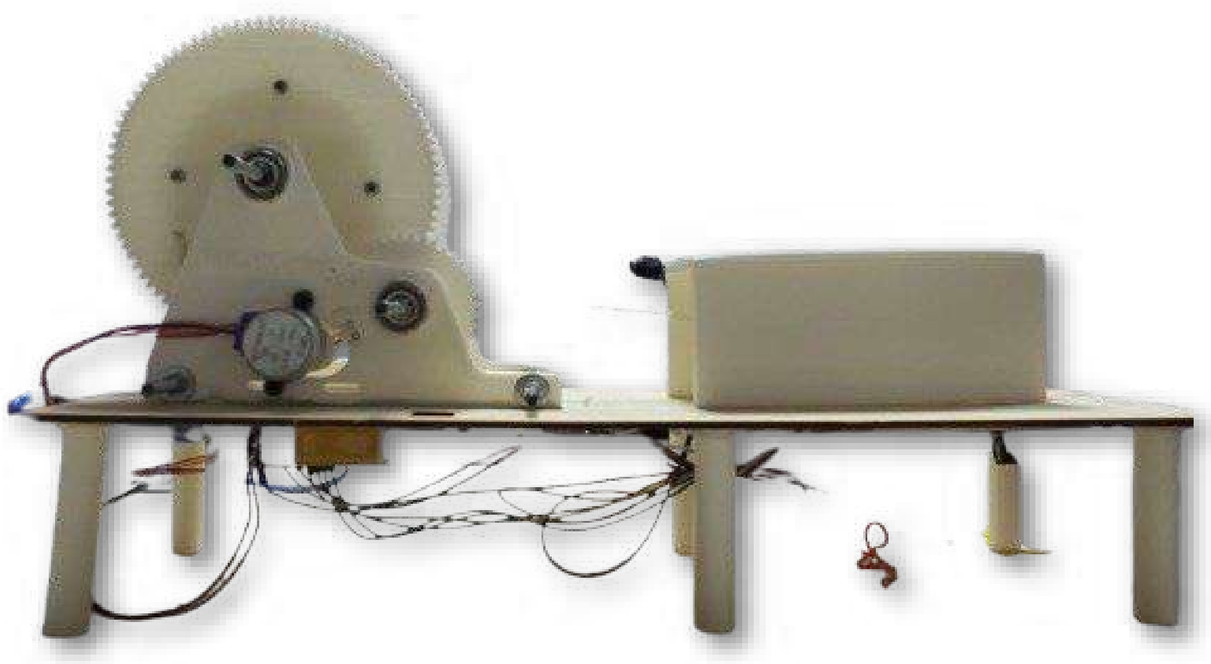
Author: Plop Iulian
Mentor: Victor Ciuvaga

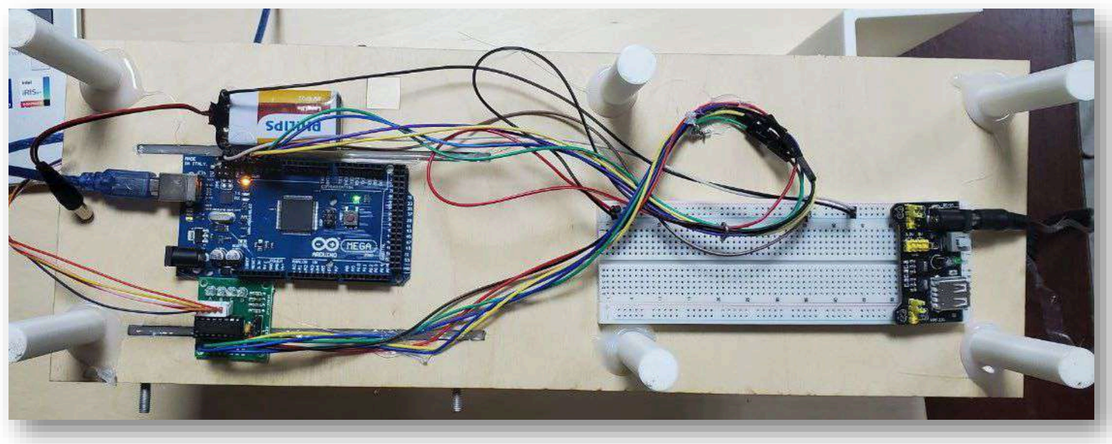
A

The PET Bottle Recycler is an innovative device designed to convert discarded plastic bottles into **high-quality 3D printing filament**. This project addresses the growing issue of **plastic pollution** by providing an **efficient and sustainable** way to recycle PET waste into a **valuable resource** for 3D printing applications.

This study explores the efficiency of the recycling process by analyzing the quality and consistency of the filament produced. The system consists of a **cutting mechanism**, an **extrusion unit**, and a **cooling system**, ensuring a uniform filament diameter. The integration of **Arduino-based automation** allows for precise control of temperature and extrusion speed, optimizing the quality of the output.

Experiments were conducted using **various types of PET bottles** to evaluate the mechanical properties of the produced filament. The results show that the recycled filament can be successfully used for **functional and educational 3D printing applications**, reducing dependency on commercial filaments and promoting a **circular economy**.





A significant challenge in the process was maintaining **a consistent filament diameter**, as variations can impact print quality. To address this, the project includes **real-time monitoring** and **automated adjustments** to ensure stability.

The proposed system represents a step towards **accessible, eco-friendly filament production**, with applications in **education, prototyping, and sustainable manufacturing**. Further research will explore scalability, additional plastic types, and enhanced automation for improved efficiency.

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CHEMIRESISTIVE ETHANOL SENSOR BASED ON GRAPHENE AND METAL OXIDE NANOCOMPOSITES AND A PROCESS FOR OBTAINING IT

A

Patent: RO 134143 B1

Authors: COBIANU CORNEL, ȘERBAN BOGDAN-CĂTĂLIN, BUIU OCTAVIAN, DUMBRĂVESCU NICULAE, MARINESCU MARIA-ROXANA, IONESCU OCTAVIAN-NARCIS, AVRAMESCU VIOREL MARIAN

The patent **RO 134143 B1** describes an **innovative sensor** that presents a **technical solution** aimed at improving efficiency, functionality, or performance. The invention likely includes **specific components or processes** that differentiate it from existing solutions.**The novelty** of the sensor results from the original synthesis process of the sensitive layer and the innovative way of nanostructuring the sensitive material, without using surfactants to orient the direction of material growth, but by choosing the basic pH of the synthesis solution.

Chemiresistive sensor with sensitive layer of ZnO and graphene pH=14 solution

- $Zn(NO_3)_2$ x 6 H_2O was weighed to obtain 0.8940 g and then the measured amount was dissolved in 5 ml DI H_2O;
- NaOH: 1,59 g and dissolved in 4 ml H_2O DI;
- 71,4 ml aqueous graphene solution was measured;
- The solution with the Zn salt was gradually poured into the measured graphene solution, stirring continuously;
- Drops of the basic NaOH solution were poured into the synthesis beaker, stirring continuously;
- The pH of the solution was measured with litmus paper after each small addition of NaOH solution until reaching the pH=14 value;
- The ultrasound installation was used (200 W / 1.5 h / 64-67 ^oC);
- The pH was measured again, which was maintained at 14;
- The solution was kept in the refrigerator for sedimentation for 24h;
- The water was replaced and the pH was measured again, which became 12;
- The process was repeated several times until reaching a pH = 7;
- The powder was dried in a microwave oven;
- Treatment of ZnO-graphene nanocomposite powder from solution at pH=14 – heat treatment at 450 ^oC in nitrogen;
- After calcination in nitrogen, the powder was dispersed in deionized water to form a sufficiently consistent paste that could be positioned in a controlled manner over the platinum interdigitated electrodes of the sensor. After thermal consolidation of the deposited layer, the sensor is ready for functional tests.

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

Brevet de invenție

DUPLICAT

ELIBERAT INVENTATORULUI
în baza Art.34 alin.(2),
din Legea nr.64/1991 republicată

Nr. 134143

Acordat în temeiul Legii nr.64/1991 privind brevetele de invenţie, republicată în Monitorul Oficial al României, Partea I, nr.613, din 19 august 2014.

Titular: INSTITUTUL NAȚIONAL DE CERCETARE-DEZVOLTARE PENTRU MICROTEHNOLOGIE-IMT BUCUREŞTI, VOLUNTARI, IF, RO

Titlul invenţiei: SENZOR CHEMIREZISTIV DE ETANOL PE BAZĂ DE NANOCOMPOZITE DE GRAFENĂ ŞI OXID METALIC ŞI UN PROCEDEU DE OBŢINERE A ACESTUIA

Inventatori: COBIANU CORNEL, BUCUREŞTI, B, RO; ŞERBAN BOGDAN CĂTĂLIN, BUCUREŞTI, B, RO; BUIU OCTAVIAN, BUCUREŞTI, B, RO; DUMBRĂVESCU NICULAE, BUCUREŞTI, B, RO; MARINESCU MARIA ROXANA, BUCUREŞTI, B, RO; IONESCU OCTAVIAN-NARCIS, PLOIEŞTI, PH, RO; AVRAMESCU VIOREL MARIAN, BUCUREŞTI, B, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 06/11/2018, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea și aplicarea sigiliului
Director General

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI ROMÂNIA

București, Data eliberării 30/01/2025

Tipărit ... tipografia O...

Contact: octavian.buiu@imt.ro

CARBON DIOXIDE SENSOR

Patent application A/00473, 28.01.2022

Authors: ȘERBAN Bogdan-Cătălin , BUIU Octavian, COBIANU Cornel, MARINESCU Maria-Roxana

A

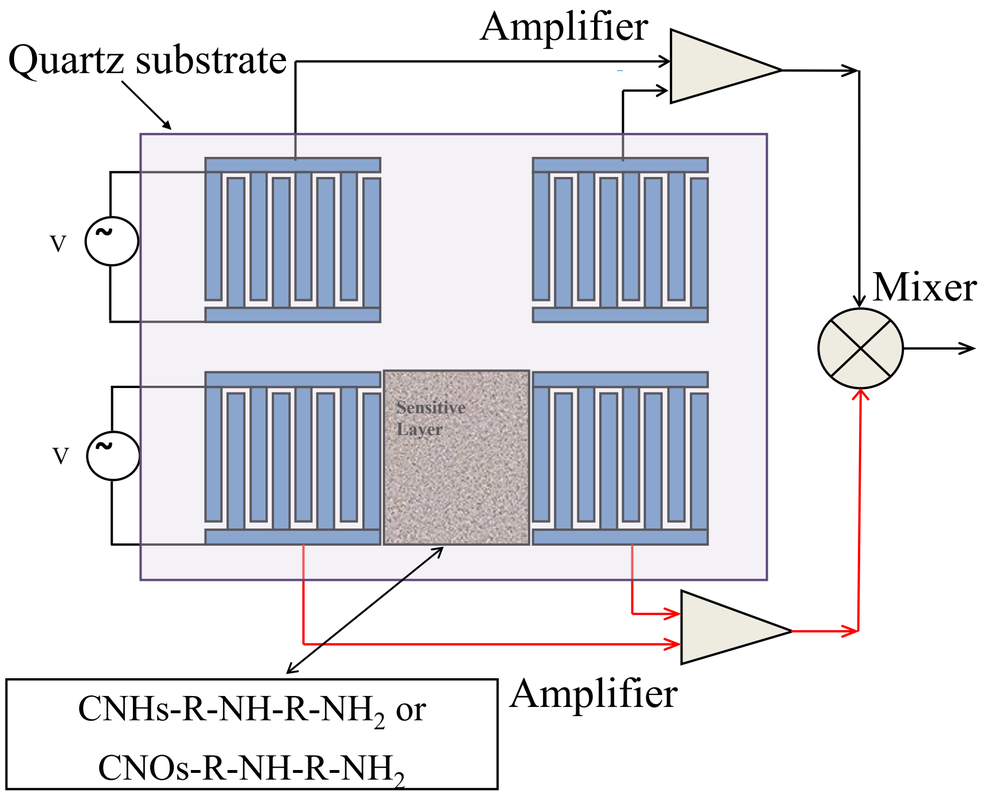
DESCRIPTION

Carbon dioxide (CO_2) detection is important in various sectors of domestic and industrial activity, such as indoor air quality control (air conditioning and ventilation systems), healthcare (monitoring of respiration, anaesthesia), agriculture (monitoring of CO_2 flow in soil), food technology (packaging processes, transport), alcoholic beverage industry.

The invention includes the design and manufacturing processes for a surface acoustic wave (SAW) CO_2 sensor, employing **carbon nanohorns** and **carbon nanoonions** functionalized with groups such as -CO-NH-CH_2-CH_2-NH-CH_2-CH_2-NH_2, (abbreviated as CNHs-R-NH-R-NH_2 and CNOs-R-NH-R-NH2) as sensing layer, a quartz piezoelectric substrate and interdigital transducers.

SYNTHESIS OF THE SENSING LAYER

• Oxidized carbon nanoborns (10 mg), purchased from Sigma Aldrich, and 1 mL of (*N*-[(dimetilamino)-1*H*-1,2,3-triazolo[4,5,6]piridin-1-ylmetilen]-*N*-metillmetanaminium hexafluorofosfat *N*-oxide-HATU)are dispersed in 5 mL diethylenetriamine and subjected to ultra sonication for 3 hours.
• The reaction mixture was diluted with 100 mL methanol and then filtered.
• The solid product is dried in the oven at 100 °C for 1 hour, under vacuum.
• A solution of CNHs-R-NH-R-NH_2 (5 mg) in 50 mL dimethylformamide is ultrasonicated at RT for 10 hours.
• The obtained solution is deposited by the spin coating method on the quartz substrate (3000 rpm, for 60 s).
• The film is heated to 100 °C for 90 mins. The obtained film is subject to a final heat treatment, at 100 °C, for 60 mins.



The sensing structure

ADVANTAGES OF THE PROPOSED SENSING LAYERS

• Improved mechanical properties, better processability, fast response, detection at RT, increased selectivity;
• High specific area / volume ratio, affinity for CO_2 molecules through HSAB-type interactions ("mass loading"), as well as a variation of its resistance in contact with CO_2 molecules ("electric loading").

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"Alexandru Ioan Cuza" University of Iași

Faculty of Biology

THE IMPACT OF PESTICIDES ON OXIDATIVE STRESS AND ANTIOXIDANT RESPONSE OF LENTIL PLANTS

Student Project

A

Authors: Elena-Iuliana FODOR

Mentor: Șef lucr. dr. Todirașcu Ciornea-Elena

Introduction

This work aimed to determine and evaluate the effects of applying pesticides to Lens culinaris through the activity of oxido-reductases that are involved in counteracting the effects produced by oxidative stress.

Materials and method

Oxidative stress is a subject that is being intensively studied nowadays, especially when it comes to its negative effects on plants. Therefore, oxidative stress represents a real imbalance between the production and storage of reactive oxygen species, visible both at the cellular and histological levels. The enzymes that were determined in this study were superoxide dismutase and peroxidase, which are oxido-reductases involved in the first line of defense against oxidative stress. Lentil seeds were sown in soil specifically intended for vegetable crops, the plants being grown in two conditions, namely: in laboratory conditions and in garden conditions, with three pesticides being applied to the ones in the garden: Pictor® Active, Faster 10 CE and Trika Expert.

Results

Following the determination of the activity of the two enzymes, a significant increase in the activity of superoxide dismutase, peroxidase and implicitly the accumulation of reactive oxygen species was observed. Therefore, in Figures 1 and 2 below, significant increases in the two oxido-reductases can be observed, compared to the reference batch, both in the lentil variants grown in laboratory conditions and in those that were grown in the garden under the influence of the three pesticides and harsh environmental conditions.

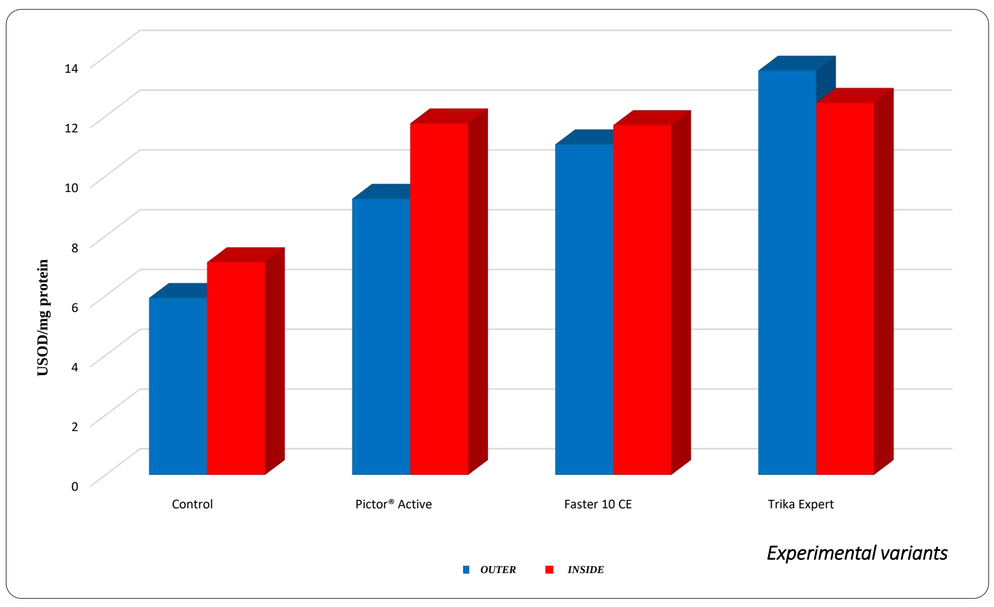

Fig. 1. Superoxide dismutase activity in lentils

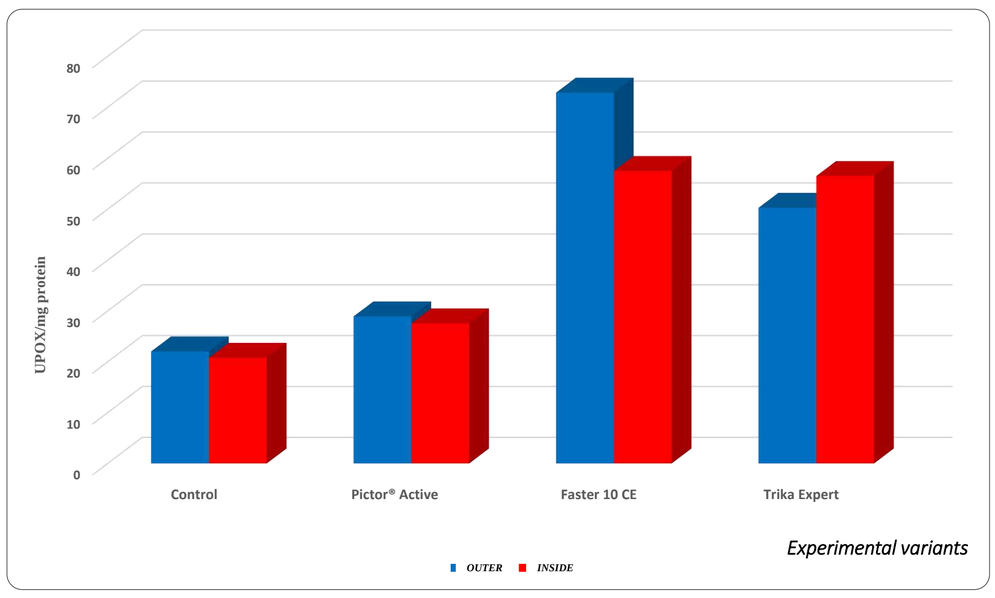

Fig. 2. Peroxidase activity in lentils

Conclusions

The intensive use of pesticides, even in the doses recommended by the manufacturer, affects agricultural crops, contributes to soil pollution, and causes major imbalances in ecosystems, impacting flora, fauna, and animal organisms.

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BRAZIL

TECHNOLOGY FOR PURIFYING INDUSTRIAL ODORS

A

Patent/project number: BR 202015011823-1

Camilo Freddy Mendoza Morejon

Andy Avimael Saavedra Mendoza and Jeferson Alexandre dos Santos Bosa

The patent refers to a modular filter consisting of a set of elements, whose unique shape and arrangement of components have resulted in a functional improvement of equipment that, through the adsorption of gaseous pollutants in a removable filtering medium, enables the treatment of gaseous effluents from various sources, particularly industries.

The main distinguishing features of the equipment include:

- A continuous feeding system for gaseous effluents from industrial processes;
- Elements that make up the gas filtration system;
- A device that allows the periodic replacement of the filtering medium after saturation;
- A device that ensures uniform porosity of the filtering medium to prevent pressure losses;
- A modular shape and arrangement that allow flexible sizing to meet various capacities;
- An operating method that ensures maximum and continuous efficiency in the treatment of industrial gaseous effluents by purifying gaseous pollutants in the filtering medium.

Contact:

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Project funded by:

CNPq
Conselho Nacional de Desenvolvimento Científico e Tecnológico

Partnership:

unioeste Universidade Estadual do Oeste do Paraná X Faricon AGROINDUSTRIAL COMPANY

GPINOVA – unioeste – Building a better world

Research Group on Technological Innovations for Innovative Territorial Development

Renewable Energy Sources and Circular Economy Applied in an Academic Community as an Example for Smart Sustainable Development

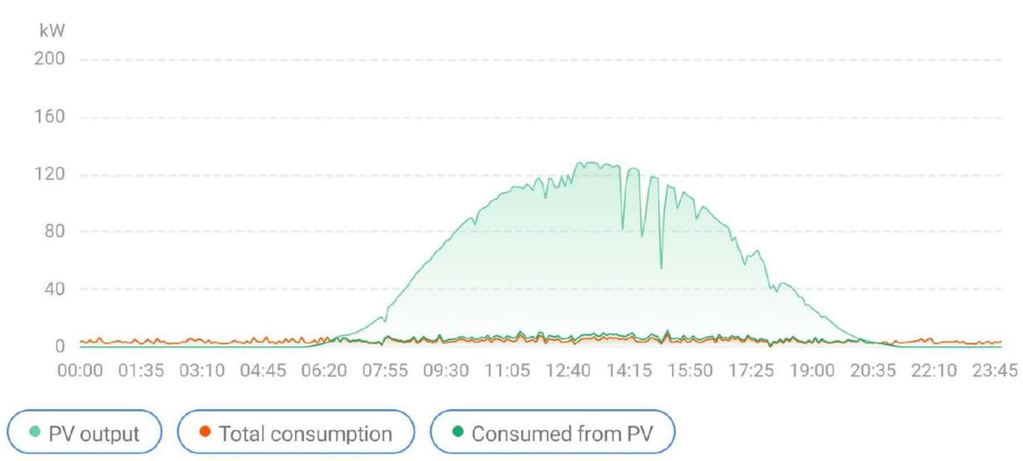
A

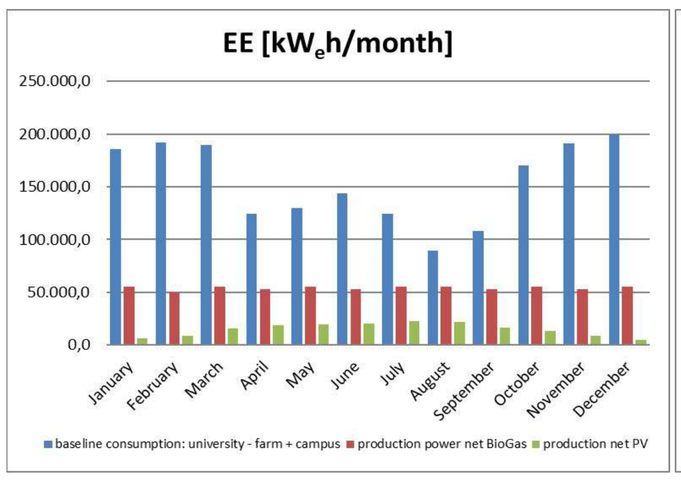
Project number: 2020/554215

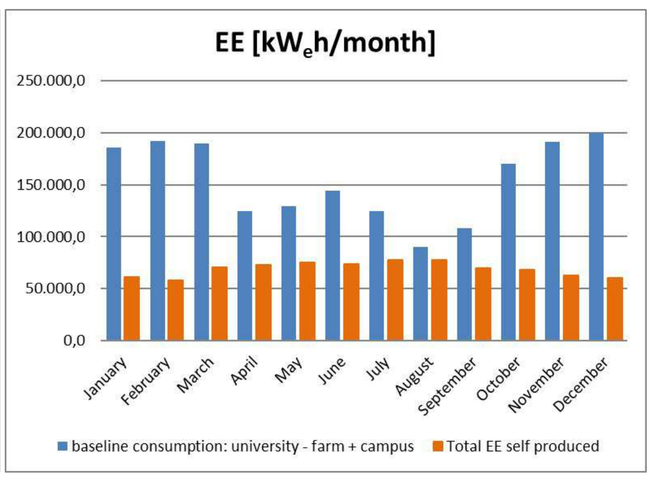
Authors: Vintilă Teodor, Popescu Cosmin Alin, Radulov Isidora, Horablaga Adina, Marco Di Stanislao

Description

The energy system consists of a photovoltaic plant of 150 kWe and a biogas plant containing a CHP unit of 100 kWe installed capacity. The total electricity production capacity of the system is predicted at approx. 825 MWh/year, which can cover up to 50% of the total electricity consumption of the USV Regele Mihai I campus in Timișoara. Total savings of CO2 equivalent are evaluated at 2400 tons / year. State of development: Project, energy system in function

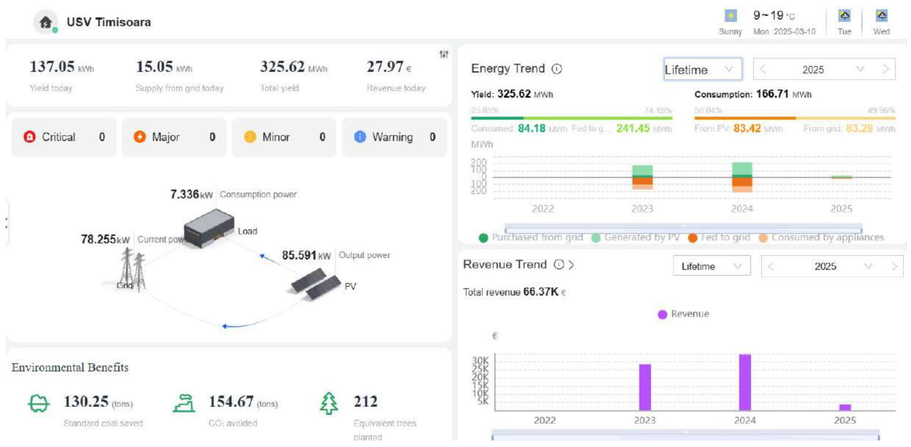






University campus will save up to 50% of electric energy from fossil fuel and 10% of thermal energy from fossil fuel

The time for renewable energy and circular bioeconomy has arrived. Replication of **RES-CIRCULAR project powered by Norway through the Norway Grants**, will help to achieve energy security in România and in Europe and to reduce negative impact of human activity on the climate and environment



University can connect renewable energy technologies with a large number fields: agriculture, animal sector, forestry, horticulture, rural development, circular economy, food industry, clean environment.

Transfer of knowledge through training of tomorrow's generation

Total budget: 1,122,514 Euro, of which 954,000 Euro are offered as a grant by Norway through EEA and Norwegian Financial Mechanisms. The rest of the total eligible expenses are foreseen in the budget of USV Timișoara. Project period: December 2020 - April 2025

Contact & info: Dr. Teodor Vintila, Department of Biotechnology, +40256277086, tvintila@animalsci-tm.ro, www.biocombustibil-tm.ro

Proiect finanțat cu sprijinul granturilor acordate prin mecanismul financiar Norvegian 2014-2021, în cadrul „Programului de Energie din România„

B

Nanotechnology

Advanced materials

Metallurgy

Civil engineering

OBTAINING COBALT BLUE FROM USED LI-ION BATTERIES

Anca Icleanu[1], Valeriu Gabriel Ghica[2]

[1]National University of Science and Technology Politehnica Bucharest, Doctoral School of the Materials Science and Engineering Faculty,
[2]National University of Science and Technology Politehnica Bucharest, Dep. of Eng. and Management of Metallic Materials Production

B

Li-ion batteries are the most common type of rechargeable battery used in portable electronic devices, electric and hybrid vehicles, and energy storage systems. The main characteristics of these batteries are: high energy density, long life, and relatively good stability.Li-ion batteries are composed of: Anode (graphite); Cathode: metal oxides such as $LiCoO_2$, $LiFePO_4$, $LiNiMnCoO_2$; Electrolyte: liquid or gel solution of lithium salts (e.g. $LiPF_6$) in an organic solvent; Separator: porous material that allows ions to pass through, but prevents direct contact between the electrodes; Housing and connections. Lithium ions circulate between the electrodes while electrons circulate through an external circuit to provide energy.Li-ion batteries have many advantages (high energy density; low weight and compact shape; fast discharge and charge rate; high number of life cycles) but also disadvantages (high manufacturing costs; sensitivity to overcharging and high temperatures; risk of fire or explosion in the event of a defect).

Materials and methods

The spent Lithium-ion batteries used in this study come from mobile phones (batteries contains Co - 78.114%)and were dismantled manually in order to extract the cathode material. The spent LIBs were discharged completely in a salt solution for 1h and dismantled manually to separate the cathode materials coated on the Aluminum foil. The ultrasonic cleaning machine (Emmi12-HC) used has the following technical specifications: housing – stainless steel, cleaning frequency = 45 kHz; cleaning time = 1–60 min; volume = 1.2 l; heating temperature = 20–80 ºC; ultrasonic power = 50/75/100 W. The ultrasonic cleaning process is based on the phenomenon of ultrasonic cavitations.

The recovery of the cobalt compound ($LiCoO_2$) recovered from Li-ion batteries can be achieved by several methods, depending on the form and purity of the material: direct reuse in the manufacture of batteries if the material is purified and has an appropriate structure; chemical-metallurgical processing for the production of alloys or superalloys; reprocessing to obtain chemical compounds for subsequent use in the chemical industry or in the manufacture of catalysts. Our own research proposes the use of $LiCoO_2$ in the production of cobalt blue pigment.

Conclusions

The paper proposes a method for separating the active paste with cobalt content from the cathode aluminum foil, by ultrasonication in a lactic acid environment and transforming it into a salable product – the cobalt blue pigment.

Spent Li-ion/LCO battery paste, containing cobalt, can be efficiently recovered and recovered through a salable product – cobalt blue ($CoAl_2O_4$); Considering the high price of the pigment (~27 USD/100g), the material costs of the cathode paste from used Li-ion batteries, plus alumina, lactic acid and the reduced consumption of the ultrasonic process open favorable prospects for the recovery of cobalt from used LCO batteries

Fig. 1 Cobalt blue (CoAl2O4) obtained from cathode paste recovered from used LCO batteries mixed with alumina

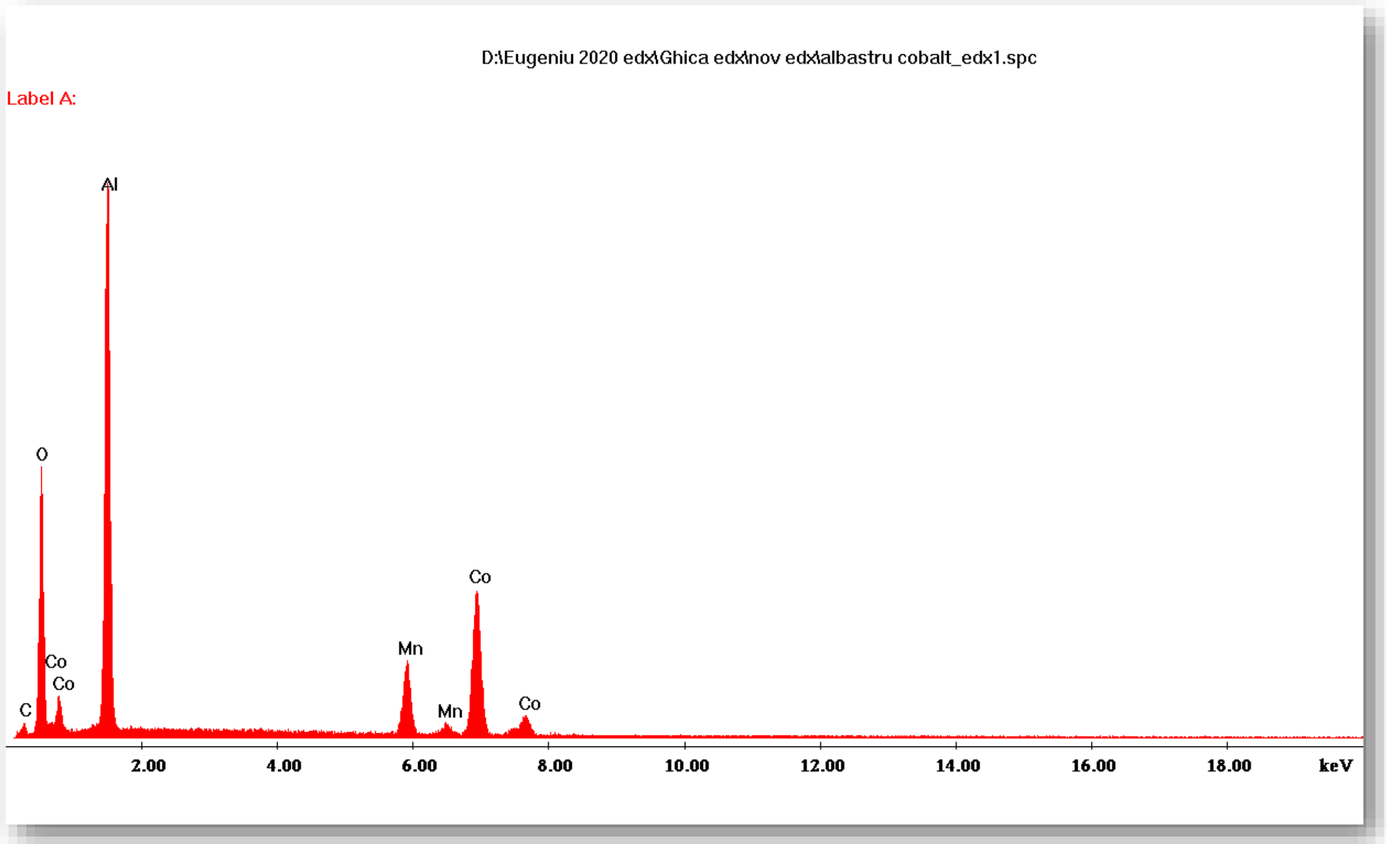


Fig. 2. Results of the Edx investigation of cobalt blue ($CoAl_2O_4$)

Contact: vanca_rhl@yahoo.com

RECOVERY OF USEFUL METALS FROM USED Li-Ion TYPE BATTERIES

B

Cristina Ariton [1], Valeriu Gabriel Ghica[2]

[1]National University of Science and Technology Politehnica Bucharest, Doctoral School of the Materials Science and Engineering Faculty,

[2]National University of Science and Technology Politehnica Bucharest, Dep. of Eng. and Management of Metallic Materials Production

Introduction

The rapid growth of battery usage in the context of the clean energy transition, especially in electric vehicles, consumer electronics and grid-scale energy storage, has driven the need for their efficient recycling to reduce environmental impact. Among batteries, lithium-ion (Li-ion) and lead-acid (LA) cells dominate the market, with LA having very high recycling rates (>99%), while Li-ion recycling is still poor, with recycling rates of around 1%. Li-ion batteries are familiar to us, because we find them in computers, mobile phones, electric or electrified cars, etc. The abbreviation Li-ion signifies the presence of lithium (Li) in the battery along with other chemical compounds. So far, six types of Li-ion batteries have been developed: LCO/$LiCoO_2$, NMC/$LiNIMnCoO_2$, LMO/$LiMn_2O_4$, LFP/$LiFePO_4$, NCA/$LiNiCoAlO_2$, LTO/$Li_4Ti_5O_{12}$. The first batteries launched on the market were of the LCO/$LiCoO_2$ type, and obviously they were the first to reach the collection and recycling centers. Until 2020, the recycling and recovery of useful metals from used Li-ion batteries is carried out in an overwhelming proportion in Asia. The European Union mobilized (2020) to catch up with the Asian markets (China, Japan and South Korea) in the field of Li-ion battery recycling, establishing the European Battery Alliance (EBA).

Materials and methods

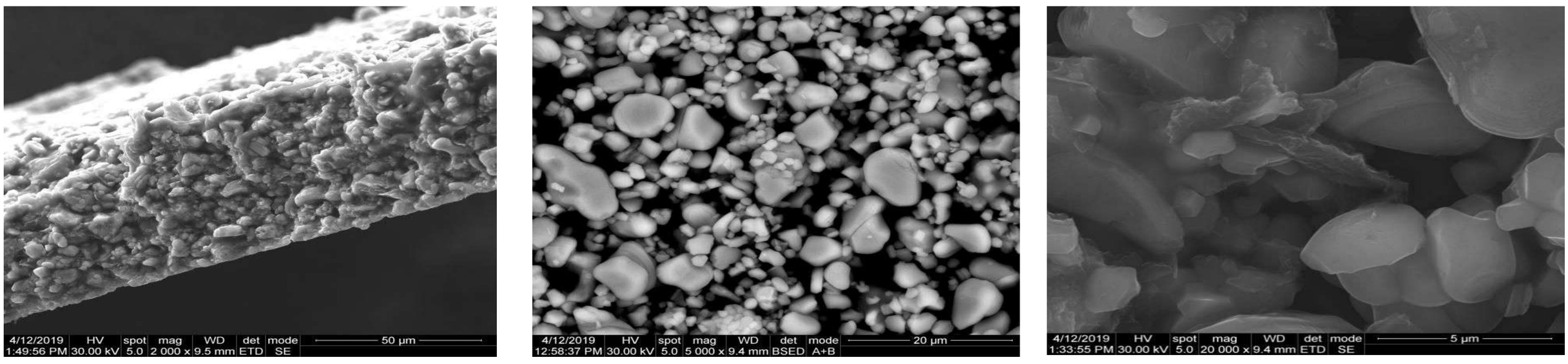
The Ni-MH batteries were manually dismantled and separated into components. The spent LIBs were discharged completely in a salt solution for 1h and dismantled manually to separate the cathode materials coated on the Aluminum foil. The Al-foil was cut into small pieces initially (kept intact for final experiments) and immersed in acidic solution (lactic acid $C_3H_6O_3$) and subjected for ultrasonic cleaning

Conclusions

In this paper an environmentally route for the recovery of active cathode material from spent Li-ion batteries was investigated. The ultrasound technology has the advantages to be easy to use, to work at different temperatures without the need of additional heat and to have low working times. The solution used, i.e. lactic acid - $C_3H_6O_3$, was used to completely detach the cathode material from Al-foil without degrading the material. The results obtained have shown that the technique presents good results at the established parameters.

Once the optimal parameters have been established, we tested the process using an entire cathode foil. The result was a maximum separation efficiency of $\eta = 88.08$ %.

In the future, we propose to process further the obtained cathode powder of $LiCoO_2$ and to clean PVDF (polyvinylidene fluoride) material using a hydrometallurgical method in order to not degrade the active material.



x 500 **x 2000** **x 10.000**

Fig . SEM images of the foil after separation (x500; x2000; x10000).

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METAL FOAMS OBTAINED FROM ALUMINUM ALLOY

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B

Description

Metal foams are lightweight cellular materials inspired by nature (e.g. wood, bone, sea sponges). Metal foams can be divided into closed-cell and open-cell foams ("metal sponges"). Metal foam products are used in structural (which consider low weight and mechanical properties) and functional (heat dissipation) fields. The applications of metal foams depend on the specific properties (permeability, conductivity).Obtaining and improving the quality of metal foams involves studying the physics of the foam: bubble formation, nucleation, growth and stability, diffusion of gases in the melt.

Materials & Methods

Metal foams with closed pores obtained from liquid aluminum alloys can be obtained by blowing with inert (argon, nitrogen) or reactive (air, oxygen) gas, by introducing compounds that dissociate to produce foaming gases (TiH_2, $CaCO_3$) - the Alporas process , by precipitating the gas previously introduced into the melt - the Gazar process, by powder metallurgy.
The inoculation of ceramic particles of graphite, SiC, TiC, Al_2O_3 (10...20%gr) allows the creation of a composite material reinforced with ceramic particles; the melt with a high viscosity, will be bubbled with inert gas or foaming reagent. First, the effect of the inoculation of ceramic particles through the vortex process in different aluminum alloys is analyzed by electron microscopy (SEI, EDX) and X-ray diffraction.
The AlSil2CuNiMg alloy was prepared in an electric induction furnace, with a crucible capacity of 10 kg and a frequency of ν = 8000 Hz, using the following materials: primary aluminum of purity 99.95%; master alloys: AlSi40; AlCu50; AlNi5; AlMnl0; AlMgl0. Ti + B in the form of master alloys AlTi5B and AlTi5BlFe3 for grain finishing and AlSrl0 for modifying eutectic silicon were used as modifiers. The following fluxes were used in the preparation: Protective flux, cleaning and deoxidation during melting, with the composition: NaCl - 45%; KCl - 45%; NaF -10%; Washing and decalcification flux for the AlSil2CuNiMg piston alloy with the following: NaCl - 40%; KCl - 40%; NaF - 20%; Deoxidation flux, washing for the AlMg5 alloy of composition: MgCl2 - 55 %; KCl -20 %; MgF2 -16 %; CaF2 -9 %; Degassing flux of composition: C2Cl6 -88 %; KBF4 -10 %; K2TiF6 -1 %; H3BO3 -1 %.The chemical composition of the alloy is: Si 12.5; Cu 1.3; Ni 1.8; Mg 1.5; Mn 0.5; Ti 0.18; Fe 0.5; rest Al + 3% graphite.

Results and Conclusions

By using an appropriate process, graphite can be inoculated in the form of fine particles (80…240 μm), relatively uniformly distributed in AlSi12CuNiMg type alloys. To improve wetting, an addition of magnesium (1% by weight) was used, and the metal bath was subjected to continuous stirring.Magnesium acts on the wetting process by reducing the wetting angle between the particles and the metal melt.The structure of the samples in the raw cast state is of the eutectic type; in electron microprobe analyses performed at three characteristic points on the sample cast in a copper metal shell, it is found that the interdendritic space is occupied by phases rich in silicon and magnesium, respectively copper and nickel. In the vicinity of the graphite particles, a fine dispersion of silicon from the eutectic (average size of 5…10 μm) is found. Mechanical tests performed on specimens taken from conventionally cooled samples in a copper shell and heat treated (quenching + aging) showed a slight decrease in tensile strength with increasing graphite content; this may be due to the agglomeration of graphite particles when a certain assimilation limit is reached.

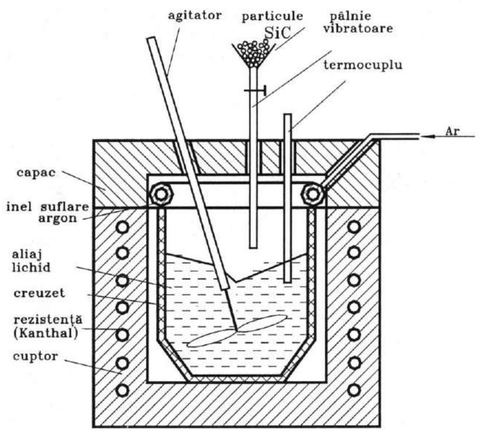

Fig. 1. Schematic diagram of the experimental installation for obtaining Al/SiCp composites through the Vortex process.

Proba	R_m [MN/m²]				
	I	II	III	IV	Media
AlSi12CuNiMg/0%Grafit	212	209	211	210	210,5
AlSi12CuNiMg/1%Grafit	207	210	206	209	208
AlSi12CuNiMg/2%Grafit	204	202	207	206	204,75
AlSi12CuNiMg/3%Grafit	199	201	201	198	199,75
AlSi12CuNiMg/4%Grafit	195	191	194	192	193
AlSi12CuNiMg/5%Grafit	181	189	182	186	184,5
AlSi12CuNiMg/6%Grafit	164	170	166	167	166,75

Fig. 2. Tensile strength, as a function of graphite content, Rm [MN/m2] for AlSi12CuNiMg alloy reinforced with graphite in the form of particles. (samples subjected to a hardening and aging heat treatment)

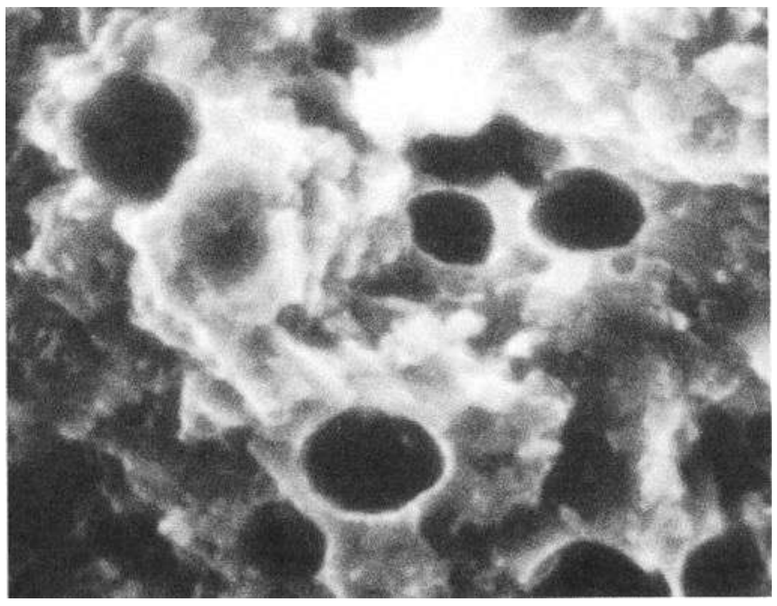

Fig. 3. Characteristic appearance of the fracture of AlSi12CuNiMg/3%Graphite alloy composites (x300).

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RECOVERY OF USEFUL METALS FROM USED Ni-MH TYPE BATTERIES

B

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Introduction

Ni-MH batteries are currently among the most widely used rechargeable batteries; this type of battery was developed and commercialized in Japan starting in 1989-1990. Ni-MH batteries contain significant amounts of REEs, such as La, Ce, Nd and Pr. Rare earth resources are unevenly dispersed globally and are found in deposits with low concentrations, which makes their extraction difficult and expensive. Most of these deposits are located in a few countries, such as China, Brazil, India, Australia, Russia, Vietnam, USA, Greenland, Tanzania, South Africa, which creates strategic dependence and geopolitical risks. In terms of production, China covers 70% of world production, followed by the USA (14.33%), Australia (6%), Myanmar (4%), Thailand (2.37%), Vietnam (1.43%). The use of rare earths in advanced technologies (magnets for permanent magnets, catalysts, batteries, electronics, etc.) has led to an increased demand, which emphasizes the need to find alternative sources of supply. Mining REEs involves energy-intensive processes and can produce severe pollution. Recycling Ni-MH batteries offers a more environmentally friendly alternative to obtain these elements, thus reducing the carbon footprint and environmental pollution.

Materials and methods

The Ni-MH batteries were manually dismantled and separated into components. The operation of separating the support paste was carried out in an ultrasonic bath type Emmi Emmi-12HC. The characteristics of the ultrasonic bath are: the maximum volume of the stainless-steel tank is 1.2 l, the tank having the following dimensions: 200x100x65 mm; cleaning frequency = 45 kHz; cleaning time = 1 - 60 min; the bath temperature can vary between 20 - 80ºC; maximum ultrasonic power = 100 W, ultrasonic power can be set to one of three levels: 50/75/100 W. The water temperature was measured continuously. Cusing water and a solution of about 1M citric acid as a medium were used. The efficiency of the recovery of the metal paste from the metal mesh was determined depending on the ultrasonication time and the bath power. The influence of the ultrasonication bath power on the bath temperature was also monitored. The cathode/anode before cleaning, respectively the cathode/anod support and the paste recovered after separation were analyzed and characterized.

Conclusions

The use of ultrasonication in 1 M citric acid medium allows a controlled and rapid dissolution of rare earth elements (Ce, La, Y) from anode pastes, with a process time between 20 and 40 minutes and an efficiency of up to approximately 84%. This process significantly accelerates the leaching process compared to conventional methods, which can take up to 24 hours.Most rare earths, especially La, Ce and Nd, go into solution during ultrasonication in citric acid, while some traces of Pr can also be detected. Traces of elements are preserved in solution, which facilitates their subsequent recovery and purification.

The ultrasonication process in citric acid is relatively cheap, environmentally friendly and efficient, being a promising alternative for the recycling of rare earths from Ni-MH batteries, especially in the context of new European regulations requiring the labeling of recycled content and specific documentation.

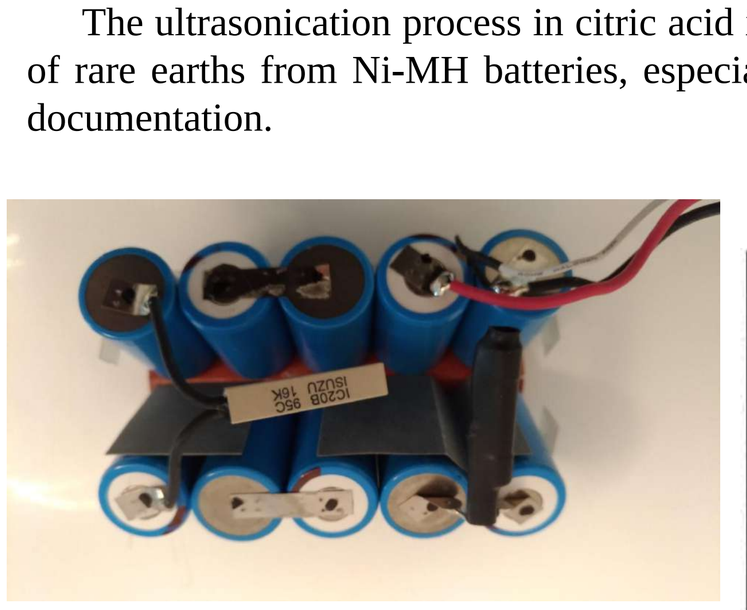

Fig.1 Manual disassembly of useful Ni-MH batery

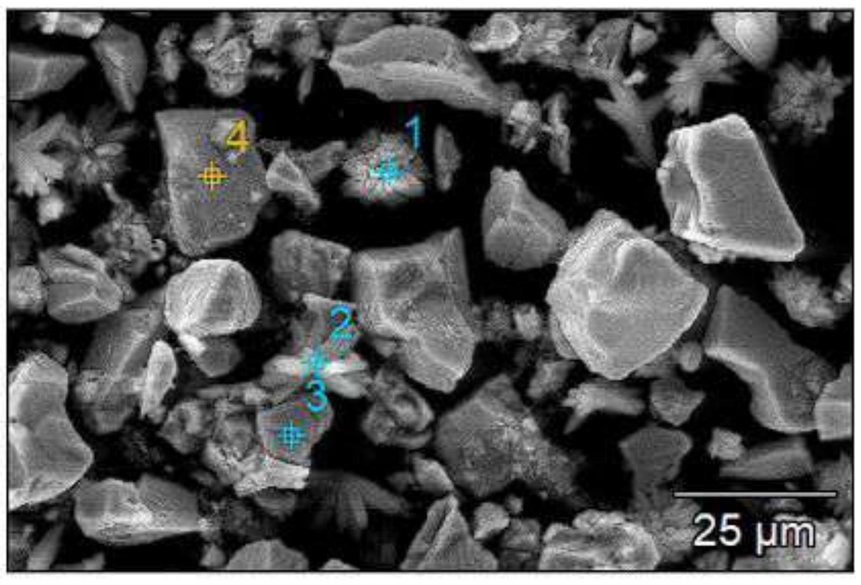

Fig 2. The morphology of the anodic paste recovered by ultrasonication in water.

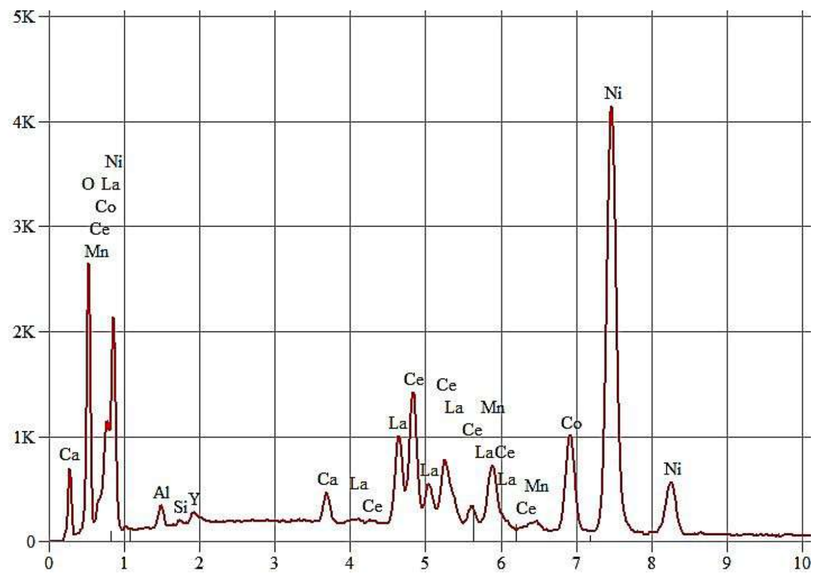

Fig 3. Chemical composition of the powder resulting from ultrasonicstion in water of a section of the anode of useful Ni-MH battery (X-ray emission spectrum).

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THE BEHAVIOUR OF THERMAL INSULATION IN CROSS LAMINATED TIMBER PANELS SUBJECTED TO ROMANIAN CLIMATE CONDITIONS

B

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Introduction

Environmental protection represents a key point in current times for civil engineering structures, where new sustainable materials are in continuous development. One of these types of materials is based on engineered wood in the form of CLT (cross-laminated timber) that can be used for both structural and nonstructural elements. In the presented case, CLT surface panels for structural walls are studied.

For the current research campaign, two types of thermal insulation applied on CLT walls are analyzed in winter and summer climate in order to emphasize the propagation of temperature and humidity among the layers of the wall. The thermal insulations considered are mineral wool and wood fiber; they represent other materials that are following sustainable, ecological, structural and cost benefits for fulfilling the resistance capacities of the wall in the building and the necessary thermal properties.

Material & methods

The climate conditions considered for summer and winter are specific for Romanian climate with high variations in temperature and relative humidity **with -15 ℃ and 80% humidity for the exterior part of the wall and 15 ℃ and 20% for the interior part of the wall in winter time and 40℃ and 5% humidity for exterior part of the wall and 30℃ and 10% humidity for the interior part of the wall.**

The thicknesses of the layers composing the wall are vertical cladding 44 mm, CLT panel 57 mm, vapor retarder 0,5 mm, mineral wool/ wood fiber 120 mm, plain tiles and battens 75 mm and vertical cladding 44 mm.

The dimensions of the wall pack are 34,05 cm with a total weight of $114{,}7\ \mathrm{kg/m^2}$. After the calculation, for winter climate the R value that measures the resistance of a material to heat flow is $4{,}129\ \mathrm{m^2}K/W$ and the sd value is 13,33 m. The U value that measures the heat transfer coefficient of a building is $0{,}242\ \mathrm{W/(m^2}K)$. The measured temperature of the inside surface is 13,2℃ and the temperature on the outside surface is $-14{,}7$℃.

For summer climate the R and U value are the same as for the winter season, the sd –value is 13,45 m. The measured temperature of the inside surface is 30,6℃ and the temperature of the outside surface is 39,9℃.

The conclusions of the study show that the hydrothermal characteristics of each layer considered for the study vary when climatic conditions change from winter to summer in terms of temperature and humidity. The differences when changing the thermal insulation are not significant. The distribution of temperature and humidity among the layers has the most relevant growth in the insulation layer of the wall pack.

In the climatic conditions considered for the study where temperature and humidity change, condensation and mold do not appear.

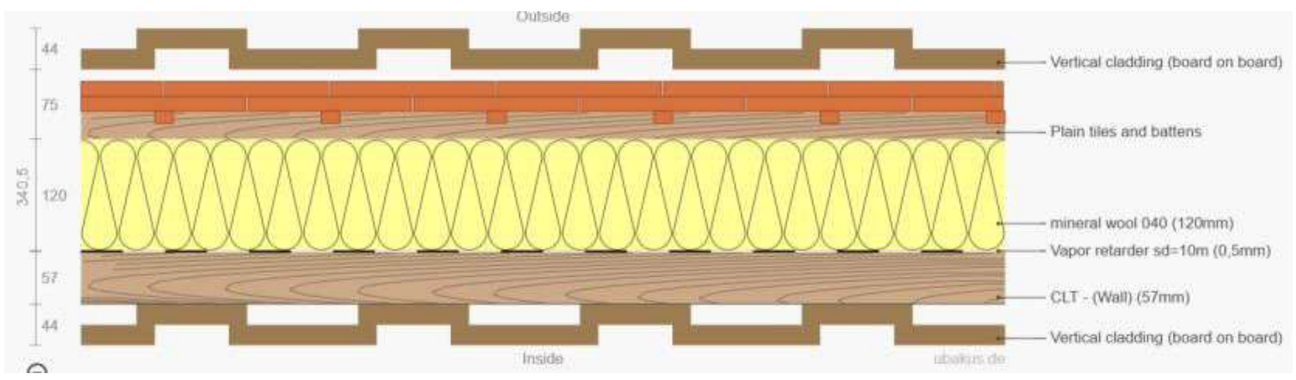
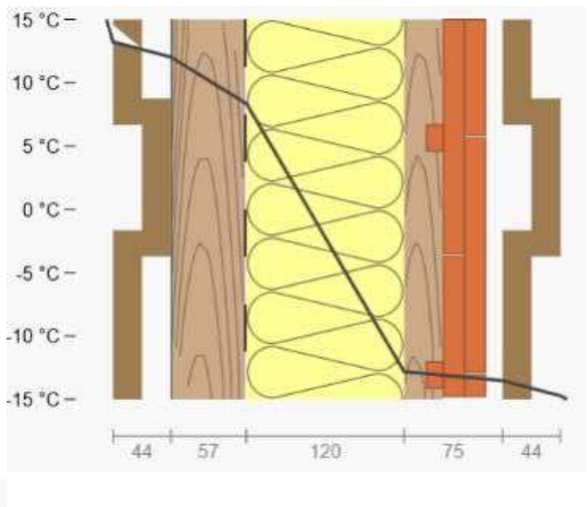


Fig. 1. Configuration of the layers composing the wall

Layers:

- vertical cladding;
- tiles and battens;
- mineral wool;
- vapor retarder;
- CLT wall
- vertical cladding.



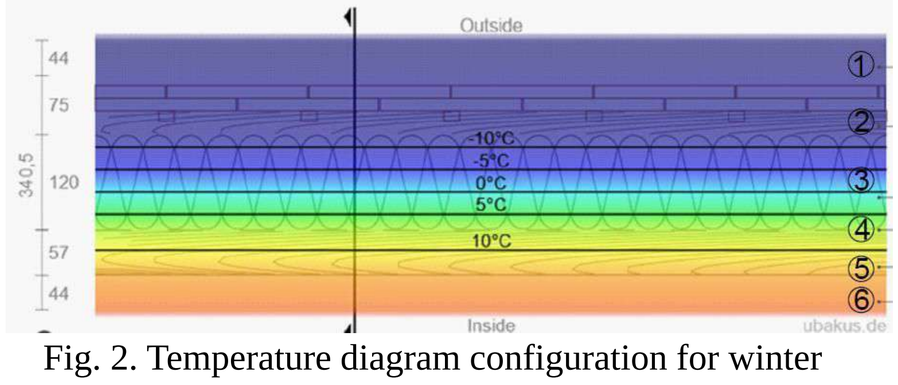


Fig. 2. Temperature diagram configuration for winter

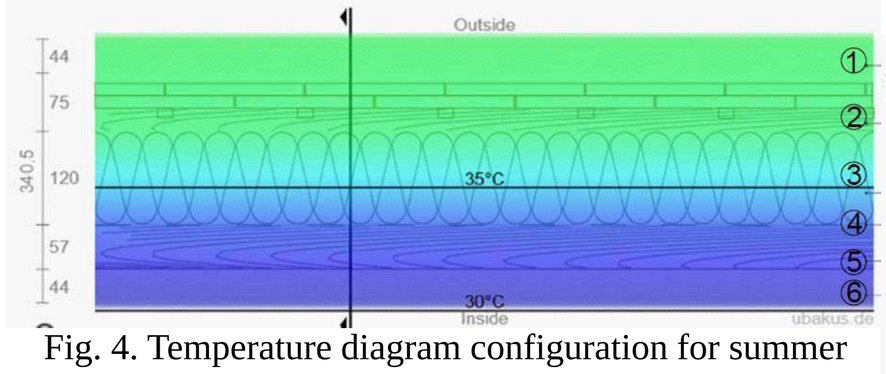


Fig. 4. Temperature diagram configuration for summer

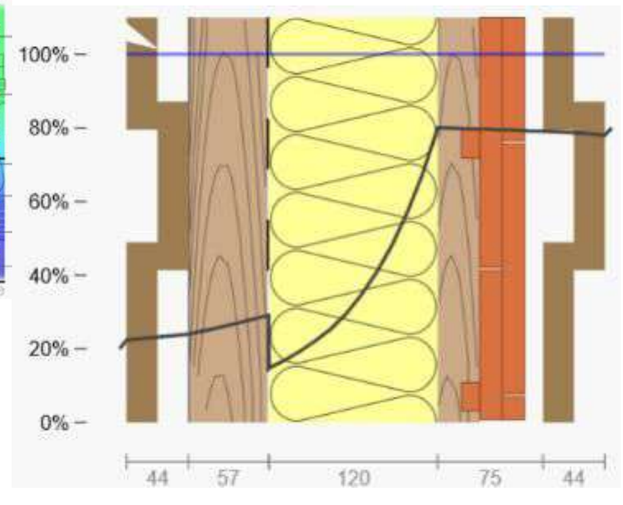


Fig. 6. Distribution of temperature and humidity among layers

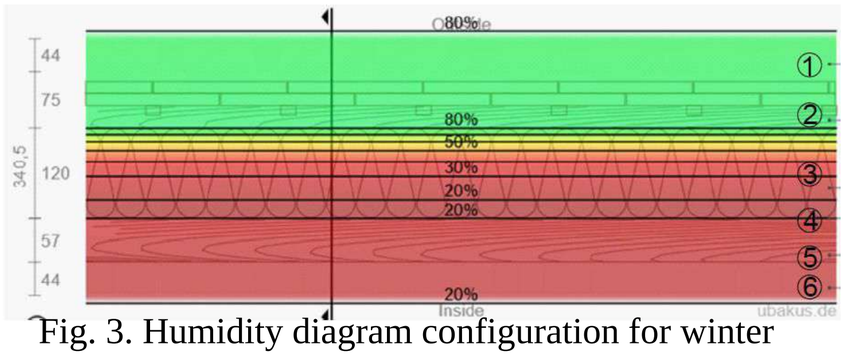


Fig. 3. Humidity diagram configuration for winter

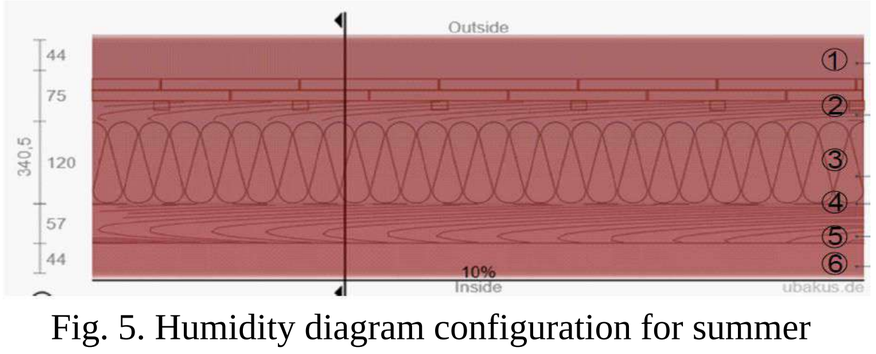


Fig. 5. Humidity diagram configuration for summer

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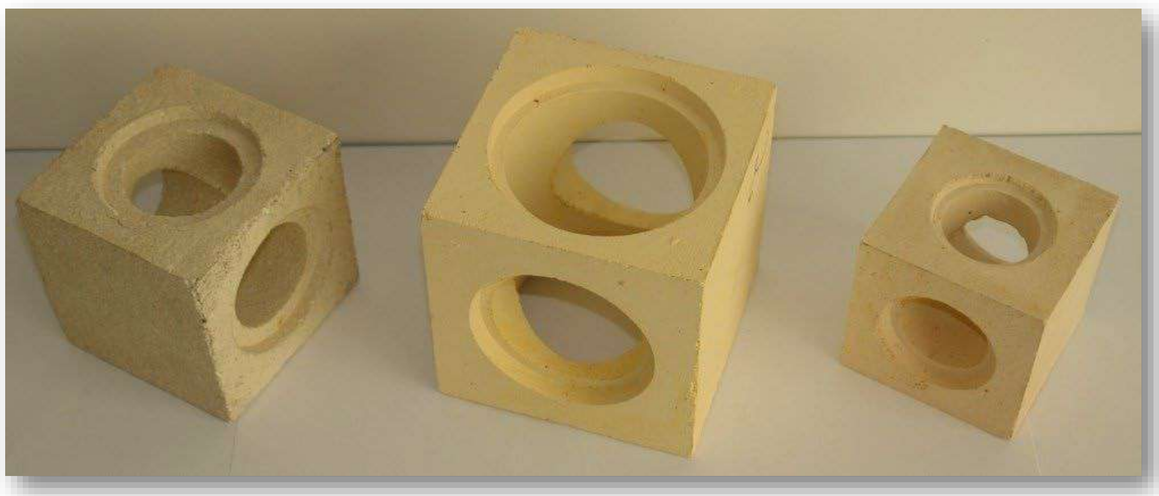
PRODUCTION METHODS OF REFRACTORY COMPONENTS

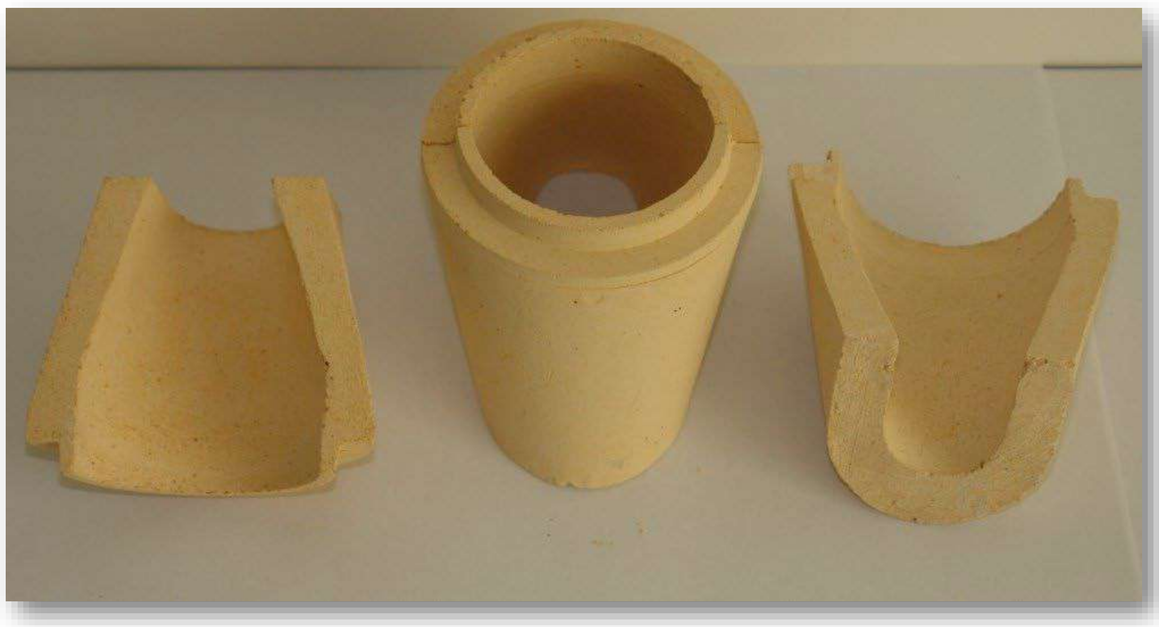
Refractory products

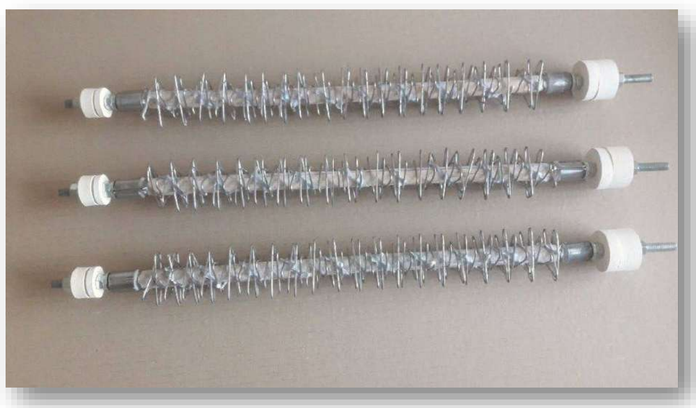
Author: *Radu BUZDUGA*

B

The sharp development of the economy in our country imposed an increase in the industry of refractory products, a fact that led to the need to establish a research and design unit specific to this field, which had the mission of ensuring the modernization of the refractory industry and the assimilation of products necessary for the steel industry taking into account all the changes along the way, through own research efforts without the contribution of a license, know-how, etc. This is how the Design Research Center for Refractory Products Braşov came into existence in 1973, and in 1974 a branch of it was established in Alba Iulia.







In 1999, the Alba Iulia Branch became, through division, an independent company, under the name Refractory Research, Design and Production Center (CCPPR SA), having diversified micro-production activities in two workshops (a refractory production workshop and a mechanic workshop). With a rich experience in applied research, the research team of CCPPR SA Alba Iulia is the author or co-author of numerous scientific works, a number of 130 inventions, 300 research works realized through the assimilation of over 140 refractory products.

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A new generation of metallic biomaterials as health solution for a sustainable life

VIZUREANU Petrică , BĂLȚATU Mădălina Simona, SANDU Andrei Victor,
ACHITEI Dragoș Cristian, PERJU Manuela Cristina,
Corina Ioana MOGA, BURDUHOS-NERGIS Dumitru Doru

Faculty of Materials Science and Engineering

"Gheorghe Asachi" Technical University from Iasi, Romania

Project number: 8/2024

B

The proposed project "A new generation of metallic biomaterials as health solution for a sustainable life" aims to obtain a new alloys system containing Titanium, Molibdenum, Niobium and Tin (Ti-Mo-Nb-Sn), with characteristics suitable for medical applications. The new generation of biomaterials will overcome the limitations of the titanium, cobalt and stainless-steel alloys as: high elasticity model and low corrosion resistance and biocompatibility. Hence, to achieve long-term stability and rapid osseointegration in orthopedic implants, surface modification of the implant surface is required. In this sense, the new titanium-based alloys will undergo specific heat treatments to obtain alloys with good mechanical properties intended for orthopedic applications.

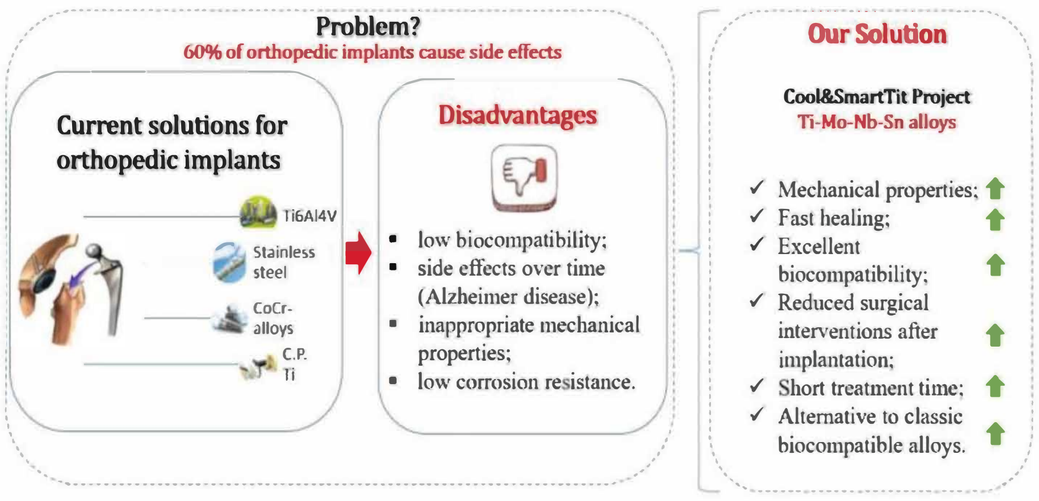
Website: https://simtit.ro/pf/coolsmartit/

Call: ERA-MIN3 Joint Transnational Call 2023

Funder: European Comision, Horizont 2020

Project period: April 2024 – March 2027

Programme Coordinator: Fundação para a Ciência e a Tecnologia (FCT), Portugal



Cool&SmartTit

A new generation of metallic biomaterials as health solution for a sustainable life

ERA•MIN 3

Raw Materials for the Sustainable Development and the Circular Economy

Coordinator

"Gheorghe Asachi" Technical University from Iasi, Romania

Partners

National Institute for Research and Development in Environmental Protection

University of Chemical Technology and Metallurgy, Sofia

UCAM Universidad Católica de Murcia

Selected References:

[1] Jiménez-Marcos C., Mirza-Rosca J.C., Baltatu M.S., Vizureanu P., Preliminary studies of new heat-treated titanium alloys for use in medical equipment, Results in Engineering, Volume 25, 2025, 104477.
[2] Niinomi M., Titanium Alloys, Encyclopedia of Biomedical Engineering, 2019, pp. 213-224.
[3] Baltatu M.S., Vizureanu P., Sandu A.V., Florido-Suarez N., Saceleanu M.V., Mirza-Rosca J.C.; New Titanium Alloys, Promising Materials for Medical Devices; Materials; 14 (2021) 5934

Originality of the proposed approach consists in the development and characterization of Ti-based alloys containing unique combination of nontoxic alloying elements that are enhancing the Young modulus (in order to have proprieties closer to the attached/replaced tissue). The newly developed alloys will be thermally treated at different temperature levels in order to obtain optimal characteristics.

Acknowledgements: **This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS/CCCDI - UEFISCDI, project number ERANET-ERAMIN-3-Cool&SmartTit-1, contract no 8/2024 within PNCDI IV**

Procedure for obtaining precast elements based on geopolymer composites with waste wood addition

Dumitru Doru BURDUHOS-NERGIS, Petrica VIZUREANU, Andrei Victor SANDU
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Patent application: A/00395 - 12.09.2025

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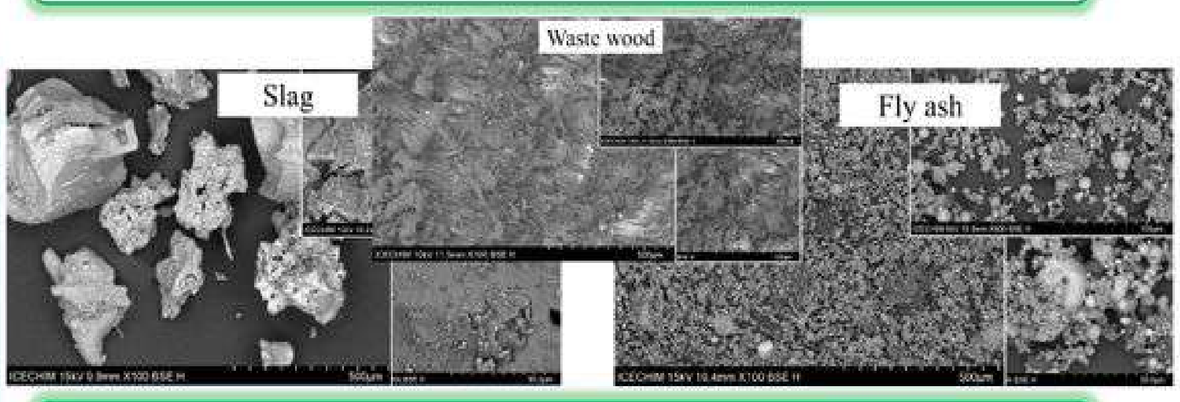
*The procedure described in this invention outlines a technology for producing innovative **geopolymer composites** suitable for civil engineering applications. These composites comprise an oxide matrix made from fly ash and slag, which is reinforced with particles of timber waste. The process for creating these environmentally friendly geopolymer composites involves mixing two components: one solid and one liquid. The solid component consists of 55-65% **class F fly ash**, 35-45% **ground granulated blast furnace slag**, and an additional 10% **timber waste**. The liquid component is a solution of sodium silicate (Na_2SiO_3) and sodium hydroxide (NaOH) in a mass ratio ranging from 1.2 to 1.3. The mass ratio of the liquid component to the solid component should be between 0.4 and 0.5, and the concentration of the NaOH solution is 8M. The wood chips range from 10 to 30 mm in size, resulting from milling old furniture. Therefore, this eco-friendly manufacturing technology enables the reuse of three types of waste materials (fly ash, slag and timber) in order to develop innovative products.*

The invention indicates that incorporating wood particles can enhance mechanical properties under certain conditions. It is recommended to maintain the wood content at 10% by weight. Besides the quantity of wood, the particle size also plays a significant role. The composite containing 10% wood showed better homogeneity than those with higher wood content.

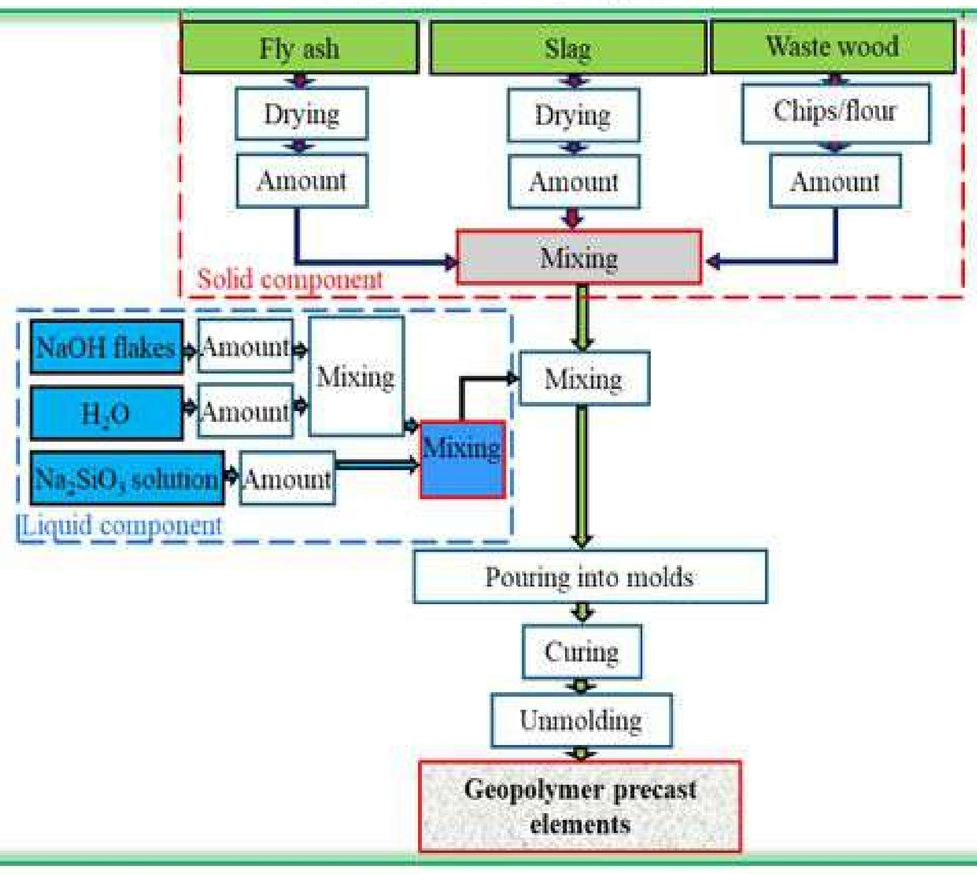
Excessive amounts of wood negatively affected the matrix's integrity, as the porous wood particles absorbed the alkaline activator, leading to a weaker structure and inadequate dissolution of the raw materials. Additionally, fine particles, such as wood flour, contribute to denser composites by filling pores, while larger particles help reduce crack formation through a bridging effect. However, if the bonding between components is weak, higher porosity may be observed.

Microstructural analysis at high magnification revealed that composites with a 10% wood addition exhibited improved interfacial bonding and fewer microcracks. In contrast, composites with 20% wood showed multiple delamination zones and weak bonding between the matrix and the reinforcing particles, which accounted for their reduced mechanical performance.

Raw materials



Process flow diagram



The final product

Pre-Geo: Geopolymers Composites Wood Recycling

Selected References:

[1] Dumitru-Doru BURDUHOS-NERGIS, Andrei-Victor SANDU, Petrica VIZUREANU, The Effect of Wood Addition on the Properties of Geopolymers: A short review, Archives of Metallurgy and Materials, accepted for publication.

[2] Dumitru Doru Burduhos Nergis; Toma Fistos; Andrei Victor Sandu; Petrica Vizureanu, The impact of adding timber waste on the microstructure of fly ash-based geopolymer composites. European Journal of Materials Science and Engineering, 2025, 10, 151–162, doi:10.36868/EJMSE.2025.10.02.151

Acknowledgements: This work was supported by a National Research Grants of the TUIASI, project number GNaC 2023_271/2024, Prefabricate inovative pe bază de compozite geopolimerice cu adaos de deșeuri lemnoase (Pre-Geo), Innovative products based on Geopolymer composites with waste wood addition (Pre-Geo). Website: https://simtit.ro/arut271/

Idejno rješenje gradskog trga, parka i spomenika
CONCEPTUAL DESIGN OF THE CITY SQUARE, CITY PARK, AND MEMORIAL

Autors: Ena Gatarić, Dejan Dakić, Damjana Cvijanović, Lana Stanković, Ana Marija Oroz, Emilija Najdek, Janko Trivunović, Tea Todorović, Helena Vujasinović, Ana Tepić, Darko Ristić, Bojana Vučić, Milica Marić, Teodora Gajić, Tijana Gajić, Isidora Predić / JU Građevinska škola Banja Luka / Savez inovatora Republike Srpske / Republic of Srpska - Bosnia and Herzegovina
Mentors: Pavlović Jelena dia, Dijana Papuga dia, Dušanka Safner dia, Veljko Hrgar dia

B

SR/ Osnovni cilj predloženog koncepta idejnog rješenja gradskog trga, spomen-obilježja i gradskog parka jeste stvaranje skladno oblikovanog javnog prostora koji povezuje funkciju odmora, okupljanja i komemoracije. Prostorno rješenje integriše gradski park kao prirodnu zonu, trg kao centralnu urbanističku tačku i spomen-obilježje kao simbol kolektivnog pamćenja. Ova tri segmenta oblikovana su tako da funkcionalno i vizuelno čine jedinstvenu cjelinu, odnosno jedinstven i prepoznatljiv javni prostor koji danas ne postoji u gradu.

Ideja vodilja bila je promocija i očuvanje lokalnog identiteta kroz prirodna bogatstva: rijeku Vrbanju, kap vode, pčelu i pčelinje saće. Rijeka je ključni izvor života, podržava poljoprivredu i ekosisteme te predstavlja temelj života zajednice i kao takvu je treba čuvati. Sam naziv grada „Čelinac“ dovodi se u vezu s riječju „pčela“, jer je ovo područje kroz istoriju bilo poznato po pčelarstvu. Zato je rješenje trga oblikovano kao skup heksagonalnih ćelija pravilno raspoređenih jednu uz drugu, koje simbolično predstavljaju porodicu, stabilnost i zajedništvo. Fontane su stilizovane kao kap vode, dok su motivi pčele i saća prisutni u svim segmentima projekta.

Osmišljavajući ambijent, prostor je koncipiran tako da bude pristupačan svim korisničkim grupama, i mlađoj i starijoj populaciji, kao mjesto susreta prošlosti I budućnosti.

Urbanistički koncept zasniva se na prostornoj, vizuelnoj i funkcionalnoj povezanosti. Memorijalna zona, trg i park postavljeni su u jednoj kompozicionoj osi koja omogućava nesmetan protok korisnika i prirodan prelazak iz jedne u drugu zonu, uz jasno kretanje u pravcu sjever–jug. Jedinstvena paleta materijala, linija i pejzažnih elemenata obezbjeđuje vizuelno jedinstvo prostora, dok svaka zona zadržava svoju funkciju, ali istovremeno može da podrži zajedničke manifestacije, kulturne programe i svakodnevne aktivnosti.

Prostor je tretiran kao pješačka zona, pri čemu se postojeća saobraćajnica uz zapadni dio parcele, odnosno dio Ulice Prve čelinačke lake brigade, transformiše u pješačku ulicu s mogućnošću povremenog pristupa vozila radi dostave, kako bi se formirala mirna oaza bez buke automobila. Parking prostor planiran je na jugozapadnom dijelu parcele. Šetalište uz rijeku povezano je sa mrežom pješačkih staza koje vode kroz i oko svih zona, zatvarajući krug i čineći jedinstvenu ambijentalnu cjelinu, dok je uz njih planirana i biciklistička staza jasno odvojena materijalizacijom I bojom.

Spomen-obilježje, kao najosjetljiviji element kompozicije, oblikovano je sa simbolikom orlovog krila jasno postavljenom u znak vjere, naglašeno savremenim osvjetljenjem i obogaćeno audio-doživljajem. Svi elementi projekta — klupe, štandovi, paviljon i prostori za sjedenje — oblikovani su savremenim izrazom, korišćenjem prirodnih materijala i u skladu s principima energetske efikasnosti.

EN/ The main goal of the proposed conceptual design of the city square, memorial, and city park is the creation of a harmoniously designed public space that connects the functions of rest, gathering, and commemoration. The spatial solution integrates the city park as a natural zone, the square as a central urban point, and the memorial as a symbol of collective memory. These three segments are shaped to functionally and visually form a unified whole, that is, a unique and recognizable public space that does not currently exist in the city.

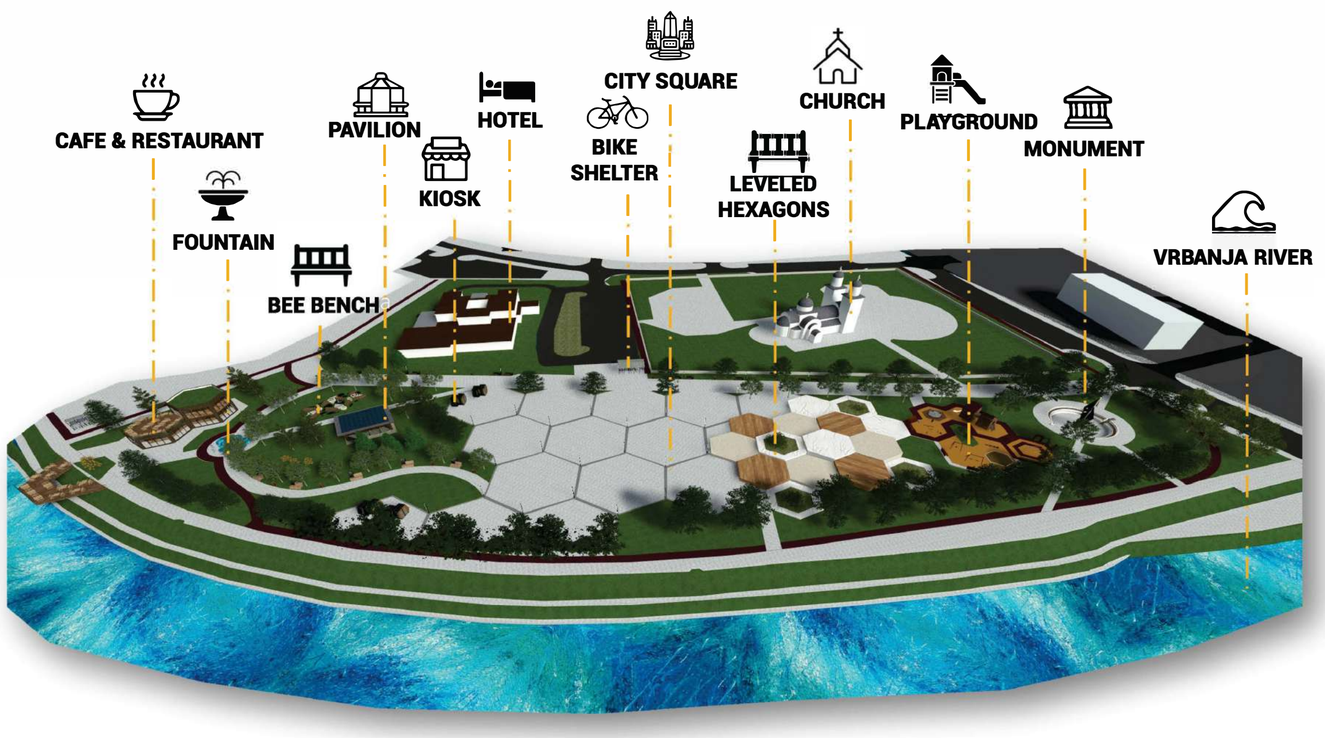
The guiding idea was the promotion and preservation of local identity through natural resources: the Vrbanja River, the drop of water, the bee, and the honeycomb. The river is a key source of life, supports agriculture and ecosystems, and represents the foundation of the community's life and therefore must be preserved. The very name of the town “Čelinac” is associated with the word “bee,” as this area has historically been known for beekeeping. For this reason, the square is designed as a set of hexagonal cells regularly arranged next to one another, symbolically representing family, stability, and togetherness. The fountains are stylized as a drop of water, while the motifs of bees and honeycombs are present in all segments of the project.

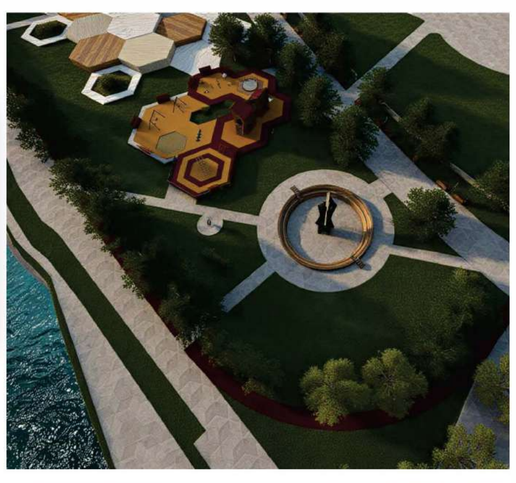
In designing the ambience, the space was conceived to be accessible to all user groups, both younger and older generations, as a meeting place of the past and the future.

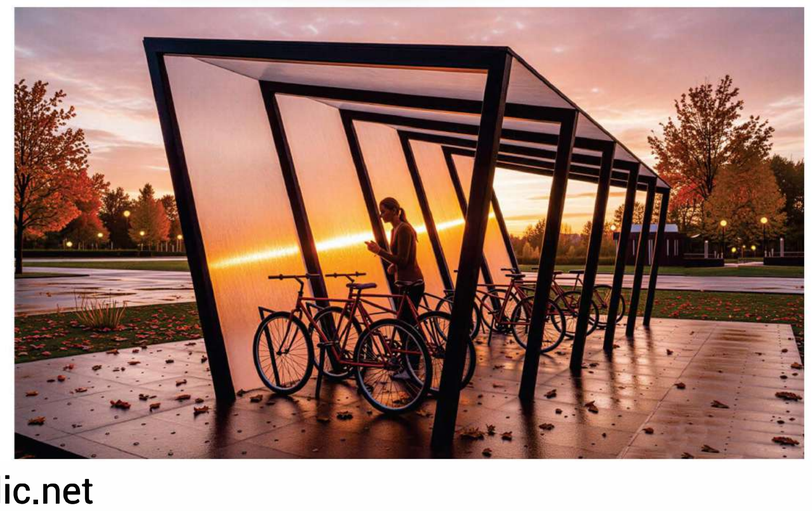
The urban concept is based on spatial, visual, and functional connectivity. The memorial zone, square, and park are arranged along a single compositional axis that enables unobstructed movement of users and a natural transition between zones, with clear orientation in the north–south direction. A unified palette of materials, lines, and landscape elements ensures visual unity, while each zone retains its own function but is also capable of supporting joint events, cultural programs, and everyday activities.

The area is treated as a pedestrian zone, where the existing roadway along the western part of the site, a section of Prve čelinačke lake brigade Street, is transformed into a pedestrian street with the possibility of occasional vehicle access for delivery purposes, in order to create a calm oasis without traffic noise. Parking is planned in the southwestern part of the site. The riverside promenade is connected to a network of pedestrian paths that lead through and around all zones, forming a continuous spatial unit, while a bicycle path is planned alongside them, clearly separated by materialization and color.

The memorial, as the most sensitive element of the composition, is designed with the symbolism of the eagle's wing clearly arranged in the sign of faith, emphasized by contemporary lighting and enriched with an audio experience. All elements of the project — benches, stands, pavilion, and seating areas — are designed in a modern manner, using natural materials and in accordance with the principles of energy efficiency.







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Research and application of low rebound high-performance shotcrete based on dual carbon targets

CAI No. ON07 **B**

Description :

Concrete is the foundation of infrastructure and the cornerstone of safety. To address the current problems of high carbon emissions, insufficient toughness, and high rebound rates in shotcrete, our organization has conducted research and demonstration on low-carbon high-performance shotcrete technology, in response to the national “Dual Carbon” strategic goals.

innovation point

a nano-material-modified toughness enhancer and rebound reducer

aluminate-organic acid composite system accelerator

rebound rate below **5%**

a single-pass spraying thickness **15 cm to 20 cm**

exhibiting excellent cohesion and homogeneity.

innovation point

Innovative and optimized **shotcrete mix proportion design**

innovation point

“waste recycling principles”

solid waste materials and recycled aggregates are incorporated into shotcrete through technical measures, thereby reducing carbon emissions.

innovation point

1. developed **an innovative 3D (three dimensional) laser scanning method for testing shotcrete rebound rate**
2. a control methodology for **pumpability and sprayability**
3. a testing protocol for **cohesive properties and tensile bond strength** of rebound-reducing materials
4. an experimental approach for **high-value utilization** of rebounded shotcrete material.

innovation point

first developed a **carbon analytical and calculated framework** for shotcrete

enabling precise pinpointing of primary carbon emission sources throughout its lifecycle and therefore providing scientific support for carbon reduction initiatives.

13 Invention patents, 2 Utility model patents, 3 consortium standards, and 1 software copyright, and published 4 academic papers.

multiple scientific advancement awards

achieves carbon reduction of 581 tonnes per kilomete

RMB 209 million in concrete admixture sales revenue

Contact: Tel.: 0086-13934598425 **Email: 327820338@qq.com**

中铁十二局集团有限公司
CHINA RAILWAY 12TH BUREAU GROUP CO.,LTD

ADVANCED COMPUTATIONAL-EXPERIMENTAL JOINT ANALYSES ON NOISE CONTROL PERFORMANCES OF CELLULOSIC FIBERS-BASED FOAMS

B

This research was funded by the National R&D Program PN-III-P4-PCE-2021-0714, PCE 22/2022, and the Research Grants of the Dunarea de Jos University of Galati RF 3646/30.09.2021, RF 9418/30.03.2023, RF 2475/31.05.2024

Authors: Silviu Marian NASTAC[1,2], Maria Violeta GUIMAN[2,1], Petronela NECHITA[1], Mihai SECIUREANU[1]

[1]Dunarea de Jos University of Galati, Research Centre for Mechanics of Machines and Technological Equipment

[2]Transilvania University of Brasov / Romania

Description: This study focuses on the available and useful computational models for characterizing the acoustic properties of foam-type materials, especially those obtained based on cellulose fibers, and, respectively, on the potential capability of implementing and using these models in practical applications. In the studies, both the empirical *Delany - Bazley* model and its variants were considered, as well as the phenomenological group of models (*Johnson-Champoux-Allard, Johnson-Champoux-Allard-Lafarge, Johnson-Champoux-Allard-Pride-Lafarge*). Also, *Prediction of Sound Absorption Coefficient using the Transfer Matrix Method* (PSAC-TMM) was considered. For the evaluation of transport properties, based on numerical modeling and computational simulations, the *Lattice Boltzmann Method* – LBM was used. In the framework of computational research, comparative analyses between compatible simulation approaches were developed. The simulation applications were designed having as reference the experimental data obtained for groups of foam-formed materials based on cellulose fibers.

Figure 1. *A set of samples used in tests to identify acoustic protection characteristics*

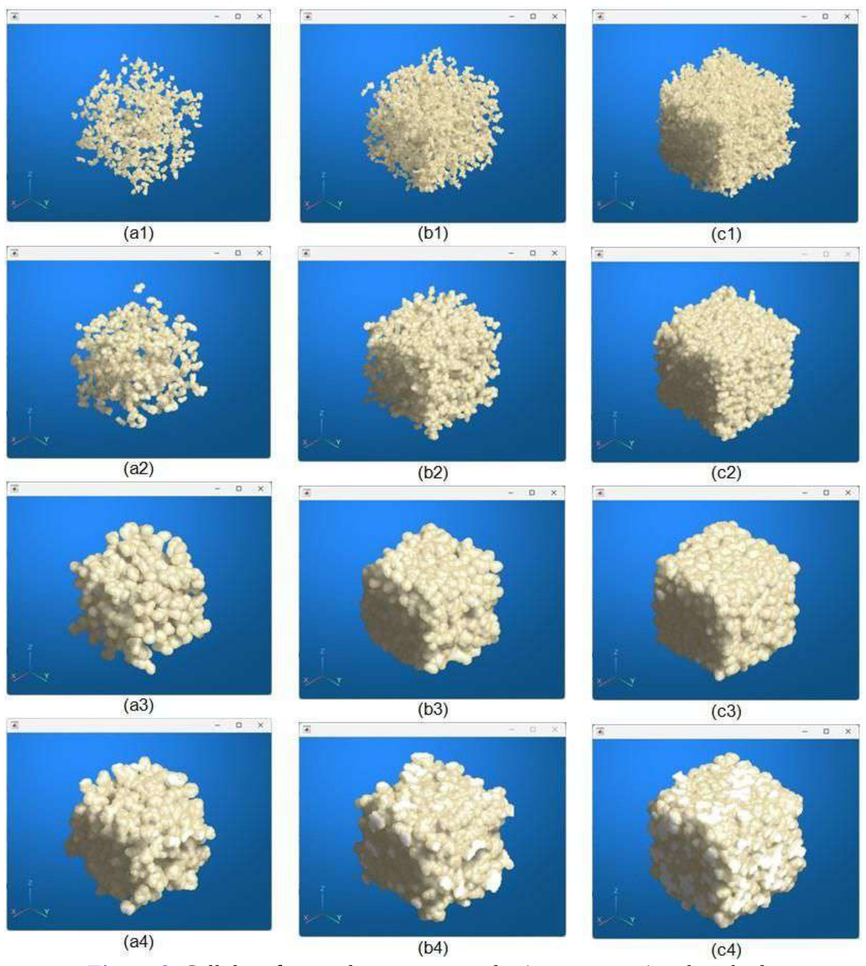

Figure 6. *Cellulose foam volumes generated using computational methods, for different values of fiber curvature* (0.4...0.8), *fiber thickness* (0.1...3.0) *and respectively the number of fibers in the analyzed volume* (500,1500, 5000)

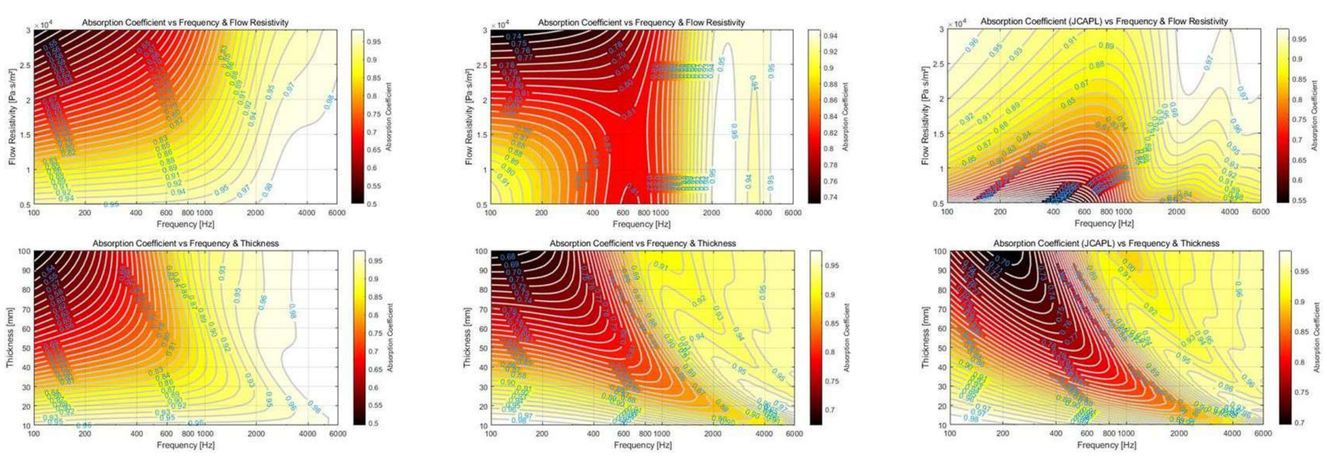

Figure 2. *Comparative analysis of the estimates of the acoustic absorption coefficient for the* DB, JCA *and* JCAPL *models as a function of frequency and flow resistivity (top row), respectively as a function of frequency and material layer thickness (bottom row)*

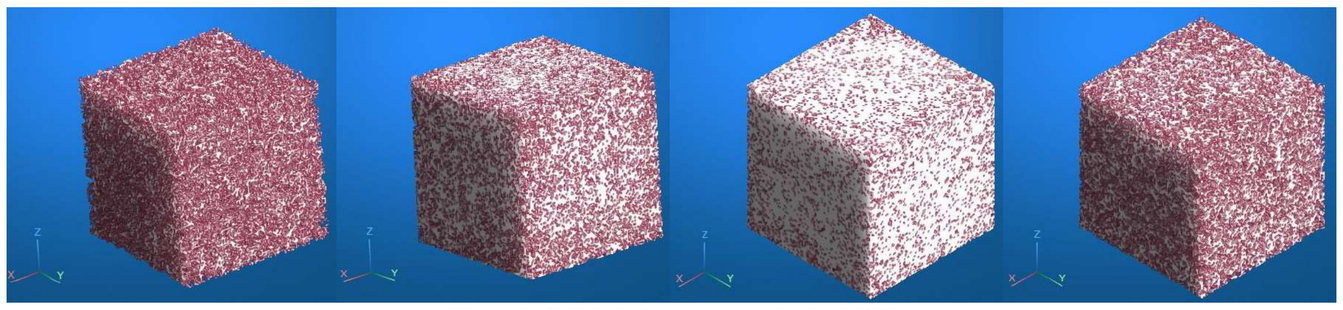

Figure 4. *Cellulosic foam generated using* LBM

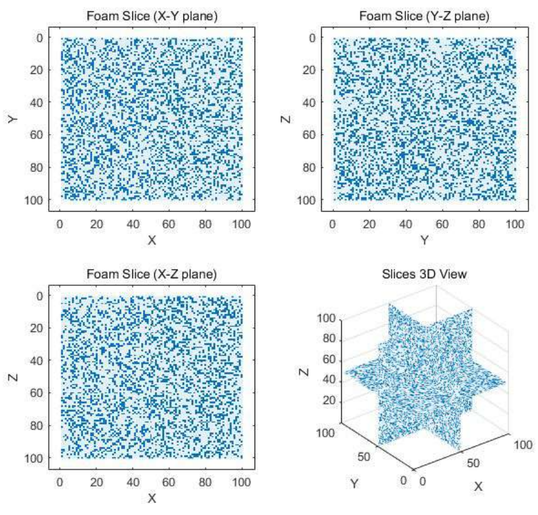

Figure 7. *Sections of a volume of cellulose fiber foam, with porosity* 0.7

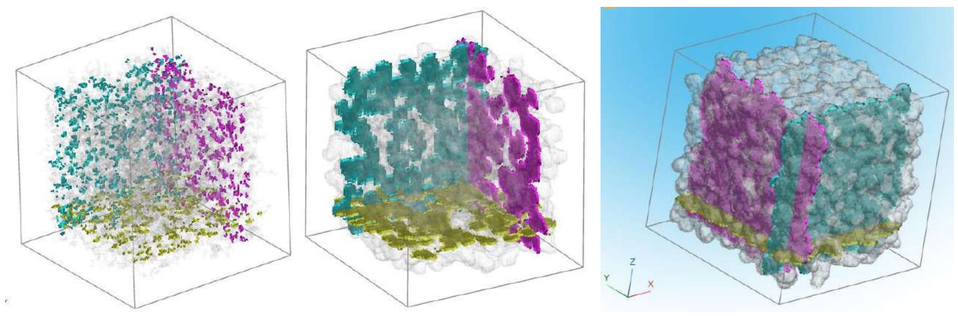

Figure 5. *The result of the sectional segmentation operations along the three orthogonal axes, at a distance of 20% of the corresponding size of each side*

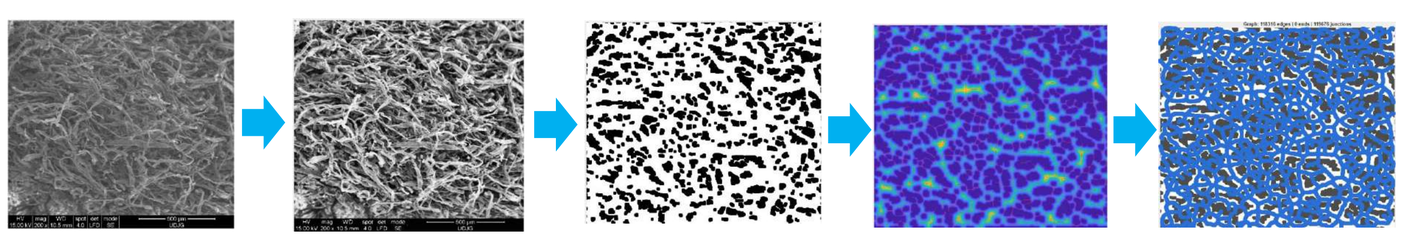

Figure 8. *Estimation of acoustic properties of foams based on advanced processing of sectional images (example for* SEM *microphotography): initial image (a), pre-processed image (b), result of binary transformation (c), estimation of skeleton and connections (d), respectively superimposition of paths over the binary image (e)*

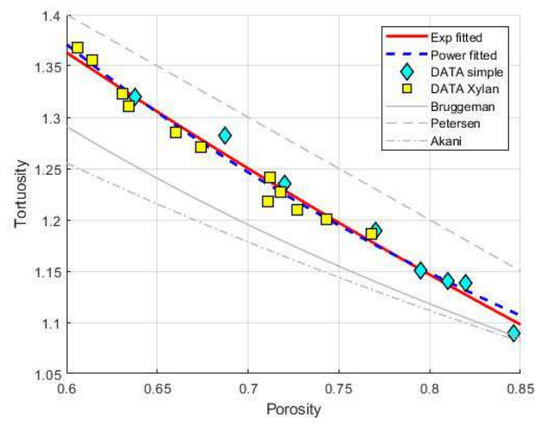

Figure 3. *Correlative analysis between tortuosity and porosity for cellulose foams, carried out through the combined approach of material groups and respectively of the two specific parameter estimation models*

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PetForge

Authors: Kacso Andras, Sîrba Rareș
Mentor: Mircea Nistor
Student Project

B

PETForge is a machine that transforms ordinary bottles into filament that can be used to make 3D prints. The system is digitally controlled via an Arduino Mega 2560 microcontroller and allows for real-time monitoring and adjustment of parameters.

Electronic Components:

- **Arduino mega** 2560
– main control unit

- **16x2 (or 16x4) LCD** – menu, temperature, and time display

- **2 physical buttons** (start/stop)
– quick process control

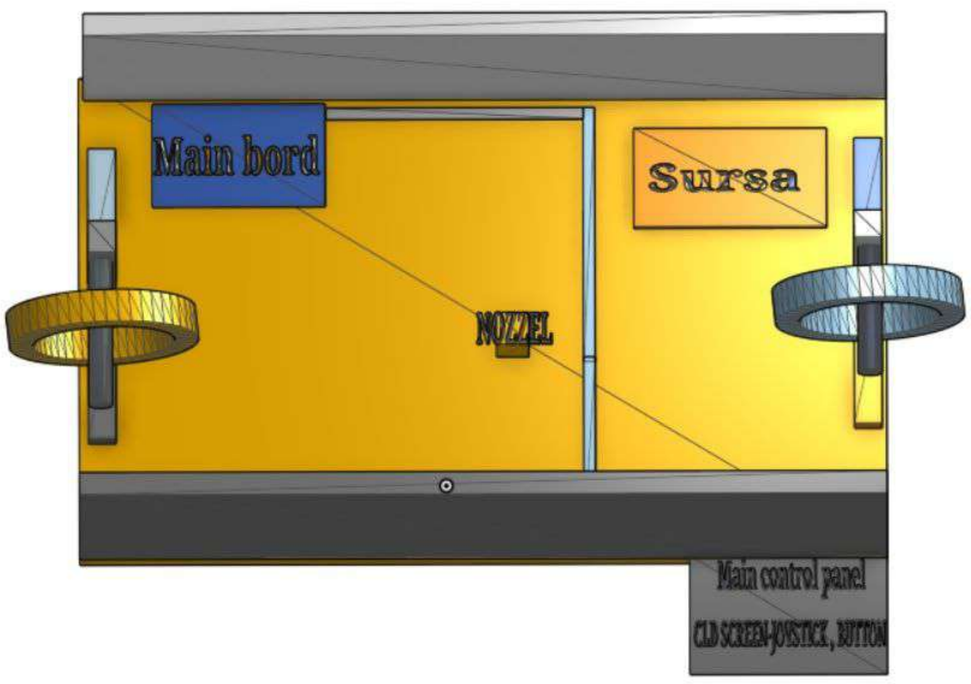
- **Thermistor (NTC)**
– nozzle temperature measurement (heat nozzle)

- **Analog joystick**
– menu navigation and value modification

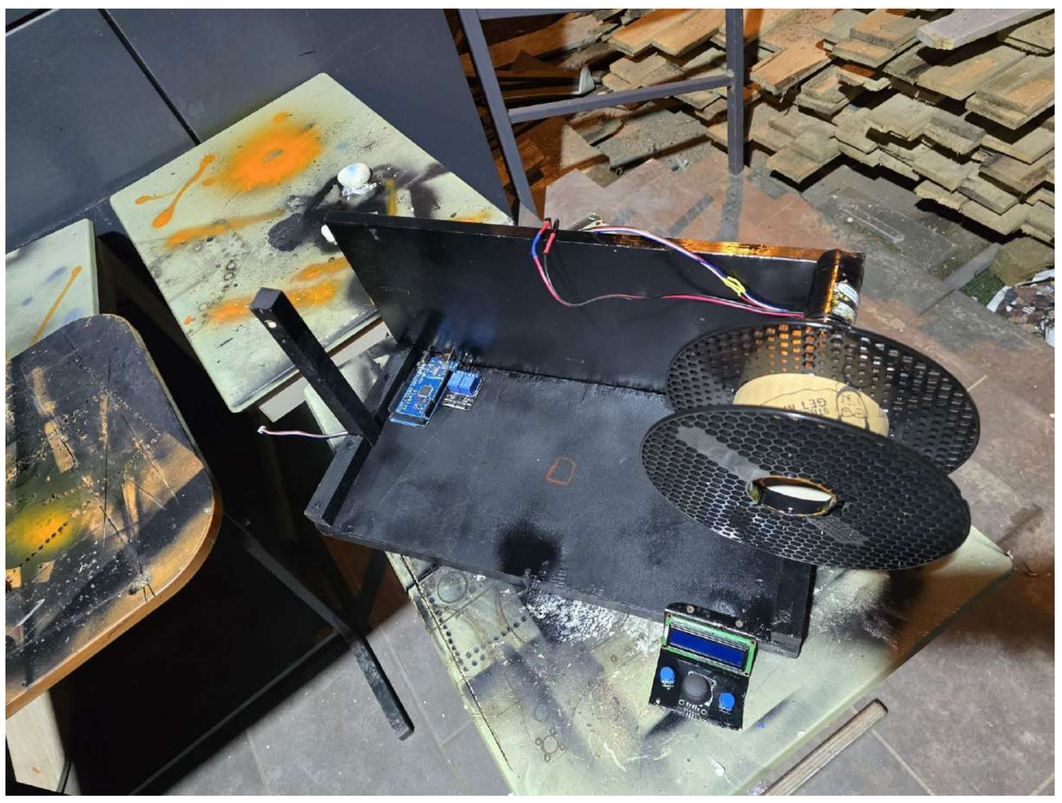
Mechanical Components

- **Heat Nozzle**
heats the PET between 100°C and 400°C

- **Traction Motor**
pulls the filament and winds it onto the reel
- **Spool-Rolling System;** Software Features: The system has an interactive joystick-controlled menu where the user can select the desired temperature (100°C–400°C)
- **Modify the temperature in real time,** set the operating time, monitor the live temperature read by the thermistor, and start/stop the process via physical buttons.



3d model of PetForge



Current Prototype

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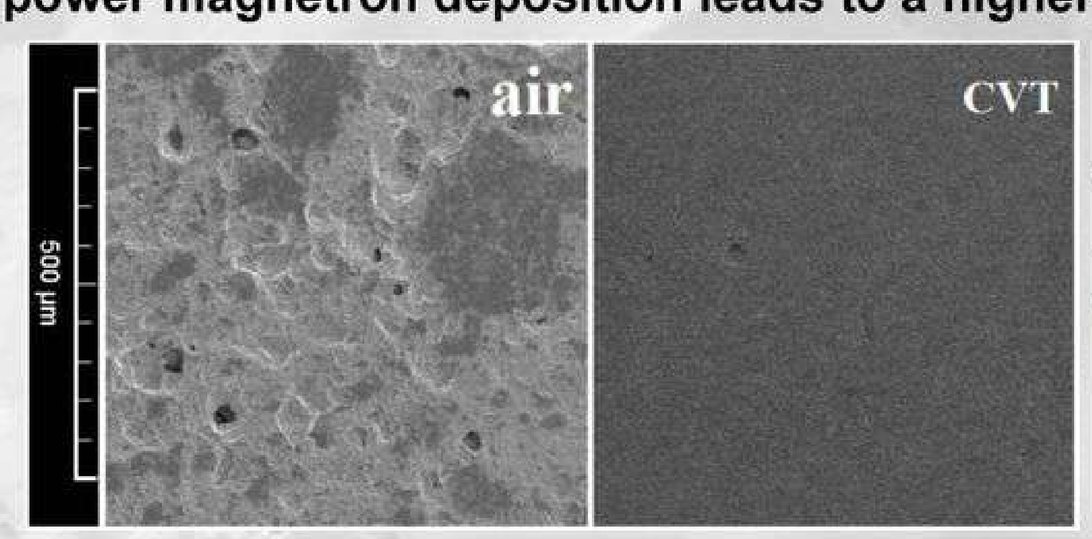
PRODUCING CONDUCTIVE CERAMIC TARGETS AND THIN FILMS OF $Fe_2O_3 \cdot (ZnO)_k$ ALLOYS AT LOW TEMPERATURES

PATENT: MD 1829/2025.03.31
AUTHORS: Gleb COLIBABA, Dumitru RUSNAC, Vladimir FEDOROV, Anatolie SIDORENKO, Olga SHIKIMAKA

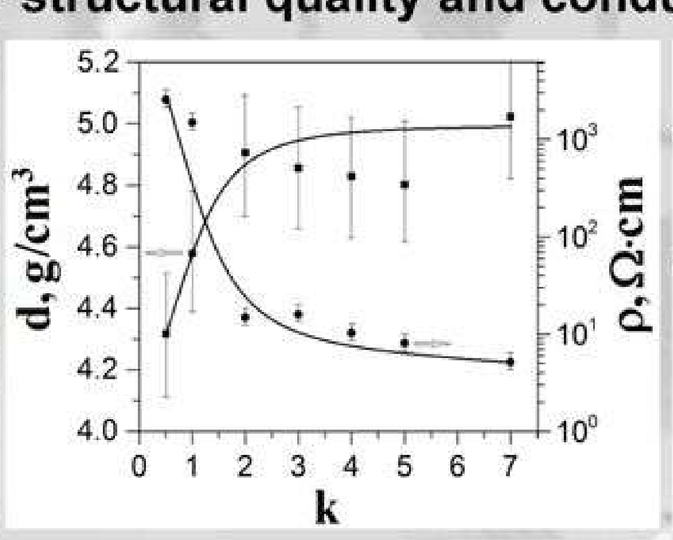
APPLICATION FIELDS: Optoelectronics.

AIM: The elaboration of cost-effective technology for low temperature sintering of uniform and conductive $Fe_2O_3 \cdot (ZnO)_k$ ceramic magnetron targets using chemical vapour transport (CVT) reactions. The deposition of $Fe_2O_3 \cdot (ZnO)_k$ thin films with improved structural quality and controllable electrical properties.

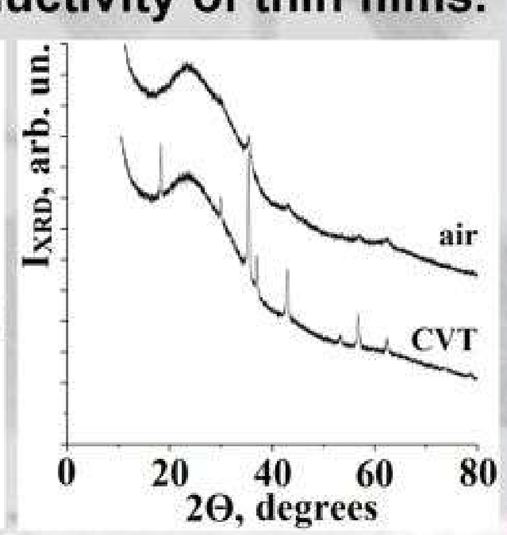
SOLUTION: $Fe_2O_3 \cdot (ZnO)_k$ ceramics are sintered in quartz ampoules using HCl + H_2 as a CVT agent. HCl increases the vapor pressure by 8 orders of magnitude (mainly halides), improving the mass transport between sintered particles, contributing to a higher uniformity, density and hardness of ceramics. H_2 increases concentration of intrinsic donor defects (Zn/Fe excess), contributing to higher conductivity and thermal stability of high-power magnetron targets. High power magnetron deposition leads to a higher structural quality and conductivity of thin films.



SEM images of $Fe_2O_3 \cdot ZnO$ samples obtained by sintering in air and using CVT



The density and resistivity of CVT $Fe_2O_3 \cdot (ZnO)_k$ alloys



The XRD spectra of $Fe_2O_3 \cdot ZnO$ thin films

ADVANTAGES:

- Decrease of sintering temperature from 1500 to 1050 °C
- 99% of the initial diameter
- High density up to 4.5 g/cm³ (90 % relative density)
- Absence of material loss and interaction with a crucible (low sintering temperature)
- No need to use expensive nanopowders
- Complete dissolution of components
- Relatively low resistivity down to 5 Ω·cm (decrease by 3–5 orders of magnitude)
- High thermal stability (no target cracking, increase of current density from 15 to 40 mA/cm²)
- Higher structural quality of thin films deposited at the high magnetron power
- Obtaining conductive thin films with controllable chemical activity and optical properties.

IMPLEMENTATION STAGE: Pilot.

ACKNOWLEDGMENTS: This work was supported by the Ministry of Education, Culture and Research of Moldova under the projects No. 25.80013.5007.10RE (Strategic Vision for the Development of Scalable Thin-Film Technologies in Niche Photovoltaic Markets), 011201 and 020201.

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Ti AND TiO_2 EPITAXIAL LAYERS FOR PHOTOVOLTAIC DEVICES

PATENT, RESEARCH PROJECT NUMBER: MD 4772/2022.05.31; MD 1740 Z/2024.08.31; MD 4924 C1/2025.12.31; MER subprogram 011207

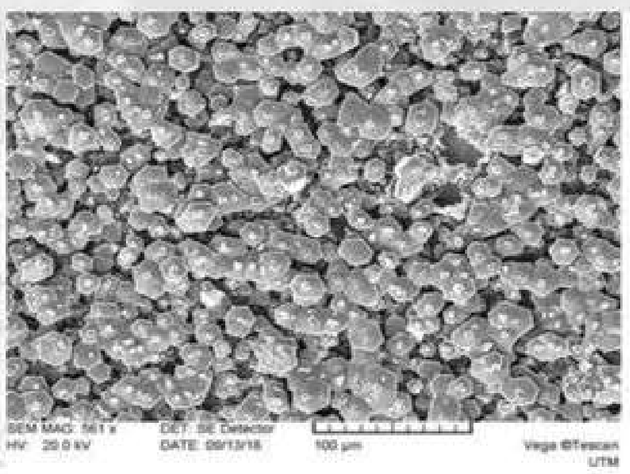
AUTHORS: Leonid GORCEAC, Vasile BOTNARIUC, Simion RAEVSCHI, Petru CHETRUS, Elena BERCU, Sergiu VATAVU

APPLICATION FIELDS: Optoelectronics. Unconventional energy sources.

AIM: Preparation of epitaxial layers of Ti and TiO_2 for photovoltaic devices (solar cells, photodetectors, etc.).

SOLUTION: The application of CVD (chemical vapor deposition) and HVPE (hydride vapor phase epitaxy) methods in separate flows of Ar and O_2 and respectively H_2 and HCl (gas) allowed the preparation of epitaxial layers of Ti and TiO_2 at deposition temperatures of 800÷850℃ and 400℃.

RESULTS: 1. TiO_2 epitaxial layers; 2. ITO - TiO_2 - InP heterojunctions for photovoltaic cells and photodetectors in the visible region of the spectrum; 3. Ti epitaxial layers, SEM image (fig) and electrical parameters (table) for GaN ohmic contacts (photovoltaic devices).



SEM image of Ti layer (800℃), on GaN/AlGaN/Al_2O_3 support

Technology	Support	Deposition T, ℃	Electrical parameters		
			R, Ω/□	n·10^{-21}, cm^{-3}	μ, cm^{2}V^{-1}S^{-1}
HVPE (hybride vapor phase epitaxy)	Si (111)	850/1000	200	4,5	10
	GaN/AlGaN/Al_2O_3	800/850	3,0	4,6	80
	GaN/AlGaN/Al_2O_3	500/850	2,6	1,1	90
	GaN/AlGaN/Si	700/850	5,0	14	5
	GaN/AlGaN/Si	800/850	3,5	36	7

ADVANTAGES: The application of CVD and HVPE technologies allowed the preparation of Ti and TiO_2 epitaxial layers for enhancing photovoltaic devices parameters based on InP and GaN compounds with increased resistance to corpuscular radiation.

IMPLEMENTATION STAGE: Laboratory scale.

ACKNOWLEDGMENTS: This research was supported by the MER subprogram 011207.

Opportunity
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MINISTER OF EDUCATION AND RESEARCH - NATIONAL RESEARCH AUTHORITY

URBAN INCD INCERC

CLAY SOIL COMPOSITION WITH BIOPOLYMER CAST IN FORMWORK

Patent application no. A/00571 / 28.11.2025
Project no. PN 23 35 04 01

B

Authors: Aurelian GRUIN, Cornelia BAERĂ, Ana-Cristina VASILE, Bogdan BOLBOREA, Alexandru ION, Claudiu-Sorin DRAGOMIR, Alexandra-Marina BARBU

Claim 1: A clay soil composition cast in formwork, characterized in that it comprises:
– 25–35% clay having granulometric fraction < 2 μm,
– 2–3% lignin in the form of sodium lignosulfonate,
– 65–75% mineral aggregates with maximum particle size of 16 mm,
– water in a water/clay ratio between 0.25–0.30, optionally with the addition of a dispersing agent such as sodium tripolyphosphate, used in the case of a clay fraction content exceeding 32%.
Claim 2: The composition according to claim 1, characterized in that the clay constitutes the main inorganic binder, in the absence of cement or lime.
Claim 3: The composition according to claim 1, characterized in that the lignin acts as an organic stabilizer, reducing drying shrinkage and improving compressive strength and internal cohesion.
Claim 4: The composition according to claim 1, characterized in that it is cast into reusable formwork made of metal, wood, or rigid plastic and compacted by mechanical vibration.

AIM:

The invention relates to a CLAY SOIL COMPOSITION WITH BIOPOLYMER intended for the manufacture of ecological construction elements by casting into reusable formwork. The proposed solution aligns with the current trend of **developing sustainable materials with low environmental impact**, representing a viable alternative to cement-based or synthetic polymer-based materials.

THE INNOVATIVE NATURE:

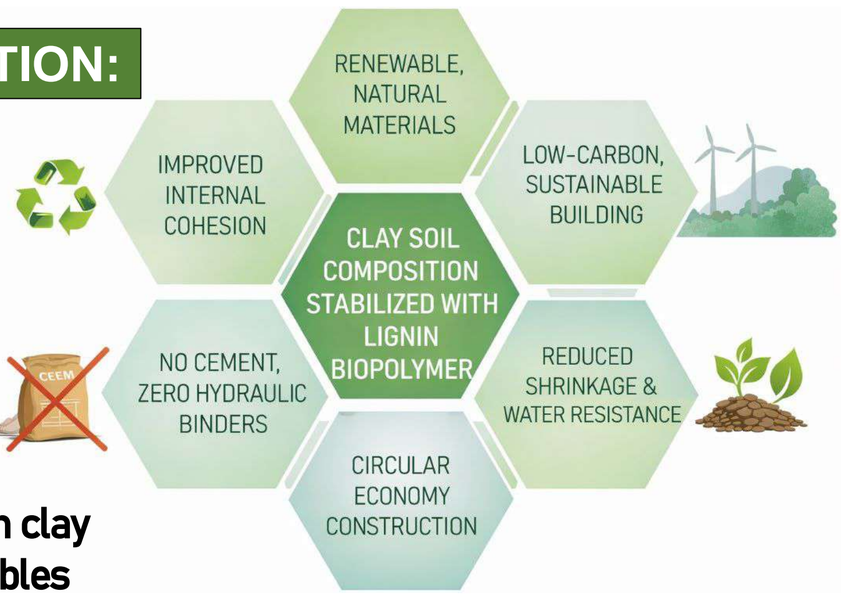
The innovative character of the invention lies in the use of clay as the primary inorganic binder in a non-hydraulic system cast into formwork and stabilized exclusively with lignin in the form of sodium lignosulfonate, which acts as an organic agent for cohesion enhancement and shrinkage reduction.

THE PROBLEM:

Cement-based construction generates over 35% of global CO_2 emissions, with cement production contributing approximately 7–8% of the total, making conventional building materials a major driver of climate change.

POSSIBILITY OF RESOLUTION:

Replacing hydraulic binders with clay stabilized by natural lignin enables low-carbon, recyclable, and sustainable cast building materials.



This research was funded by the Nucleu Programme of the National Research Development and Innovation Plan 2022-2027, supported by MCID, "ECODIGICONS" project no. PN 23 35 04 01: "Fundamental-applied research into the sustainable development of construction products (materials, elements, and structures, as well as methods and technologies) that utilizes current national resources to enhance the eco-innovative and durable aspects of Romania's civil and transport infrastructure", financed by the Romanian Government.

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PROCESS FOR ECO-GENERATION OF REPAIR MORTAR BY VALORIZATION OF SPENT GARNET WASTE AS A PARTIAL SUBSTITUTE FOR NATURAL AGGREGATE

Patent application no. A/00587 – 03.12.2025
Project no. PN 23 35 04 01

B

Authors: Cornelia BAERĂ, Aurelian GRUIN, Ana-Cristina VASILE, Bogdan BOLBOREA, Alexandru ION, Claudiu-Sorin DRAGOMIR, Alexandra-Marina BARBU

Claim 1: A process for obtaining the industrial sub-product "Inert mineral addition SG-AWJ" generated from Spent Garnet waste originating from AWJ processes, characterized in that it is obtained through a specific succession of collection, sorting, verification, and storage operations, generating a recycled aggregate with controlled chemical and mineralogical composition, free of toxic content, having a particle size range of 0.05–2.00 mm, intended as a 10–50% partial substitute of natural sand (0/4) in cementitious compositions.

Claim 2: The industrial sub-product "SG-AWJ" generated from used Garnet waste as defined in Claim 1, characterized by Fe_2O_3 content 20–45%, SiO_2 25–40%, minimal contaminants (Cr, Cu, Mn), and granulometric distribution d10 ≈ 0.06–0.15 mm, d50 ≈ 0.20–0.40 mm, d90 < 0.7–1.2 mm.

Claim 3: A process for eco-generation of repair mortar EcoGarnPlus® using SG-AWJ (defined in Clarim 2) as 10-50% partial aggregate substitute, cement 25–33% of aggregate mass, W/C ratio 0.40–0.50.

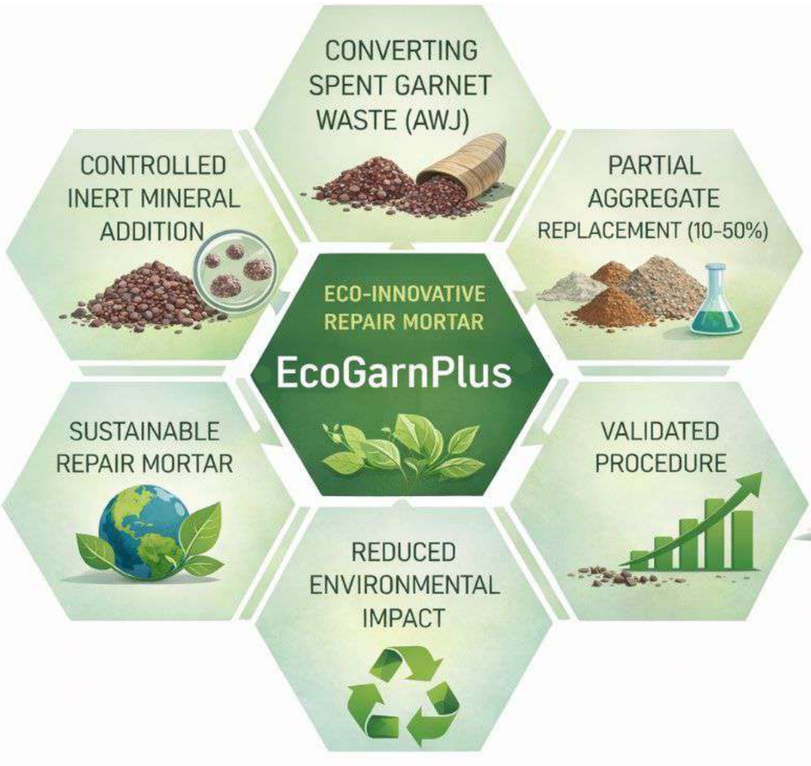
Claim 4: EcoGarnPlus repair mortar, produced using the inert mineral additive SG-AWJ derived from spent Garnet waste as a partial substitute for natural aggregate according to Claim 3, characterized by high physico-mechanical performance (28-day compressive strength of 35–45 MPa, flexural strength of 6.2–7.5 MPa, adhesion ≥ 0.5 MPa), freeze–thaw resistance after 50 cycles (η < 35%), and a compact microstructure confirmed by SEM/EDX analysis.

AIM:

To develop and validate an eco-innovative repair mortar by converting Spent Garnet waste (AWJ) into a controlled inert mineral addition (**SG-AWJ**), leading to the production of the sustainable repair mortar **EcoGarnPlus.**

THE INNOVATIVE NATURE:

The innovative character of the invention lies in the development of a validated and generalizable procedure for converting spent garnet waste (AWJ) into a controlled inert mineral addition, **SG-AWJ**, used in significant proportions (10–50%) as a natural aggregate substitute in the **EcoGarnPlus repair mortar**, ensuring mechanical and durability performances equivalent or superior to conventional materials while simultaneously *reducing environmental impact*.



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PROCESS FOR PRODUCING AND ALKALINE-ACTIVATED FLY ASH-BASED GEOPOLYMER BINDER WITH SELF-CLEANING CAPACITY

B

Patent application no. A/00487 / 29.10.2025

Project no. PN 23 35 05 01

Authors: Andreea HEGYI, Adrian-Victor LĂZĂRESCU, Claudiu-Sorin DRAGOMIR, Cristian PETCU, Alexandra-Marina BARBU, Mircea-Iosif RUS, Tudor Panfil TOADER, Alexandra CSAPAI, Carmen-Teodora FLOREAN, Brăduț-Alexandru IONESCU

Claim 1: Process for producing alkaline-activated fly ash-based geopolymer binder, with self-cleaning capacity.
Claim 2: Alkaline-activated fly ash-based geopolymer binder with self-cleaning capacity.

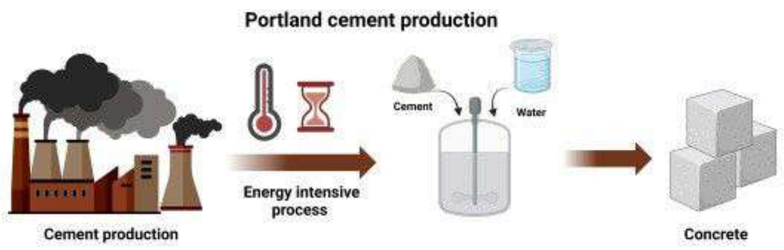
AIM:

Is to offer, using local materials from Romania, a complete and environmentally friendly solution for the production of alternative building materials with low environmental impact by applying the concept of Circular Economy: an industrial by-product becomes a raw material in the design and manufacture of a binder with properties similar to cementitious binders and with superior, innovative properties through the induction of self-cleaning capacity.

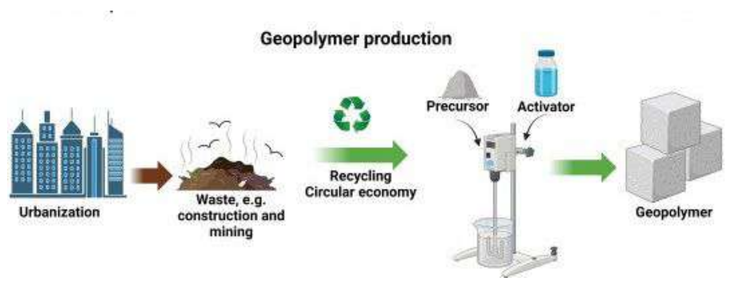
THE INNOVATIVE NATURE:

Converting waste into an environmentally friendly finished product with high added value, which, through its composition, is given a "smart" component—the ability to **self-clean**

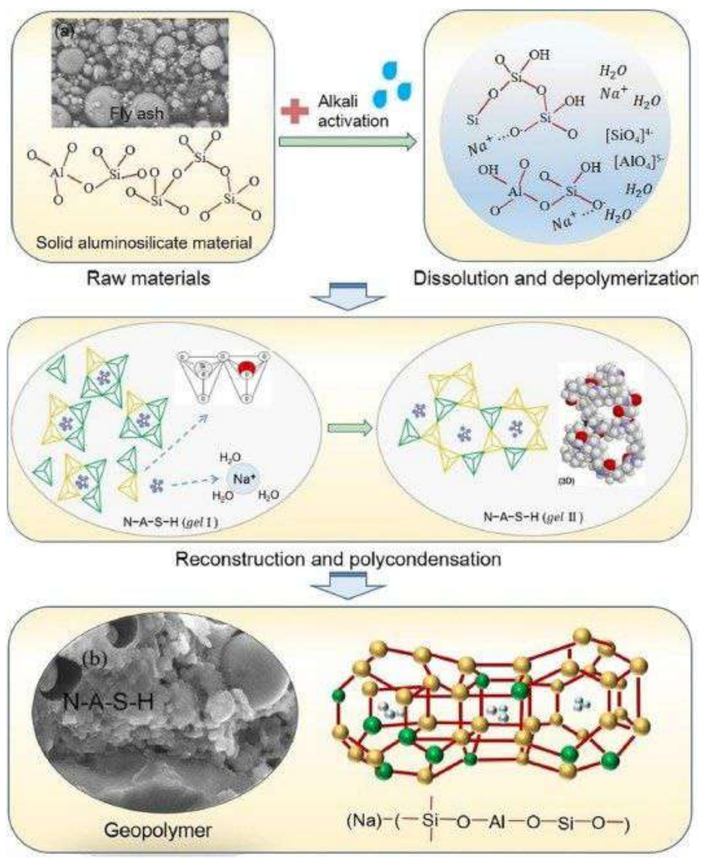
THE PROBLEM:



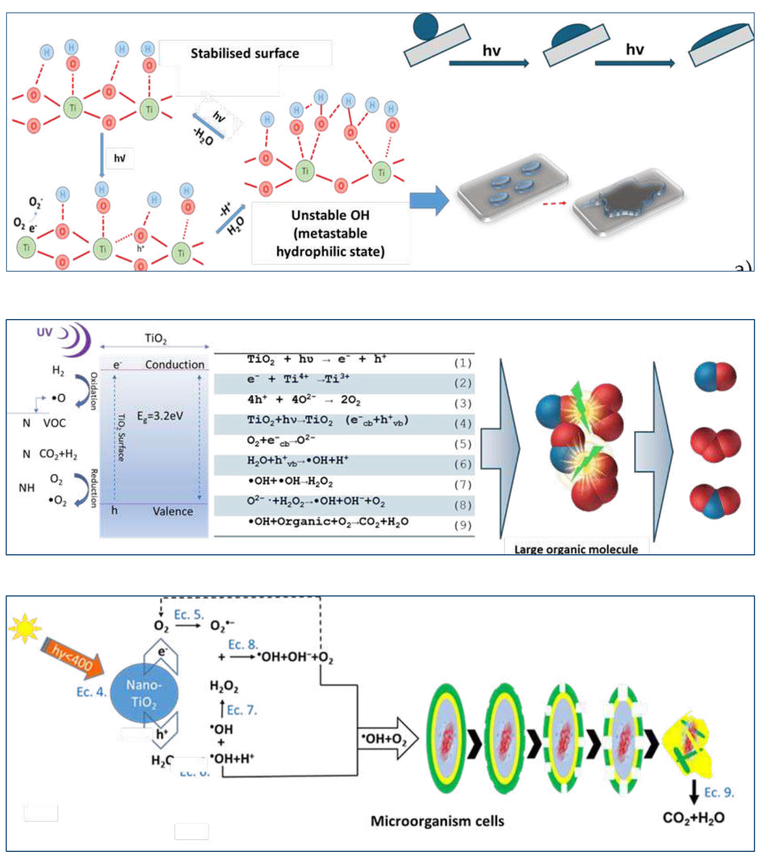
POSSIBILITY OF RESOLUTION:



MECHANISMS OF FLY ASH GEOPOLYMERIZATION THROUGH ALKALINE ACTIVATION



SELF-CLEANING MECHANISM OF THE SURFACE DUE TO THE ACTIVATION OF TIO_2 NANOPARTICLES UNDER UV IRRADIATION



This research was funded by the Romanian National Research Authority, project No. PN 23 35 05 01 "Innovative sustainable solutions to implement emerging technologies with cross- cutting impact on local industries and the environment, and to facilitate technology transfer through the development of advanced, eco-smart composite materials in the context of sustainable development of the built environment".

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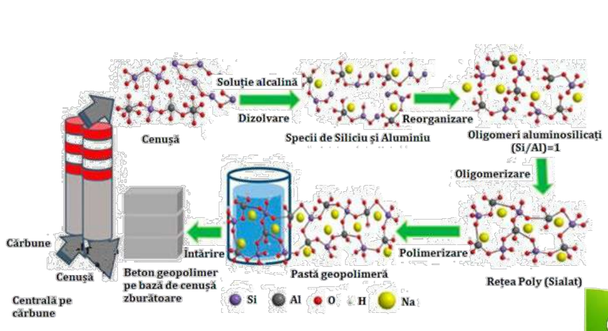
INNOVATION AND SUSTAINABILITY
Exploitation of industrial by-products for construction products with proven technological maturity

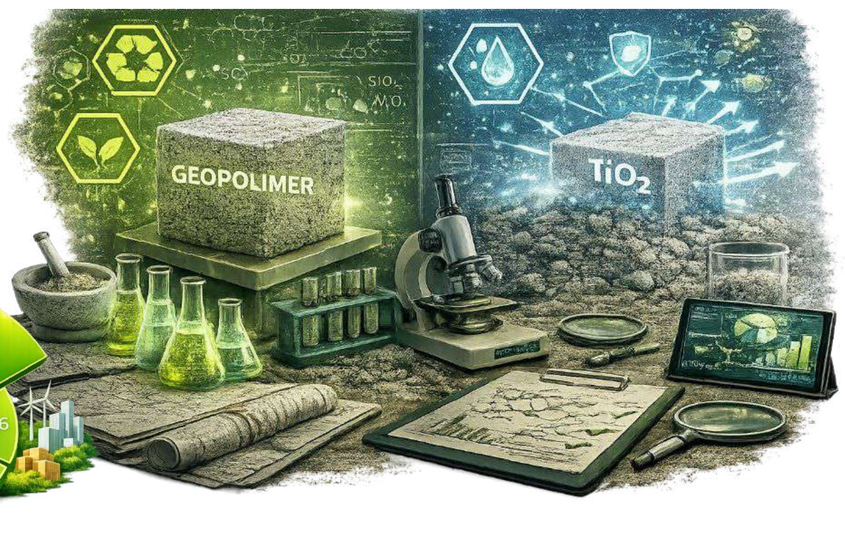
Project no. PN 23 35 05 01

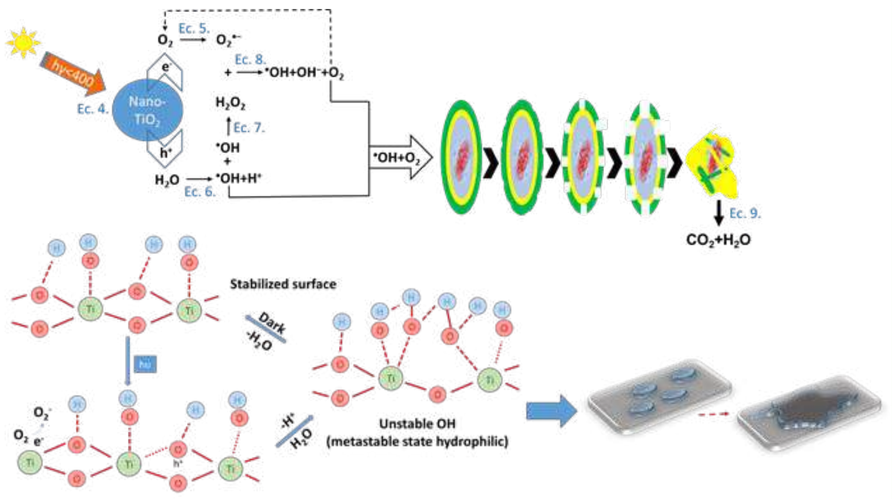
Authors: Adrian-Victor LĂZĂRESCU, Andreea HEGYI

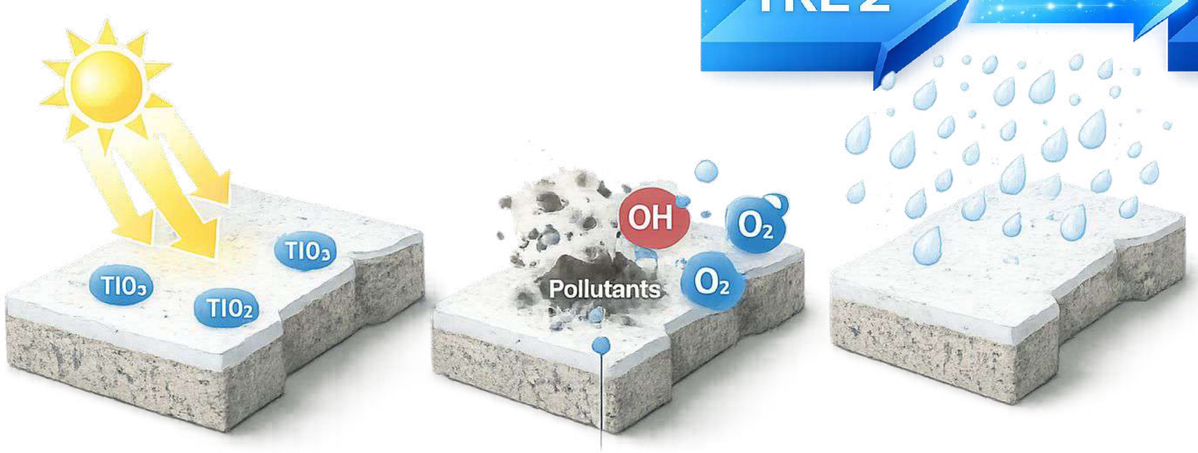
B

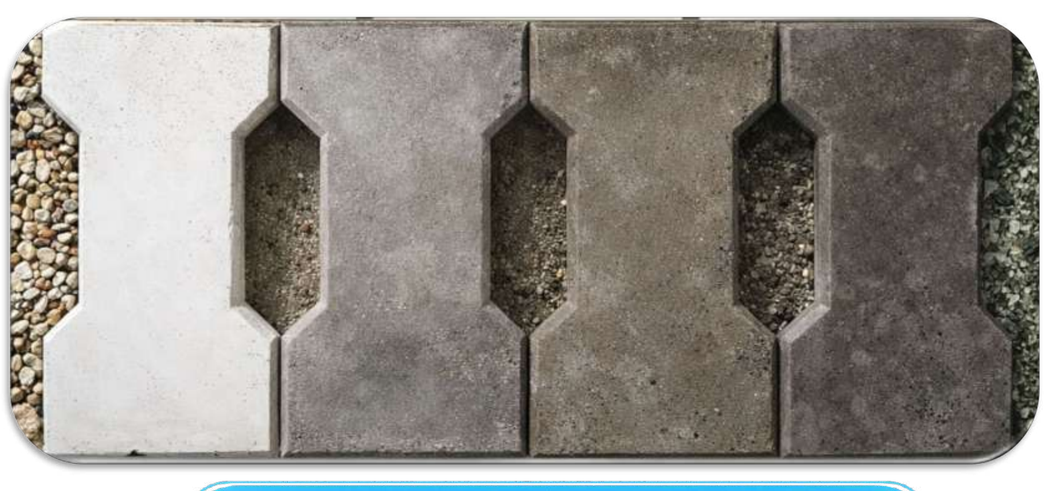
- This work aims to demonstrate the valorization of industrial by-products through the development of alkali-activated geopolymer paving blocks with photocatalytic TiO_2 surface coatings.
- Fly ash–based binders were formulated as low-CO_2 alternatives to Portland cement and processed into full-scale paving elements.
- The addition of TiO_2 provided self-cleaning functionality via photocatalytic degradation of organic contaminants under light exposure, reducing surface fouling and maintenance demand.
- The developed materials exhibit technological maturity at prototype level and show potential for durable, sustainable applications in urban pavements and pedestrian infrastructure.











Different Types of Aggregates (Natural / Recycled)

CO_2 Green alternative to cement
Much lower CO_2 emissions compared to conventional concrete

Self-cleaning effect
The surface degrades organic pollutants and dirt

Minimal maintenance
Natural clearling by rain + photocatalysis

Alkaline activation
Valorizes industrial waste (Slag, ash)

Enhanced durabillty
Good resistance to chemical agents and aggressive environments

This research was funded by the Romanian National Research Authority, project No. PN 23 35 05 01 "Innovative sustainable solutions to implement emerging technologies with cross- cutting impact on local industries and the environment, and to facilitate technology transfer through the development of advanced, eco-smart composite materials in the context of sustainable development of the built environment".

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URBAN INCD INCERC

Economic Efficiency of Green Buildings

Project PN 23 35 05 01
Author: Mircea-Iosif RUS

B

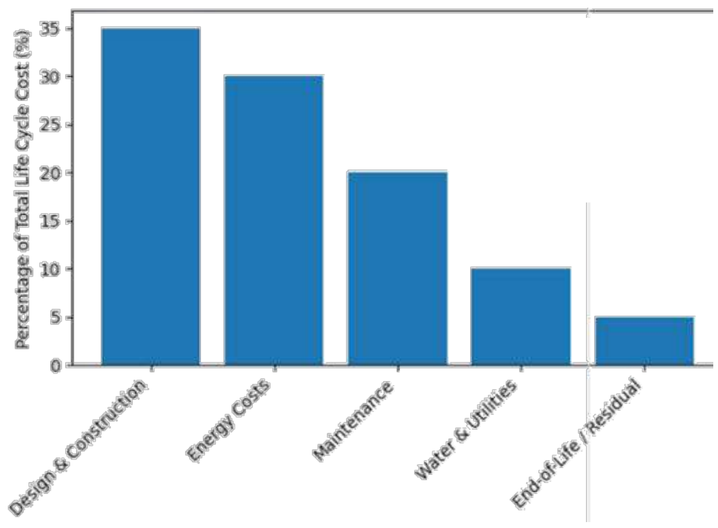
Context and Motivation

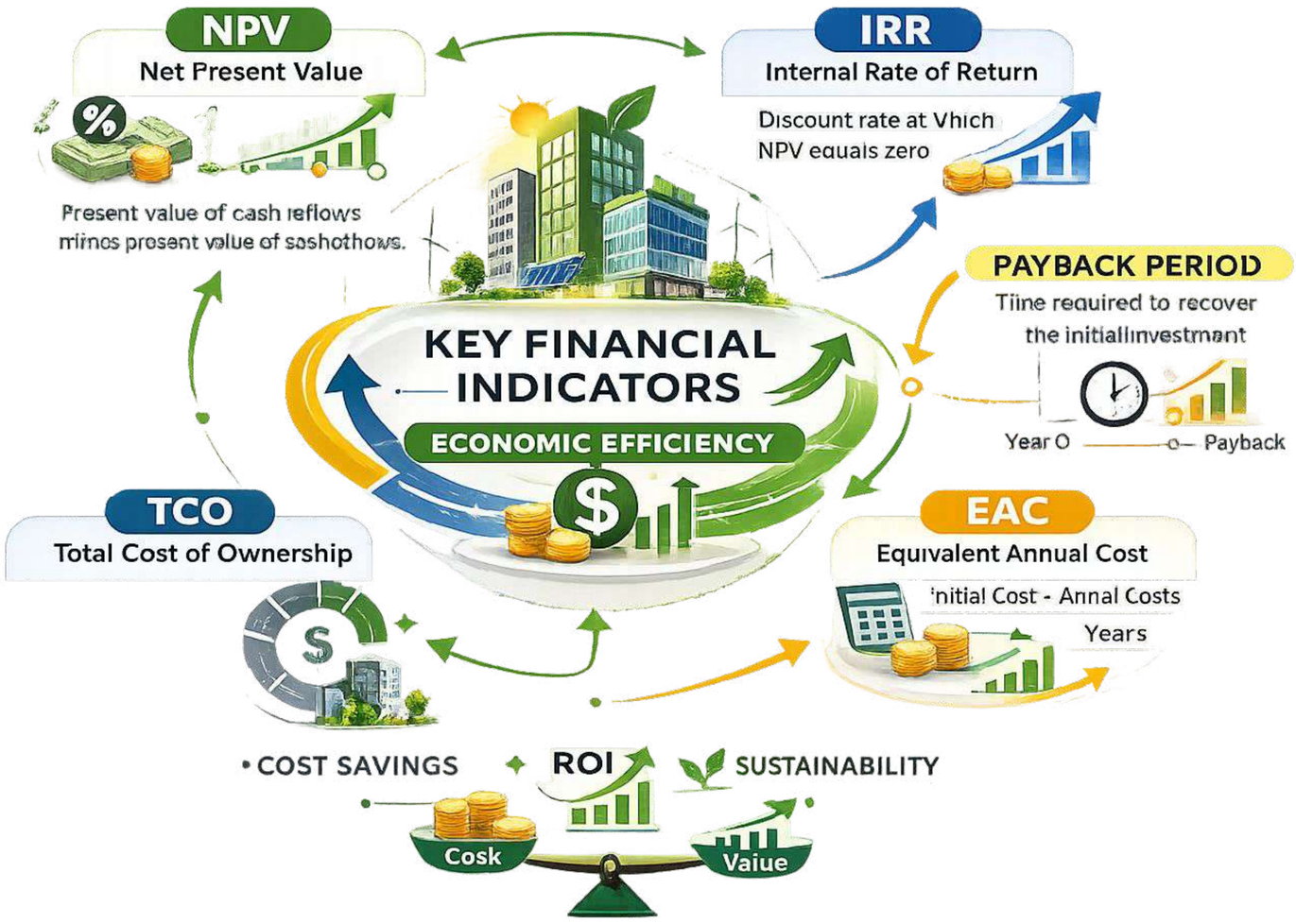
Green buildings reduce energy consumption and resource use, improve comfort, and mitigate regulatory risks. Although initial investment costs may be higher, operational savings and stronger market positioning often offset the difference

LCC integrates all relevant costs from design to end-of-life. In practice, operating costs can exceed initial investment, making energy-efficient technologies and smart systems economically decisive.

What Economic Efficiency Means

Economic efficiency is evaluated through:
(i) Life Cycle Cost (LCC),
(ii) reduced operating costs,
(iii) market premium and asset value,
(iv) risk mitigation, and
(v) occupant wellbeing and productivity





Conclusions and Implications

Green buildings generate economic advantages through energy savings, lower maintenance costs, stable occupancy rates, and improved access to green financing. Strategic decision-making should rely on LCC analysis and transparent post-occupancy performance monitoring.

This research was funded by the Romanian National Research Authority, project No. PN 23 35 05 01 "Innovative sustainable solutions to implement emerging technologies with cross- cutting impact on local industries and the environment, and to facilitate technology transfer through the development of advanced, eco-smart composite materials in the context of sustainable development of the built environment".

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Special Issue
Thermal Mitigation Effects of Green and Blue Infrastructure and Urban Sustainability from an Interdisciplinary Perspective

Guest Editors
Dr. Mircea-Iosif Rus
Dr. Lucian Gaban

Deadline
31 December 2026

sustainability
IMPACT FACTOR 3.3
CITESCORE 7.7

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INNOVATIVE MODEL FOR EVALUATING THE PERFORMANCE OF EUROPEAN INVESTMENTS FOR THE SUSTAINABLE DEVELOPMENT OF MOUNTAIN AREAS

Integrated analysis of the 2014–2020 PNDR and 2023–2027 PS PAC programs using data-based performance indicators

Authors: Tudor Panfil TOADER, Daniela Mihaiela BOCA, Daniela Elena REBEGA

B

1. INTRODUCTION

Mountain areas are territories characterized by natural constraints and socio-economic imbalances, requiring public interventions aimed at sustainable development. In Romania, the European programs PNDR and PS CAP are the main financial instruments dedicated to supporting agricultural and rural investments. In the absence of standardized evaluation tools, the actual performance of investments remains difficult to quantify, which justifies the development of an integrated analytical model.

2. RESEARCH OBJECTIVE

To develop and validate an innovative mathematical model for evaluating the performance of European investments by integrating financial and territorial indicators into a synthetic efficiency index applicable to mountain areas in Romania.

3. METHODOLOGICAL FRAMEWORK

3.1 Data sets analyzed

- **National Rural Development Program (NRDP 2014–2020)**
- **National Strategic Plan (PS CAP 2023–2027)**
- **official databases on investments in**
- **mountain areas**

3.2 Variables analyzed	Symbol Parameter analyzed
Np- Number of projects	Vc - Contracted value (€)
Vp - Paid value (€)	Ri - Implementation rate
Dt - Sectoral distribution	

3.3 Methods used

- **descriptive statistical analysis;**
- **indicator normalization**
- **multi-program comparative analysis;**
- **Engineering assessment of systemic efficiency**

4. PROPOSED MATHEMATICAL MODEL

Investemnt Performance Indicator (IPI) $IPI = \left(\frac{V_p}{V_c}\right) \cdot W_t$

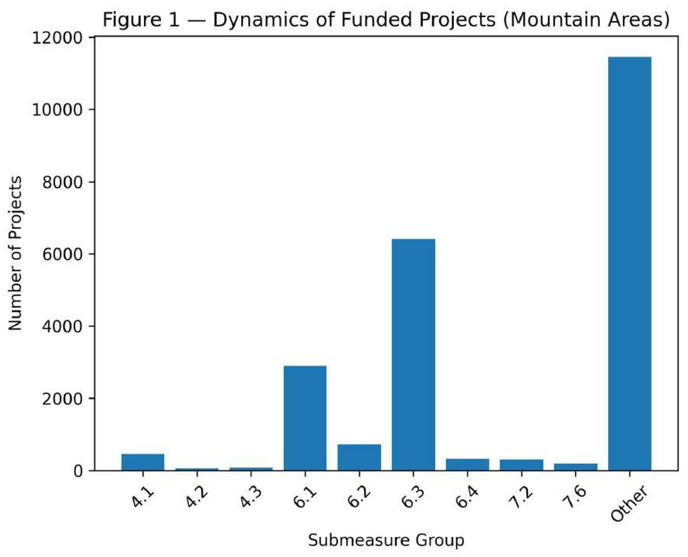
Funding Data (PNDR + PNS) → **Financial Efficiency (Vp / Vc)** → **Territorial Weight (Wt)** → **Investment Performance Index (IPI)**

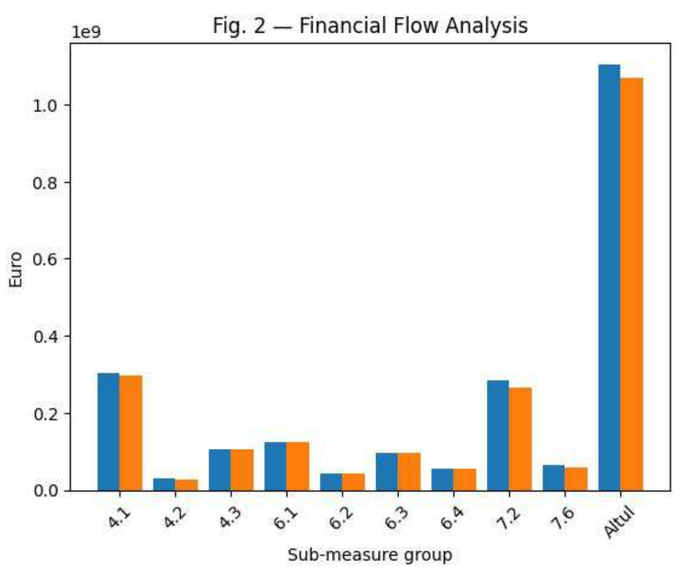
Technical interperation

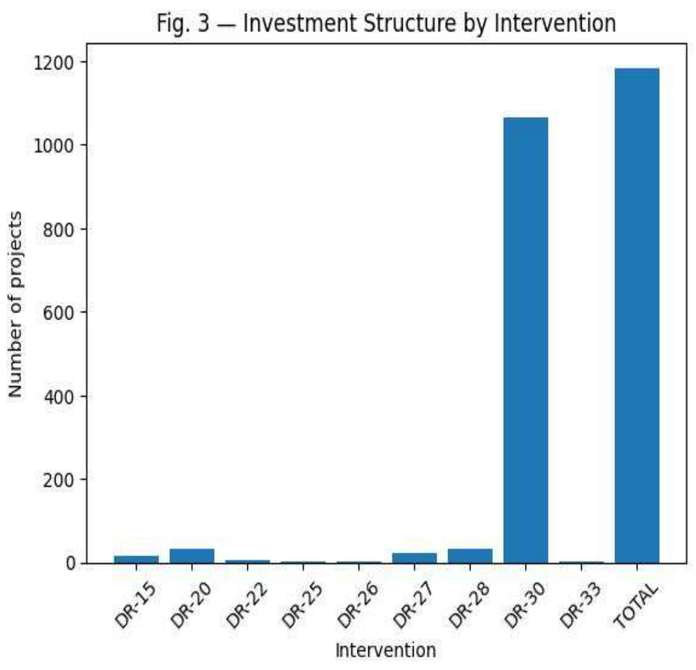
IPI ≈ 1 → high investment efficiency
0.6 < IPI < 1 → moderate performance;
IPI < 0.6 → low efficiency

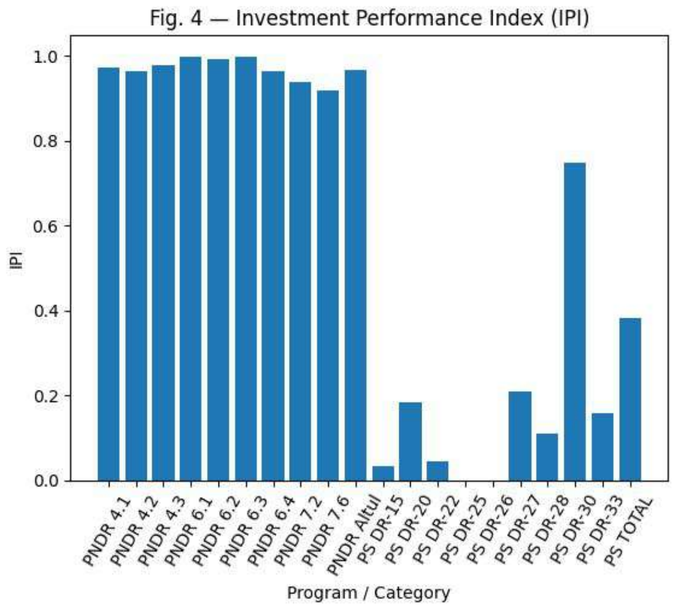
The model allows the simultaneous evaluation of financial performance and territorial impact, similar to engineering analyses of system performance.

5. EXPERIMENTAL RESULTS









6. CONCLUSIONS

The present research demonstrates that the evaluation of European investments in mountain areas can be transformed from a descriptive financial assessment into a quantitative engineering-based performance analysis through the proposed Investment Performance Index (IPI).

The integrated analysis of PNDR and PNS programs highlights significant differences in implementation dynamics and financial efficiency across intervention categories, confirming the necessity of a synthetic evaluation The methodology proves to be scalable and transferable, offering a practical analytical tool for supporting evidence-based decision-making in public investment policies and sustainable territorial development.

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ENGINEERED CEMENTITIOUS COMPOSITE (ECC) MIXTURES DEVELOPED TO IMPROVE CONCRETE PERFORMANCE UNDER DYNAMIC LOADING, TENSILE STRESS AND SELF-HEALING CONDITIONS

PhD research

Ioan Ștefan ZAVASCHI, Tudor Panfil TOADER, Călin Grigore Radu MIRCEA, Carmen-Teodora MOLDOVAN, Cosmin CHIRILIANU

B

INTRODUCTION

The intrinsically reduced tensile strength of plain concrete (PC) prompted the development of reinforced concrete (RC), followed by fiber-reinforced concrete (FRC) and, more recently, engineered cementitious composites (ECC). The incorporation of randomly oriented short fibers into the cementitious matrix significantly enhances mechanical performance, particularly in terms of tensile and flexural strength, ductility, fatigue resistance and impact performance. Moreover, the reduced crack widths, attributed to stress redistribution enabled by fiber incorporation, contribute to improved self-healing capacity.

MATERIALS AND METHODS

ECC specimens were prepared using ordinary Portland cement (PC), fly ash (FA), marble powder (MP), sand (0-4 mm), water, and a polycarboxylate-based high-range water-reducing admixture (HRWR). The mixtures also incorporated the cement-based crystalline admixture MasterLife WP 1000 (ML1000) and polyvinyl alcohol (PVA) fibers in different volume fractions (0.5%, 1.0%, 1.5%, 2.0%, 2.5% and 3.0%). The testing program included three-point bending tests, compressive strength tests, crack initiation and monitoring using image acquisition in combination with ultrasonic pulse velocity (UPV) and impact resistance evaluation using the Charpy pendulum test.

RESULTS

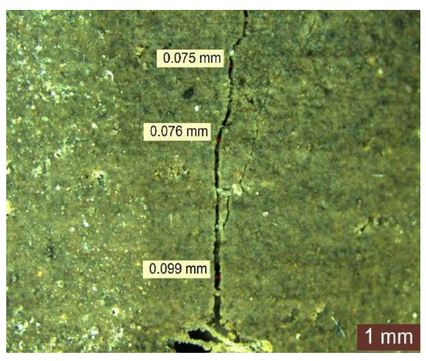
Three specimens from each mixture were tested under three-point bending and compression at 28 days to determine the compressive strength, tensile strength and the cracking load, as presented in Table 1. Subsequently, three additional specimens from each mixture were subjected to the predetermined cracking load in a three-point bending test to induce controlled cracking.

Table 1. Crack initiation forces and modulus of rupture.

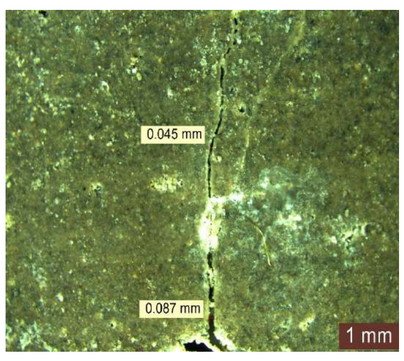
Mixture ID	Fiber volume [%]	F_{cr} [kN]	MOR [N/mm^2]
C1	0.5	2.12	4.97
C2	1	2.63	6.18
C3	1.5	3.49	8.20
C4	2	3.65	8.55
C5	2.5	4.84	11.34
C6	3	5.52	12.94

Mixture ID, Mixture Identification; F_{cr}, Cracking Load; MOR, Modulus of Rupture.

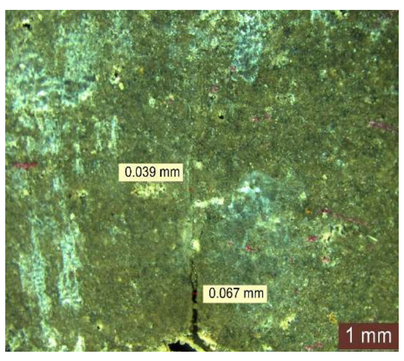
The results indicate that tensile strength increases with increasing fiber volume fraction, thereby influencing crack widths and consequently, the self-healing capacity of the specimens. Specimens with crack widths up to 0.1 mm exhibited complete or almost complete crack closure, whereas specimens with larger crack widths (≥0.15 mm) showed partial or no closure, depending on the initial crack width.



3 days of curing



13 days of curing



59 days of curing

CONCLUSIONS

Advancements in concrete technology, combined with increased attention to environmental factors, have prompted the development of novel concrete mixtures. ECC represent a natural progression in concrete materials due to their enhanced mechanical performance and durability, thereby contributing to reduced production costs and pollution while addressing current engineering challenges.

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Design and Constructive Optimization of an Industrial Hall Used for Electrostatic Field Painting

Patent/project number: UNSTPB 133/2021

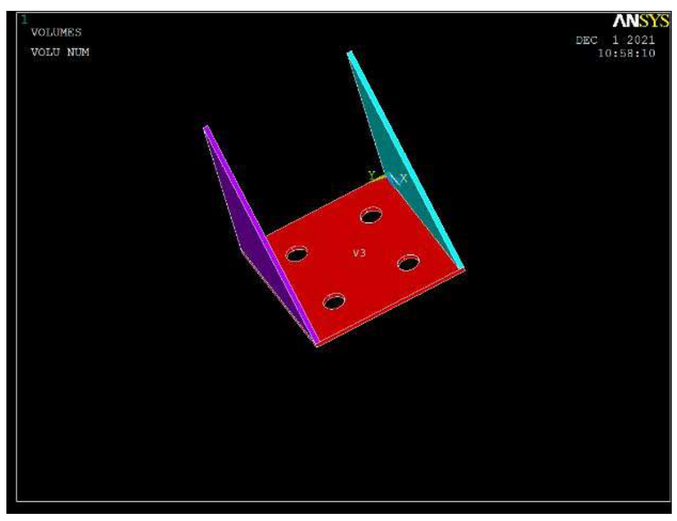
Authors: Florea Bogdan, Semenescu Augustin, Chivu Oana Roxana, Niţoi Dan, Marcu Dragoş Florin, Pasare Vili

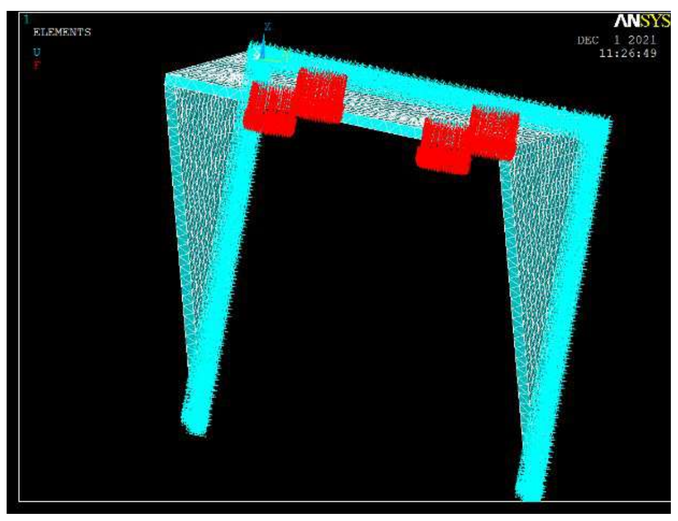
B

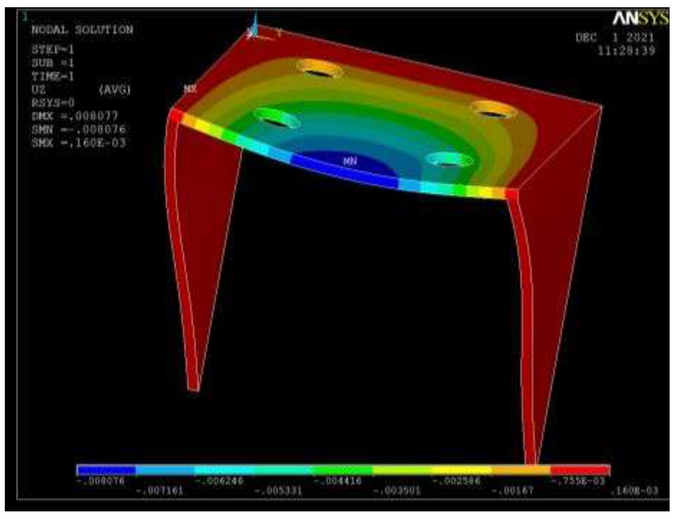
Based on the theoretical principles of steel structure design and the specific functional requirements of an electrostatic painting booth, a comprehensive constructive and structural optimization process was carried out for the proposed industrial hall. The research approach combined normative design criteria (according to SR EN 1993-1-1 and related standards), constructive detailing requirements, and practical execution constraints in order to ensure structural safety, durability, and operational efficiency.

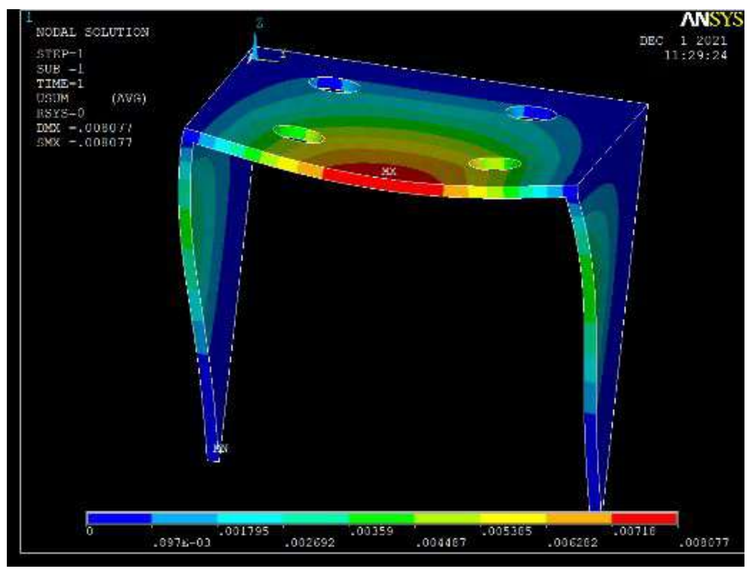
In order to validate the structural configuration and the chosen dimensional solutions, a finite element analysis was performed for the main beam-type elements defining the metallic structure of the painting cabin. The numerical simulations allowed the evaluation of stress distribution, displacement fields, and critical zones under the most unfavorable load combinations, including gravitational and seismic actions.

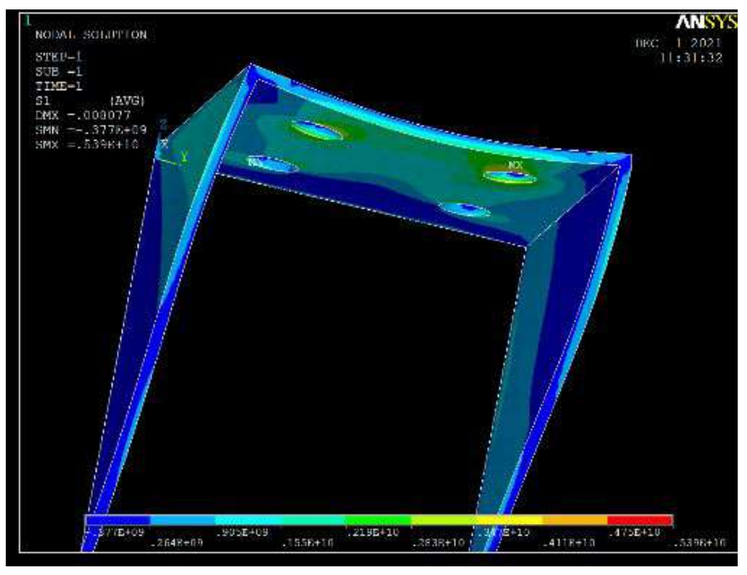
To support and illustrate the optimization results, graphical representations of the modeled elements were generated, highlighting the deformation patterns and stress concentration areas. These visual analyses provide an intuitive understanding of the structural behavior and confirm that the proposed configuration ensures both mechanical resistance and functional performance within the imposed technical constraints.

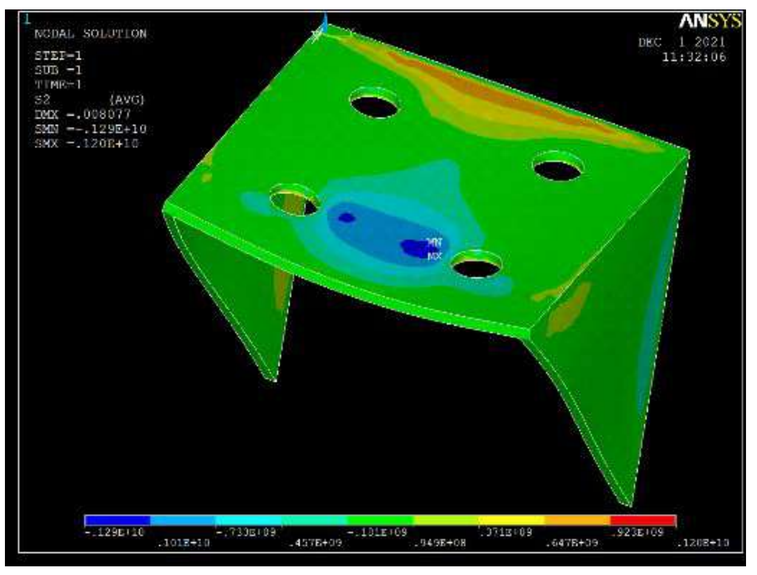












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Innovative tools in occupational health and risk management

TATARCAN ANCA-CRISTINA,
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B

A. PREZENTARE

OBIECTIVE

Dezvoltarea instrumentelor inovative pentru gestionarea eficientă a riscului în medii profesionale.

Evaluarea riscurilor profesionale în medii de muncă, evidențiind principiile fundamentale, metodele, și contribuțiile cercetătorilor români.

INOVAȚIE

Metodologii inovatoare propuse pentru evaluarea conformității cu reglementările în securitate și sănătate în muncă, folosind instrumente de auditare și abordări matematice precum METESPRRS.

Analiza relațiilor dintre securitatea profesională, nivelul de risc și probabilitatea manifestării riscului.

Direcții viitoare de cercetare în domeniul sistemelor medicale inovative și digitalizării evaluării riscului ocupațional.

Un instrument inovator precum MSSM.EXE 01 facilitează gestionarea documentelor de sistem.

B. PRESENTATION

OBJECTIVES

Development of innovative tools for effective risk management in professional environments.

Assessment of occupational risks in work environments, highlighting fundamental principles, methods, and contributions from Romanian researchers.

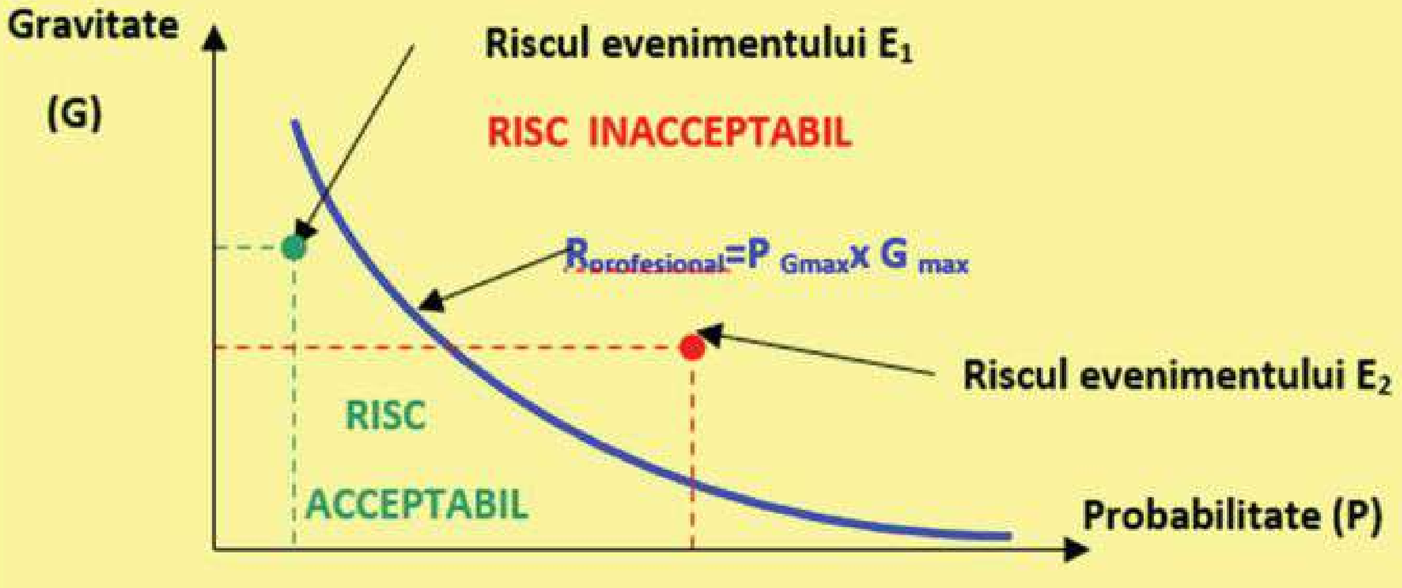
INNOVATION

Innovative methodologies proposed for assessing compliance with occupational safety and health regulations, using auditing tools and mathematical approaches such as METESPRRS.

Analysis of the relationships between occupational safety, risk level, and probability of risk occurrence.

Future directions for research in the field of innovative medical systems and the digitization of occupational risk assessment.

An innovative tool such as MSSM.EXE 01 facilitates the management of system documents.



STUDY OF THE CONSTRUCTIVE PARAMETERS AND MECHANICAL PROPERTIES OF BEAM SYSTEMS REINFORCED WITH COMPOSITE MATERIALS

B

Research Project number: 10/17.07.2024

Authors: Ianăși Aurora Cătălina, Minodora-Maria Pasăre, Nicoleta-Maria Mihuț, Rădulescu Constanța, Alin Stăncioiu, Alin Nioață

PURPOSE/OBJECTIVES OF THE PROJECT

This project contains a study of wooden beams reinforced with composite materials. The project aimed to determine the mechanical properties of wooden beams reinforced with carbon fiber composite materials, when they are subjected to bending stress.

The project highlighted the materials chosen for the beams and those used for their reinforcement.

For the beam systems thus obtained, the following parameters were determined: bending force, displacement (deformation) of the beams under the action of the bending force during the performed tests. The bending tests were carried out until the beams broke, measuring the load-displacement (deformation) dependence.

The bending behavior of reinforced beams was compared with the bending behavior of unreinforced beams precisely to determine which type of reinforcement has better stiffness and load-bearing capacity, comparing with the unreinforced beams.

With the help of the parameters determined in the measurements carried out during the tests, it was possible to identify effective beams reinforcement solutions, which could also have applicability in practice.

Types of reinforcement

Bending stress

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STUDIES AND RESEARCH ON OPTIMIZING PLASMA CUTTING PARAMETERS FOR S355JR STEEL

Project number: 11/18.07.2024

Authors: Alin Nioață, Alin Stăncioiu, Ianăși Aurora Cătălina, Nicoleta-Maria Mihuț, Elena Loredana Stăncioiu, Rădulescu Constanța

B

PURPOSE/OBJECTIVES OF THE PROJECT

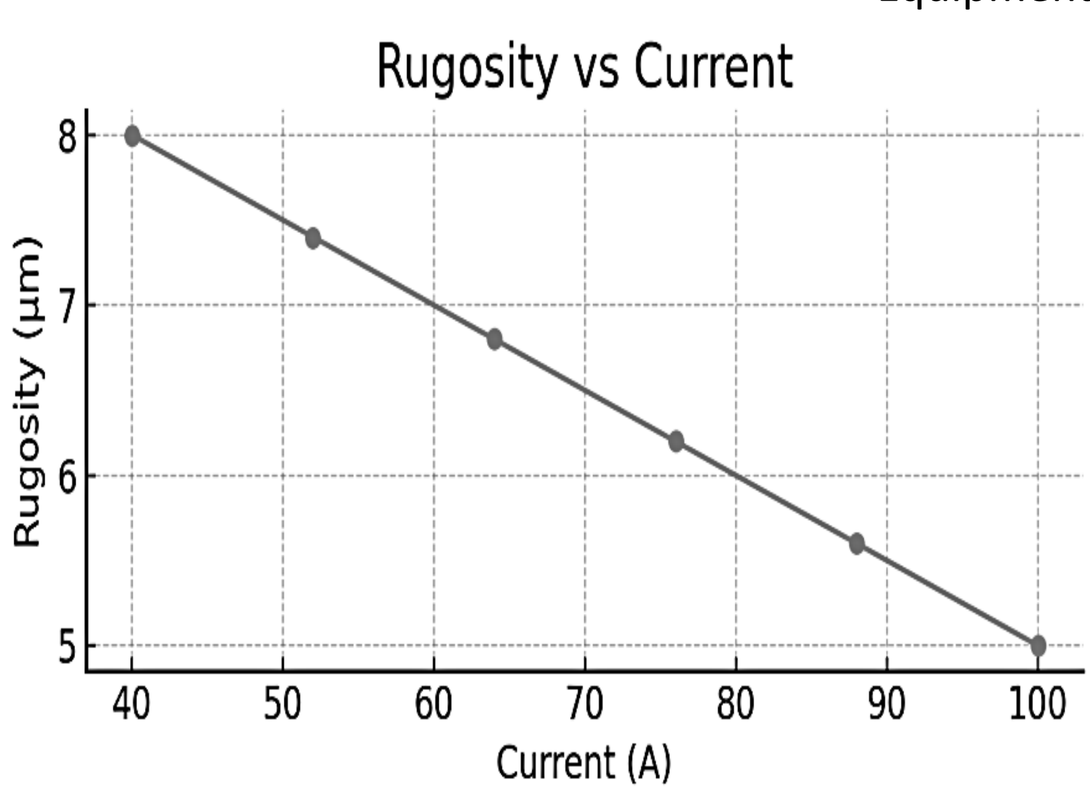
The main purpose of this study is to analyze and optimize the technological parameters of plasma cutting for S355JR steel in order to ensure superior cut quality, energy efficiency, and equipment durability. The study aims to:Identify the determining factors that influence cut quality, including surface roughness, edge perpendicularity, and the amount of slag formed.

The quality of the cut achieved by plasma cutting is influenced by several critical factors, including:

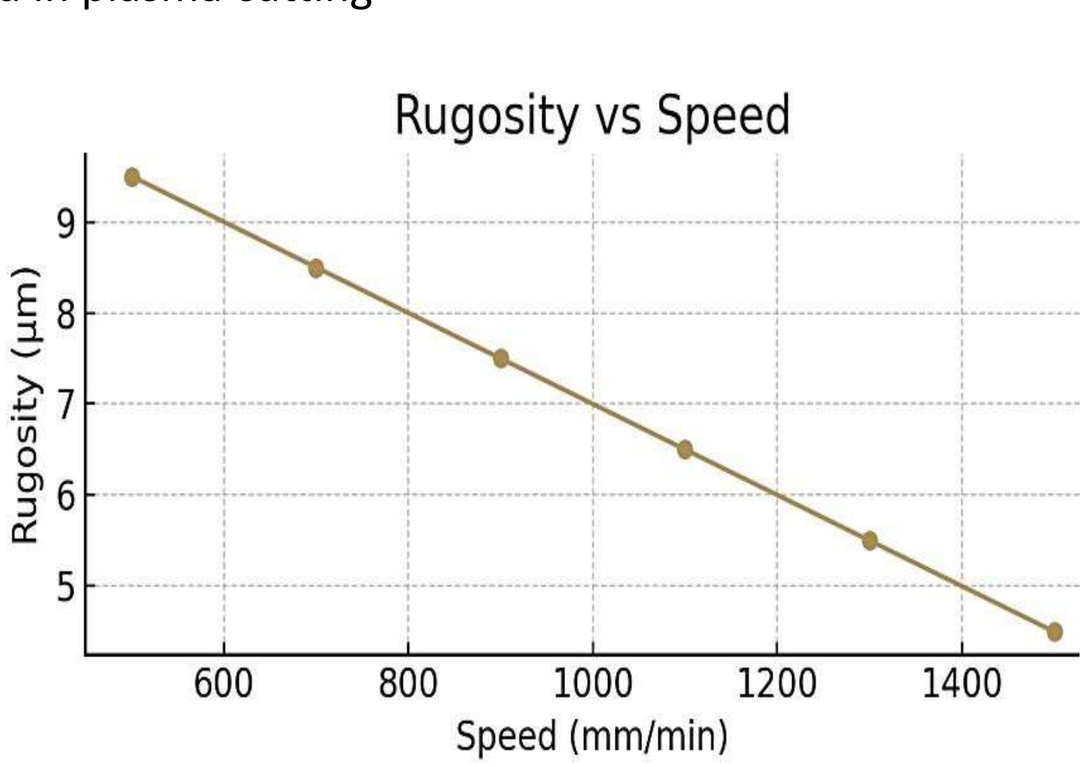
- Surface roughness: This depends on speed, electric arc voltage, the gas used, and the characteristics of the material. Too high a speed can lead to a rough surface, and too low a speed can cause slag build-up.
- Edge perpendicularity: The cutting angle is influenced by arc stability and the distance between the cutter nozzle and the material. Insufficient arc stability can result in irregular edges.
- Amount of slag formed: This varies depending on the gas used (argon, nitrogen, or compressed air), temperature, and cutting speed. An optimal balance between these factors reduces slag deposits on the edges.

Current industrial requirements, such as reducing processing times and increasing precision, necessitate the use of advanced control technologies, including automatic monitoring and optimization between processes.

Equipment used in plasma cutting



Dependence of roughness on current intensity



Dependence of roughness on feed rate

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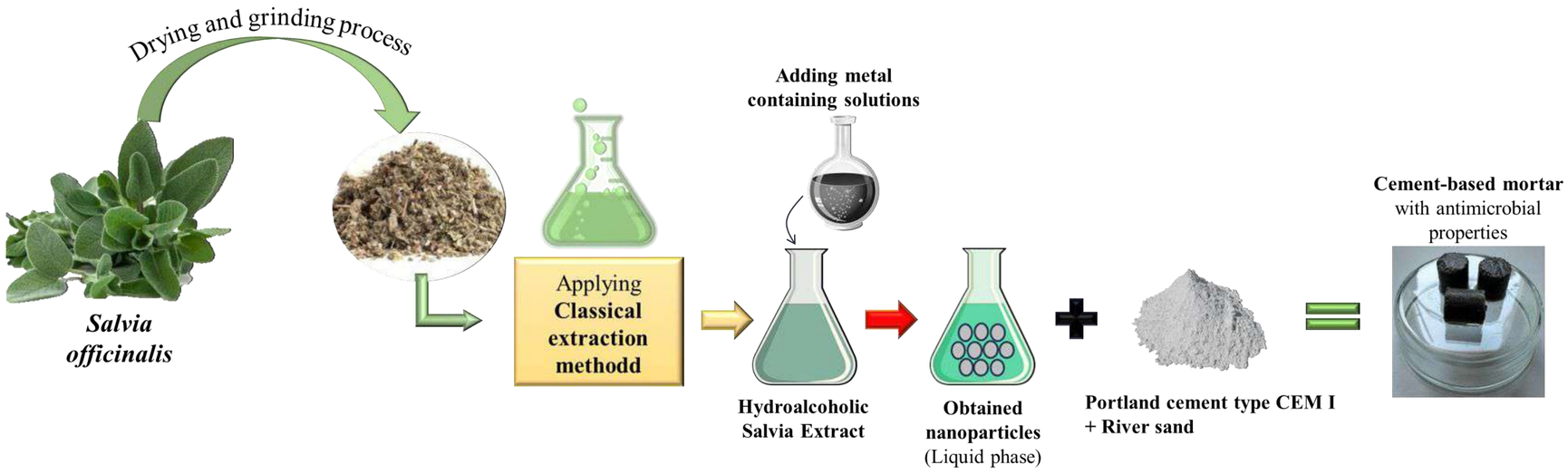
CEMENT-BASED MORTAR WITH ANTIMICROBIAL PROPERTIES AND METHOD FOR OBTAINING IT

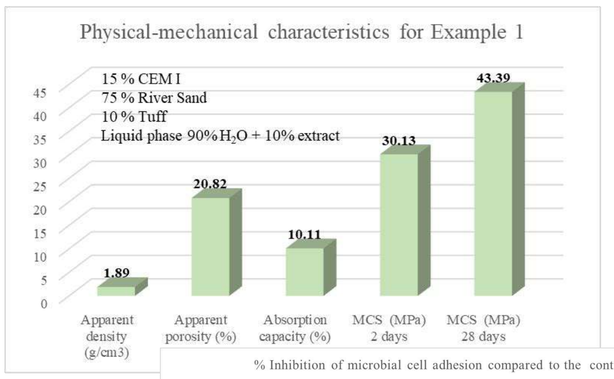
B

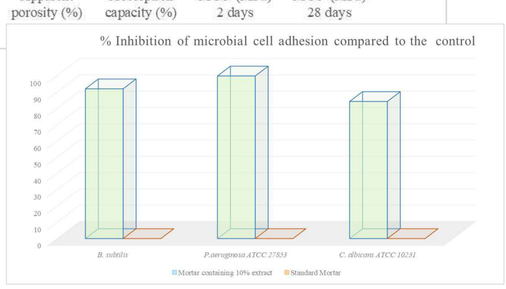
Patent application A-00147/2026

Irina FIERASCU, Radu Claudiu FIERASCU, Toma FISTOS, Anda Maria BAROI, Roxana Ioana MATEI, Ioana Silvia HOSU, Irina Elena CHICAN, Adriana MOANTA, Ionela PETRE, Carmen MUNTEANU

The present invention relates to a cement-based mortar with antimicrobial properties and a method for its preparation, with potential applications in the conservation and restoration of cultural heritage, among other fields. The cement mortar is enriched with phytosynthesized silver nanoparticles obtained using Salvia officinalis extracts (the antimicrobial component), prepared by classical hydroalcoholic extraction at controlled temperature. The mortar, according to the invention, consists of Portland cement type CEM I, river sand (fraction < 2 mm), and a liquid phase composed of water, of which 10–30% of the total volume is replaced with a hydroalcoholic extract of Salvia officinalis, a solution containing silver nanoparticles (AgNPs). The cement-to-sand ratio is 1:3, while the binder-to-liquid ratio is 0.5. The mortar has a density of at least 1.80 g/cm³ and a compressive strength after 28 days of at least 35.50 MPa, and exhibits antimicrobial activity against Gram-positive and Gram-negative bacteria. The preparation process involves obtaining the antimicrobial component and incorporating it into the cement-based composition during the mortar preparation stage.

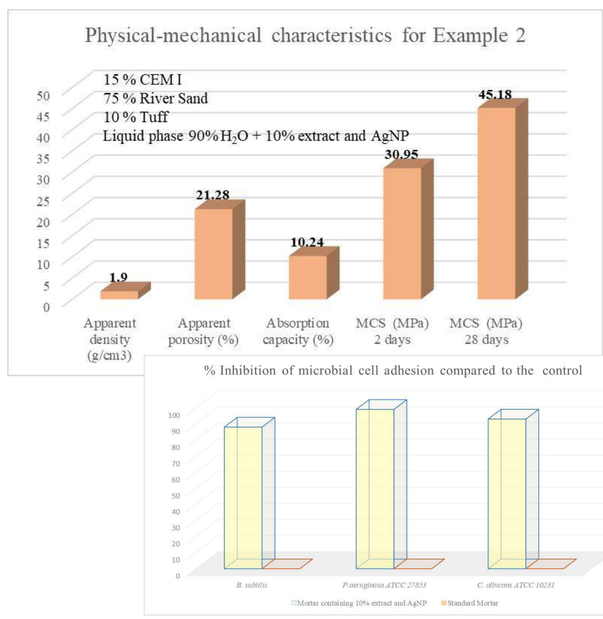






Advantages of the invention

- **Eco-friendly and low-cost reagents are used to obtain the active antimicrobial component**
- **High reproducibility at the industrial scale**
- **The invention is effective and can be applied in various fields, ranging from construction to cultural heritage protection**
- **The synthesis method is simple and easily scalable at the industrial level**
- **Reduced environmental impact**
- **Obtaining a homogeneous mortar without nanoparticle agglomeration**



ACKNOWLEDGEMENTS

This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research – National Authority for Research), CCCDI—UEFISCDI, project number PN-IV-P7-7.1-PED-2024-0286, contract 77 PED/2025, within PNCDI IV.

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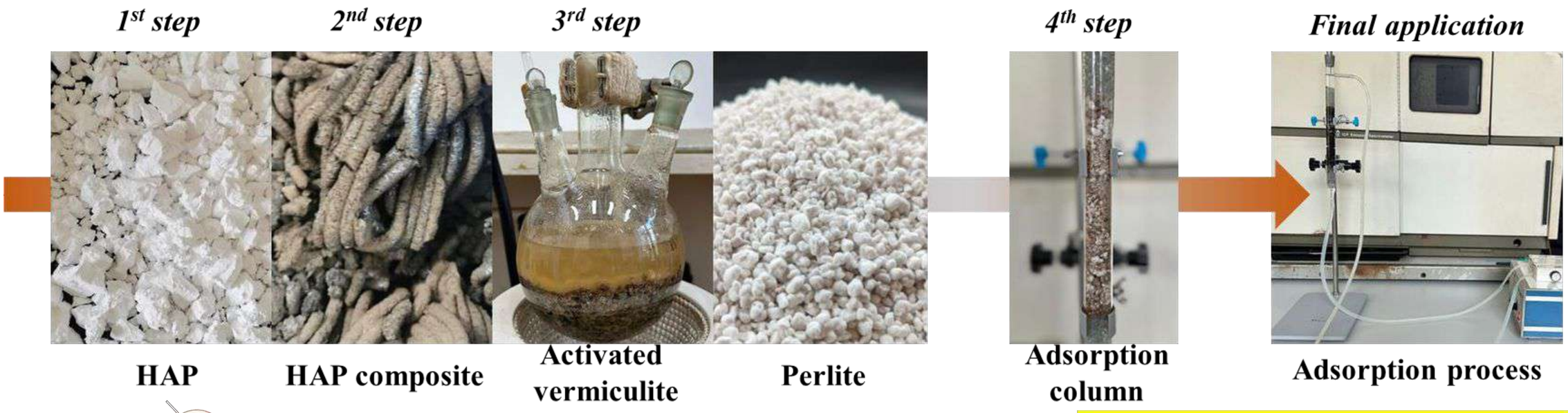
COMPOSITE BASED ON RAW MATERIALS OF NATURAL ORIGIN FOR THE ADSORPTION OF HEAVY METALS AND METHOD OF OBTAINING IT

Patent application No. 00334/2025

Radu Claudiu FIERASCU, Irina FIERASCU, Toma FISTOS, Anda Maria BAROI, Ioana Silvia HOSU, Roxana Ioana MATEI, Irina-Elena CHICAN

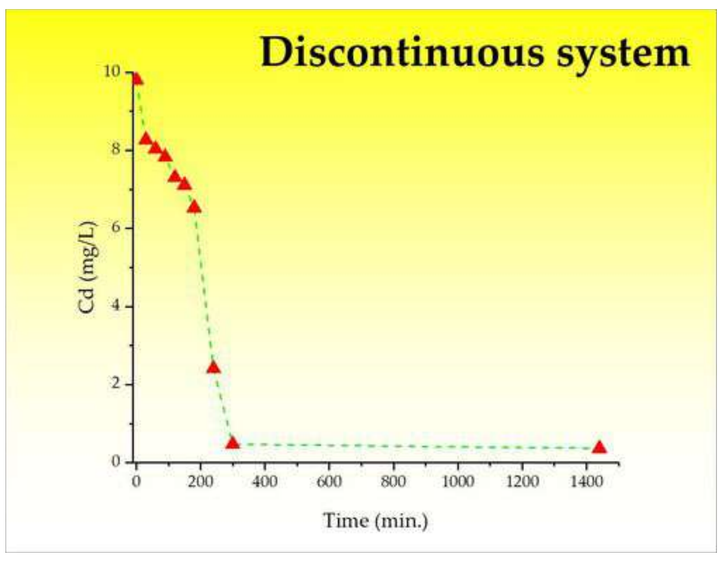
B

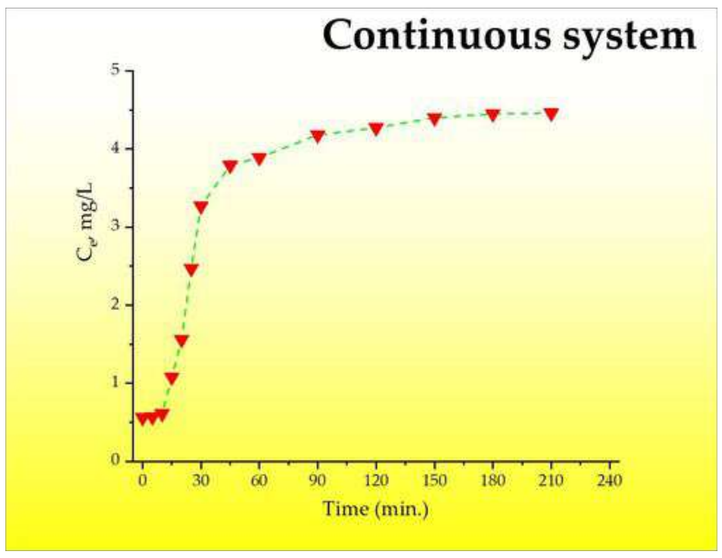
The present invention relates to a composite material and a method for obtaining it, intended for the removal of heavy metals from aqueous environments, particularly at low concentrations and under real usage conditions. The invention falls within the field of contaminated water treatment and environmental protection, addressing a pressing need for efficient, sustainable, and environmentally friendly solutions for water depollution. The proposed material consists of an active layer obtained by combining natural-origin materials – hydroxyapatite, vermiculite, and perlite – each contributing specific functional properties to the overall performance of the adsorption system. Through the synergy of these natural components, the resulting material exhibits superior efficiency in removing heavy metals under real contamination conditions (variable pH, presence of other competing ions, ambient temperature, etc.). The method of obtaining the material consists of four steps, is simple, scalable, and does not involve costly synthesis processes, making it suitable for industrial and/or municipal applications.

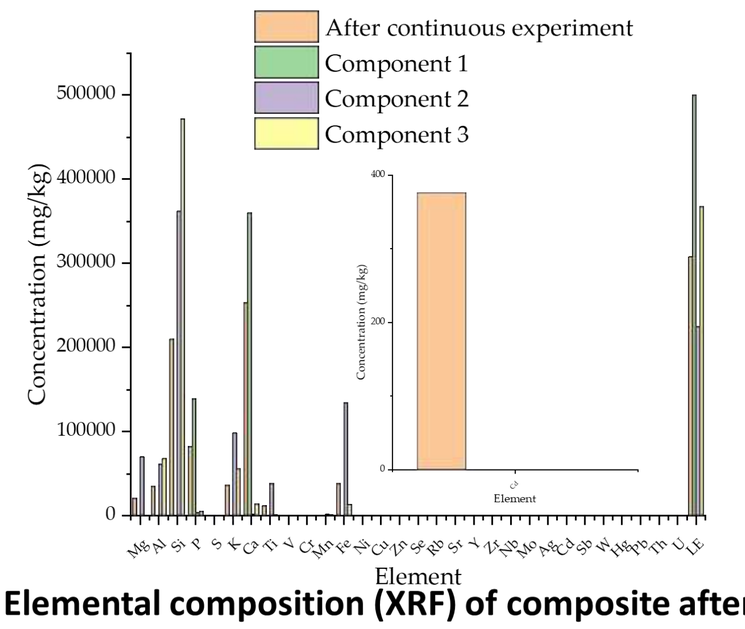


AVANTAGES

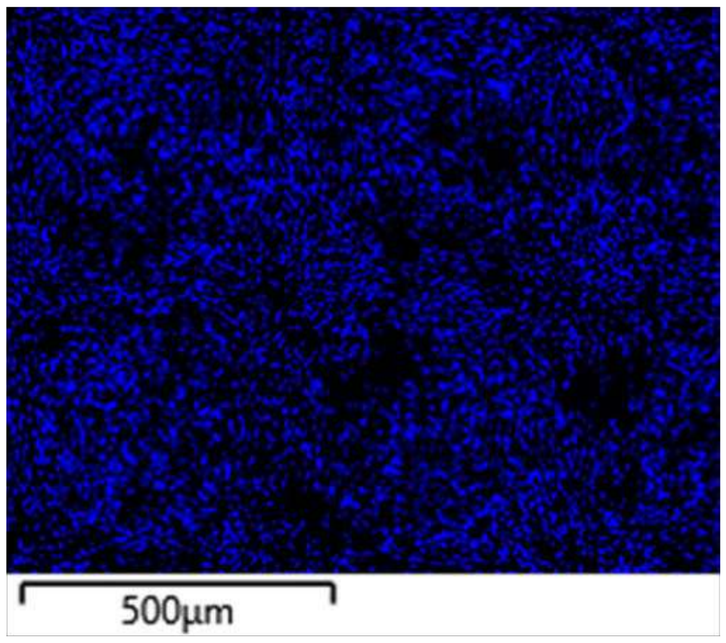
- Stability and affinity for the adsorption of heavy metals at ambient temperature, atmospheric pressure, and within the pH range typically found in aqueous effluents;
- Reproductible in terms of its physico-structural properties;
- Well-known and low-cost obtaining methods;
- No secondary pollution (sludge, ash, etc.);
- Possibility of usage in accidental pollution involving high concentrations of pollutants.







Elemental composition (XRF) of composite after continuous experiment vs. individual components.



Cd adsorption on the material – EDX data.

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Acknowledgements: The authors gratefully acknowledge the support of the Ministry of Research, Innovation and Digitization (Ministry of Education and Research, National Authority for Research) through the PN 23.06 Core Program – ChemNewDeal, project no. PN 23.06.01.01 – AquaMat, within PN IV.

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TITLE

THERMOPLASTIC COMPOSITE SELECTION METHOD FOR POWERING AN AUTOMATIC THERMOFORMING LINE

B

INVENTOR/S - CONTACT

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PATENT/PROJECT

Patent OSIM no.: RO137477-B1 / 30.05.2025

SHORT PRESENTATION

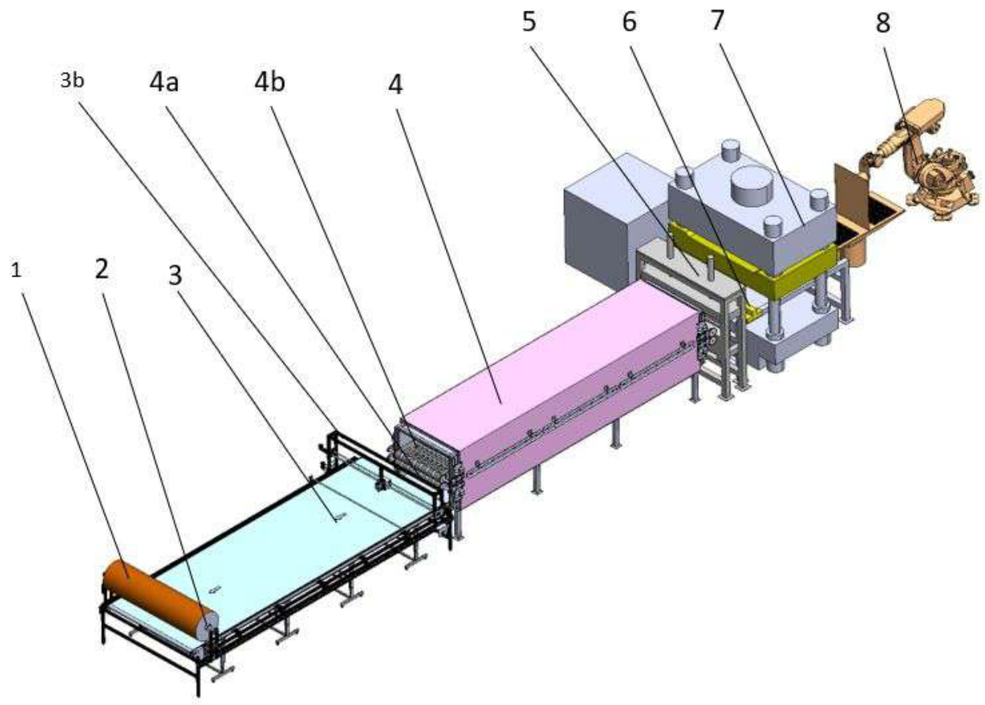
Composite material 1 from a feed drum 2 is spun on the cutting table 3 then transferred to the furnace 4, where it is heated until it reaches a temperature higher than the melting temperature of the thermoplastic matrix. A feeding mechanism 6 takes the material and transfers it to the forming press 7 where it is consolidated by cooling in a mold. Finally, the consolidated part is taken over by the robotic cell 8, for finishing the contour.

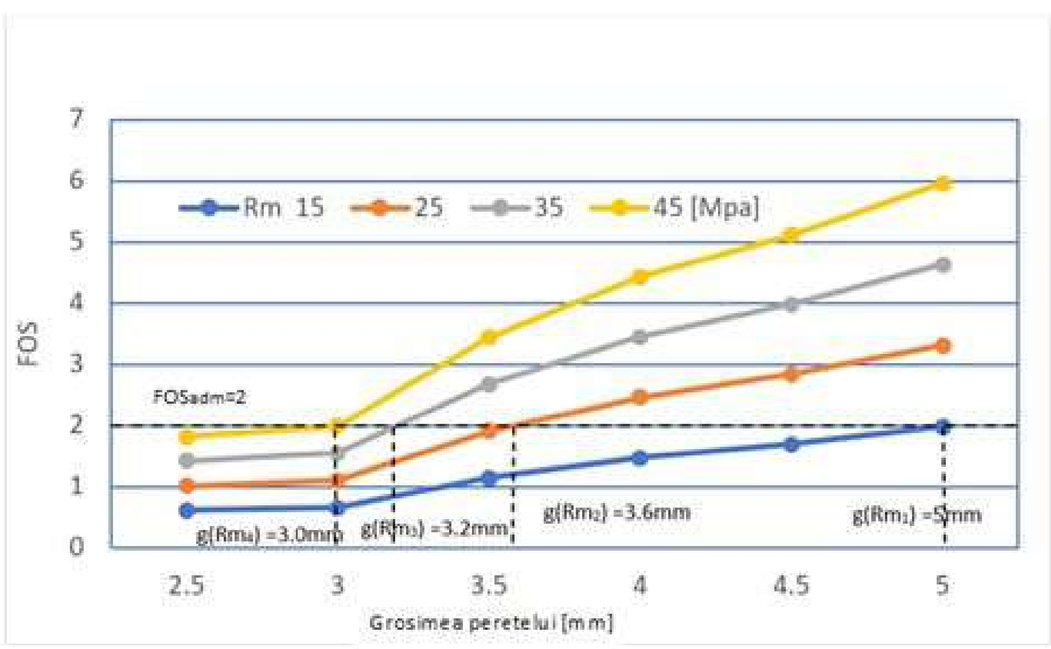
The method involves the division of products into classes with a representative benchmark, then static studies are performed by the finite element method and the minimum wall thickness is determined so as to simultaneously meet the requirements of the permissible safety factor and deformation for each available composite material, after which determine the section cost of the representative part for each available material and select the composite that offers the minimum section cost, and for any other part of the representative part group the FEA analysis will be done only with the material selected for the representative part and the wall thickness will be determined which satisfies the technical restrictions, and then the number of overlapping layers will be determined, and the data that will be transmitted to the automatic thermoforming line.

APPLICABILITY

Upholstered furniture (replacing wood in the load-bearing structure)
Construction (insulating and sound-absorbing materials)

IMAGES





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TITLE

PVA FIBER REINFORCED CEMENTITIOUS COMPOSITE WITH FLY ASH AS A REPLACEMENT FOR NATURAL AGGREGATE AND PROCESS OF OBTAINING

B

INVENTOR/S - CONTACT

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PATENT/PROJECT

Patent OSIM no.: RO138196- B1 / 30.09.2025

SHORT PRESENTATION

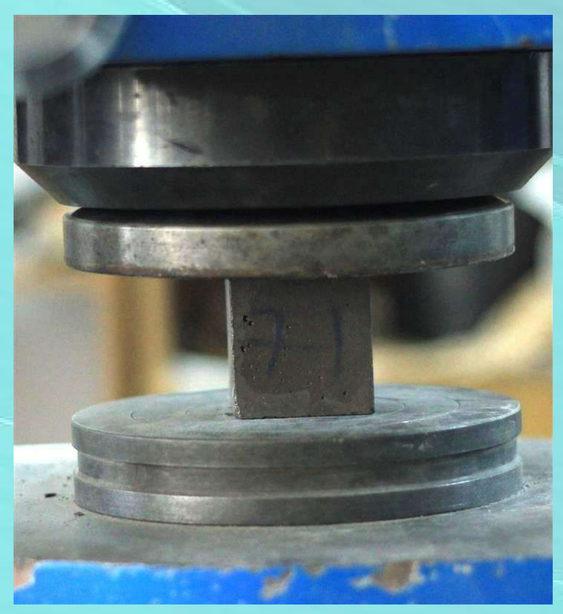
This invention relates to the composition and process of obtaining a fiber reinforced cementitious composite with 2% Polyvinyl Alcohol (PVA) fibers and fly ash as a substitute for natural aggregates. The innovative approach involves a complete substitution of aggregates typical in conventional concrete with waste from thermal power plants, such as fly ash. The result is a novel eco-friendly material with compressive and tensile strengths comparable to traditional concrete but marked by significant improvements in deformability properties.

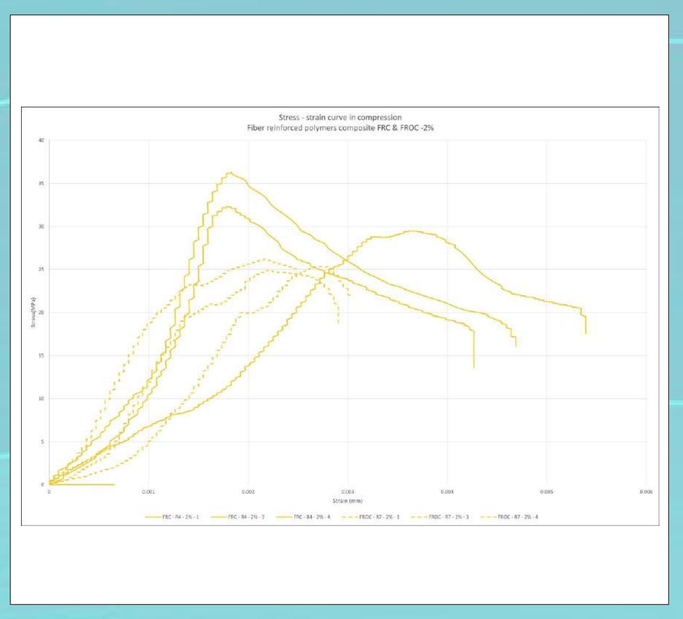
The unique properties of this material make it ideal for applications requiring increased durability, seismic resistance, and the ability to absorb energy. By incorporating fly ash as a complete replacement for natural aggregates, the material brings advantages such as reduced volumetric weight, diminished hydration heat, and lower production costs while safeguarding the environment and preserving natural resources.

APPLICABILITY

PVA fiber reinforced cementitious composite with fly ash as a replacement for natural aggregate can be applied in ductile and durable construction components such as beams, columns, and slabs, as well as in infrastructure elements like bridges and pavements. The versatility of this composite positions it as a promising solution for sustainable construction practices, offering a balance between enhanced performance and environmental responsibility.

IMAGES





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TITLE

ULTRA-HIGH-PERFORMANCE CONCRETE PRECAST PILE WITH C-SECTION, AND DISPERSED STAINLESS STEEL FIBER REINFORCEMENT, INTENDED FOR THE SUPPORT STRUCTURE OF GROUND-MOUNTED PHOTOVOLTAIC PANELS

B

INVENTOR/S - CONTACT

Şoşa Pavel Ioan, Negruțiu Camelia Maria
ioan.sosa@dst.utcluj.ro

PATENT/PROJECT

Patent application OSIM no.: A/00485/29.10.2025

SHORT PRESENTATION

The invention relates to a precast ultra-high-performance concrete pile, reinforced with dispersed stainless-steel fibers (UHPFRC), intended for the support structure of ground-mounted photovoltaic panels. The element features a C-shaped cross-section, like metal profiles, which provides increased stiffness, durability, and resistance to aggressive environments. The pilots are installed by driving, without conventional reinforcement and without the need for bracing. The invention reduces concrete volume, costs, CO_2 emissions, and corrosion risk, offering a sustainable and predictable solution for photovoltaic system foundations

APPLICABILITY

The invention concerns a precast ultra-high-performance fiber-reinforced concrete (UHPFRC) pile with a slender C-shaped cross-section, intended for ground-mounted photovoltaic support structures. The pile is entirely manufactured from UHPFRC reinforced with dispersed stainless steel fibers, without any conventional reinforcement. The optimized C-section geometry provides high bending stiffness and structural efficiency while significantly reducing concrete volume and material consumption.

The element is installed by driving, using standard equipment applied for metallic piles, without the need for bracing or auxiliary foundations. The solution offers enhanced durability, reduced corrosion risk, lower CO_2 emissions, and predictable structural behavior, representing a sustainable alternative to traditional steel or reinforced concrete foundations for photovoltaic systems

IMAGES

Using the Print-Pause-Print (PPP) technique to embed plastic foils into 3D prints

Author: Lucas Jacoby
Mentor/s: Dr. Gabriela Mărginean and Prof. Dr. Klaus Mecking

B

Introduction

Fused Filament Fabrication (FFF) is a rapidly growing additive manufacturing technique (Fig. 1). An emerging but currently rarely used approach within this field is the Print-Pause-Print (PPP) technique. By pausing the printing process midway, external components, such as magnets or other hardware, can be embedded into the part to introduce new functionalities. In this case, the PPP technique is utilized to combine two separate prints into one. The first part with filament directly printed on the foil is inserted upside down into the second part to embed it from both sides and make a secure connection. An important part of this is the pairing of materials, which is shown by the results of subsequent tensile testing in shear direction by pulling of the foil.

Fig. 1: The "The Ultimaker³" 3D printer used in this project

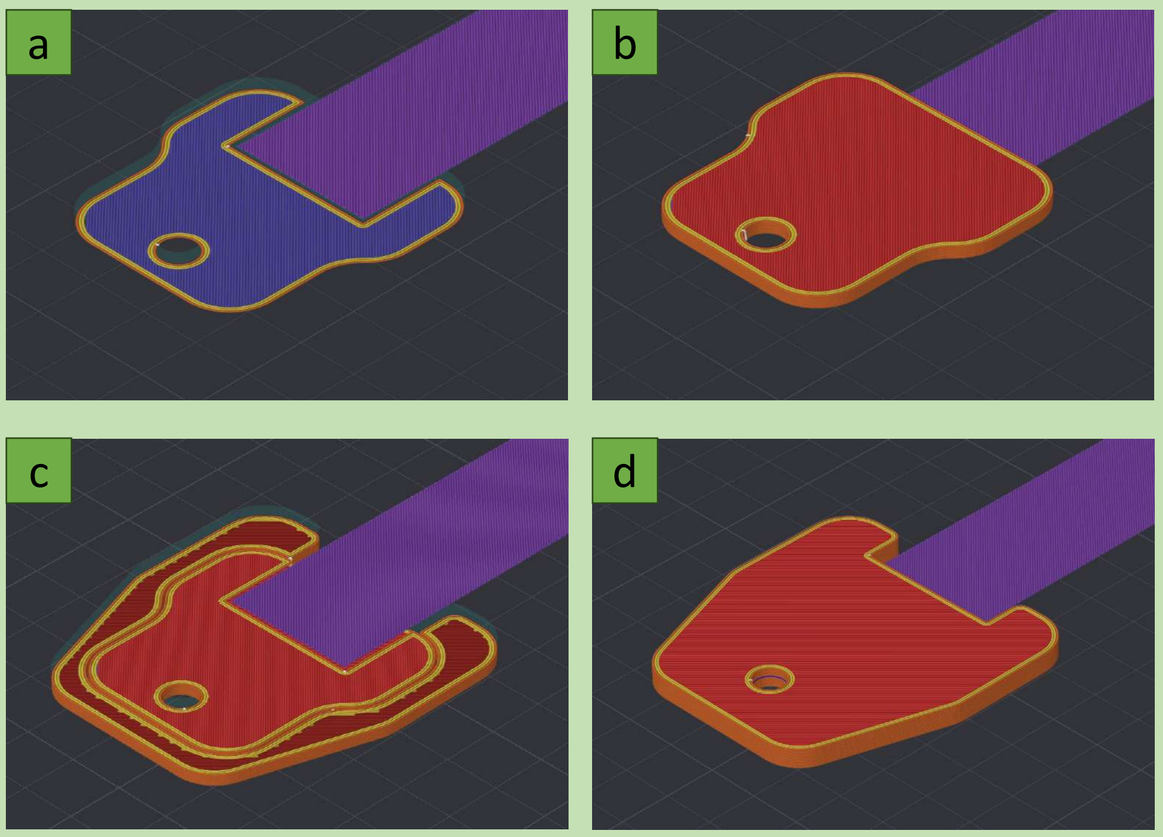

Fig. 2: Stages of the PPP sequence; a) First layer of the first part; b) Finished first part; c) First part inserted upside down in the second; d) Finished assembly

Printing Sequence

a) Secure the foil: After printing the first layer, secure the plastic foil to the build plate using a regular glue stick. This provides a stable base for the rest of the print and can be easily removed later.
b) Finish the first part: Resume the print to print directly onto the foil. Once the print finishes, carefully remove it, clean off the residual glue, and set the part aside.
c) Pause the second print: Start the second part and pause it just before the bridging layer. Place the first part upside down into the designated cavity. If the tolerances are too loose and the inserted part shifts, it may be necessary to secure it onto the build plate with glue.
d) Finish the assembly: Upon resuming the printer will bridge over the inserted part, permanently sealing the cavity and securely encapsulating the foil.

Fig. 3: A finished print mounted inside the "Hess H5000M" tensile testing machine

Tensile Tests

The tensile tests (Fig. 3) indicate that both maximum force and point of failure vary significantly depending on the material pairing (Tbl.1). Using the same filament as the foils yielded the best results. On the other hand, PP and PET do not bond well and were not printable. These failed upon removal from the print bed (Fig. 2b) due to a complete lack of adhesion between the foil and filament. Finally, while PLA pairings failed all at the interface, they still withstood a very comparable amount of force to the optimal combinations.

Filament	PP	PP	PET	PET	PLA	PLA
Foil	PP	PET	PP	PET	PP	PET
Max. Force (N)	59,28	Not printable	Not printable	295,75	43,28	280,60
Point of failure	Foil			Foil at Interface	Interface	Interface

Tbl. 1: Results of tensile tests showing different forces and point of failures

Conclusion

The use of this PPP method demonstrates a viable technique for securely embedding plastic foils within 3D printed parts. Tensile testing of the foil and filament pairings reveals that the maximum force and the ultimate point of failure vary depending on the material pairing. This indicates that actively printing onto the foil, and subsequently embedding it, can create a robust mechanical connection capable of integrating foils or in the future other objects into 3D prints.

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Influence of hBN content on the tribological behavior and thermal conductivity of HVOF-sprayed Cr3C2-NiCr coatings

Patent/project number: PhD thesis

Author/s: Dr. Julian Eßler, Dino Woelk and Dr. Gabriela Marginean

B

In industry, component surfaces are often coated to improve wear and corrosion resistance. A proven method for this is thermal spraying, in particular Cr_3C_2-NiCr coating, which is applied using the high-velocity oxygen fuel (HVOF) process and serves as a replacement for hard chrome coatings that are harmful to health [1-2]. In this project, the coating was modified by adding hexagonal boron nitride (hBN) to optimize wear resistance and thermal conductivity. The mass fraction of the dry lubricant was varied in 5% increments in a range from 0 to 15%. HBN improves dry running behavior and emergency running properties due to its two-dimensional structure and high oxidation resistance [3].

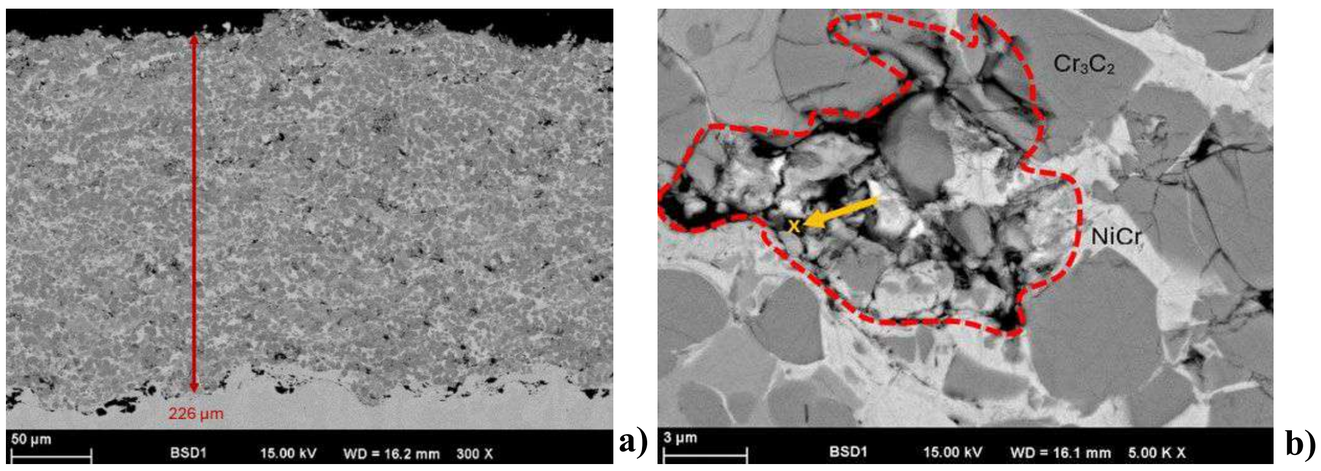

Fig. 1: Exemplary SEM image of a cross-section a) 300x and b) 5000x magnification of the sample 10% hBN

Figure 1a shows the layer structure, while Figure 1b shows a magnified view with an area outlined in red. This area contained an hBN particle that broke off during preparation. An EDX point analysis was performed at the location marked in yellow, which detected B and N. This indicates that the particles detach due to poor adhesion and partially break when the cohesive forces are exceeded.

Figure 2 shows a comparison of the hardness (HV1) of the layers. It is clear to see that the hardness decreases rapidly from an hBN content of 15%. This is again due to the poor adhesion of hBN to the cermet components. The hBN particles are rather enveloped by the Cr_3C_2-NiCr and thus positioned in a fixed location.

The investigation of the tendency to crack (see Figs. 3a and 3b) shows that it is lower at 5 and 10% hBN than in pure Cr_3C_2-NiCr layers. However, from 15% hBN onwards, an intense network of cracks develops because too few cermet components offer resistance.

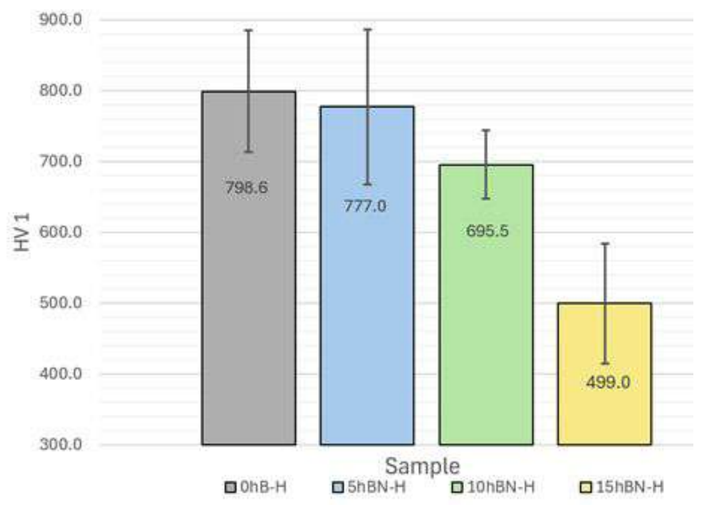

Fig. 2: Bar chart of hardness measurements (HV1) from the sample 0% hBN to 15% hBN

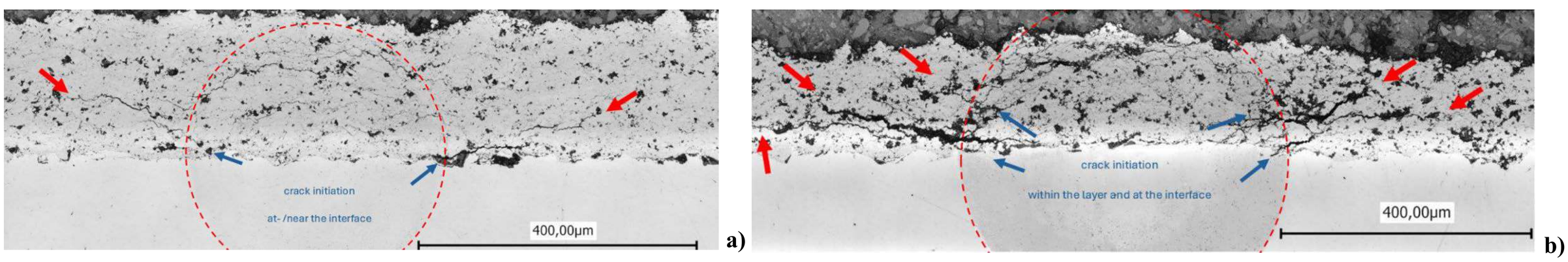

Fig. 3: Exemplary CLSM image (x 20) of the crack tendency (2.5 mm hBW 62 kp) of sample a) 10% hBN and b) 15% hBN

The results of the friction wear test (see Figure 4) show that the lowest coefficient of friction was identified at a hBN content of 10%. From a content of 15%, the friction coefficient increased again. This is because, as the hBN content increases, there is less Cr_3C_2-NiCr available to fix the hBN particles. However, no significant wear volume was generated in any of the layers examined.

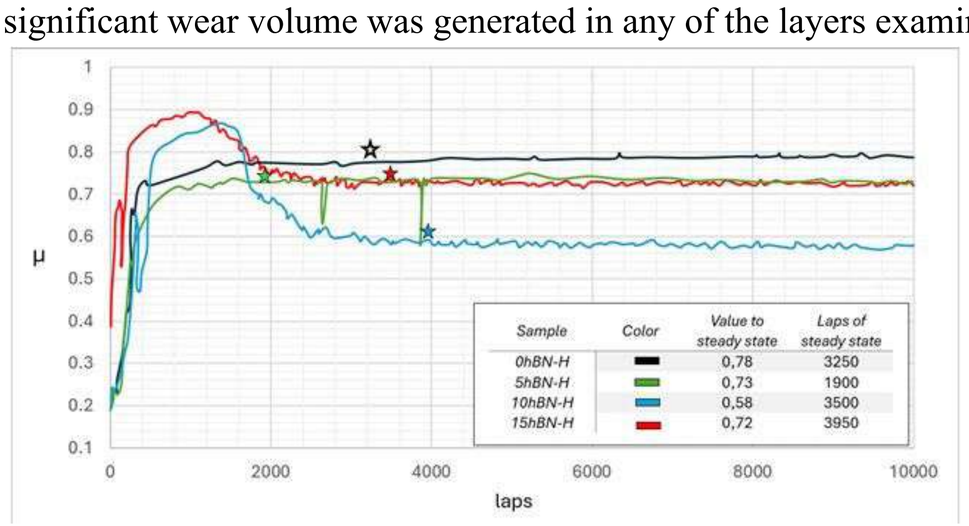

Fig. 4: Exemplary friction coefficient curves for samples 0% hBN to 15% hBN (100Cr6 wear ball at 10N)

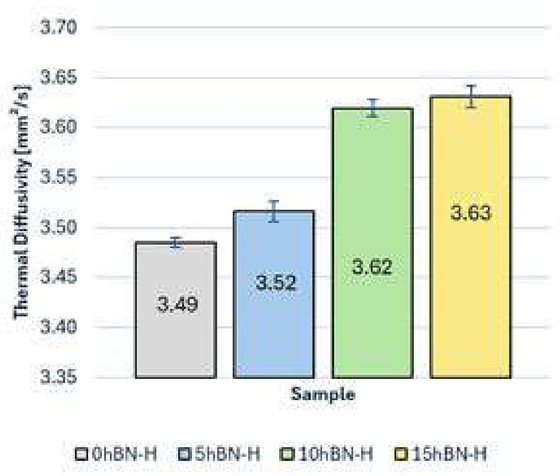

Fig. 5: Bar chart showing the thermal conductivity of samples ranging from 0% hBN to 15% hBN

Figure 5 shows the average values for thermal conductivity. Here, the sample with 15% hBN performs best and shows the highest value for thermal conductivity. However, the difference to the 10% hBN layer is very small, which indicates that a further increase in the hBN content does not offer any further improvement in thermal conductivity.

Conclusion:

HVOF can be used to successfully apply Cr_3C_2-NiCr coatings mixed with hBN. Up to a mass fraction of 10%, the hardness decreases moderately, with a significant improvement in friction and wear properties. The thermal conductivity increases significantly above an hBN fraction of 10%.

References:

[1] B. SONG, J. W. MURRAY, R. G. WELLMAN, Z. PALA, and T. HUSSAIN. “Dry sliding wear behaviour of HVOF thermal sprayed WC-Co-Cr and WC-CrxCy-Ni coatings,” Wear, vol. 442–443, p. 203114, Feb. 2020, doi: 10.1016/j.wear.2019.203114.

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[3] M. OECHSNER, T. ENGLER, H. SCHEERER, Y. JOUNG, K. BOBZIN, W. WIETHEGER, M. KNOCH, M. SCHULZ. „Tribological and Corrosion Behavior of HVOF Sprayed Cr3C2-NiCr with Nickel Cladded Graphite and Hexagonal Boron Nitride“, Juni 2021. doi: https://doi.org/10.31399/asm.cp.itsc2021p0732.

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Comparative remelting analysis of NiCrBSi/316L brazed coating for repair application of FGM coatings

B

Author/s: Marco Brand, Mareen Goßling, Ion-Dragoş Uțu and Gabriela Mărginean

Introduction

Nowadays, the conservation of resources has become the mater of paramount importance, due to the scarcity of resources, environmental concerns, and the increasing global demand. To preserve critical and functional raw materials (FGM), functionally graded coatings have become the method of choice. These advanced coatings improved durability and performance by gradually varying composition and/or structure, reducing material waste and extending the components lifespan.

Repairing FGM is particularly challenging due to their complex and carrying composition. Brazing tapes offer a promising solution by enabling the joining of two dissimilar materials.

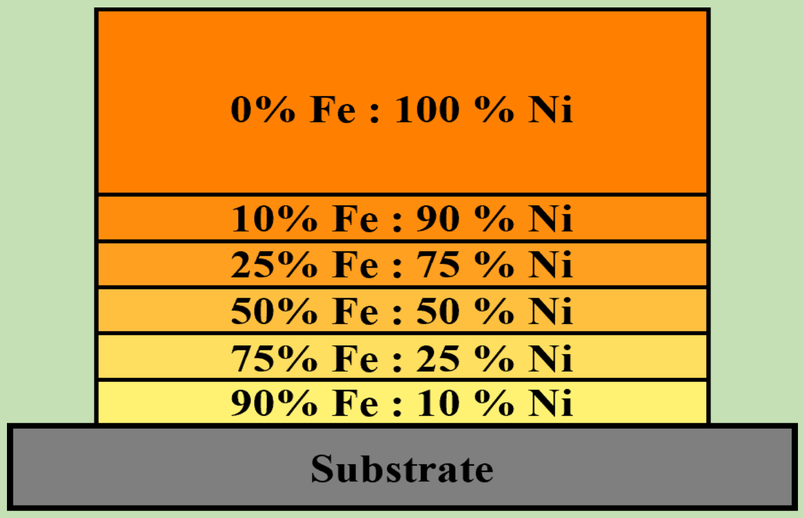

Fig. 1: Structure of functionally graded coating comprising of Ni- and Fe-based Powder

Experimental

The work presents a parameter study to advance the suitability of brazing tapes for efficient and resource-saving repair of FGM components. The following parameters were varied:

- **Laser power** (150 W, 250 W and 350 W);
- **Scanning speed** (500 mm/s, 250 mm/s and 125 mm/s);
- and **hatch distance** (0.06 mm, 0.04 mm and 0.02 mm).

Results

- Decreasing hatch distance or increasing laser power reduces among of porosity and cracks.
- No clear trend observed for scanning speed.
- 350 W laser power with 0.02 mm creates sufficient remelting results (sample 3C and 3F).

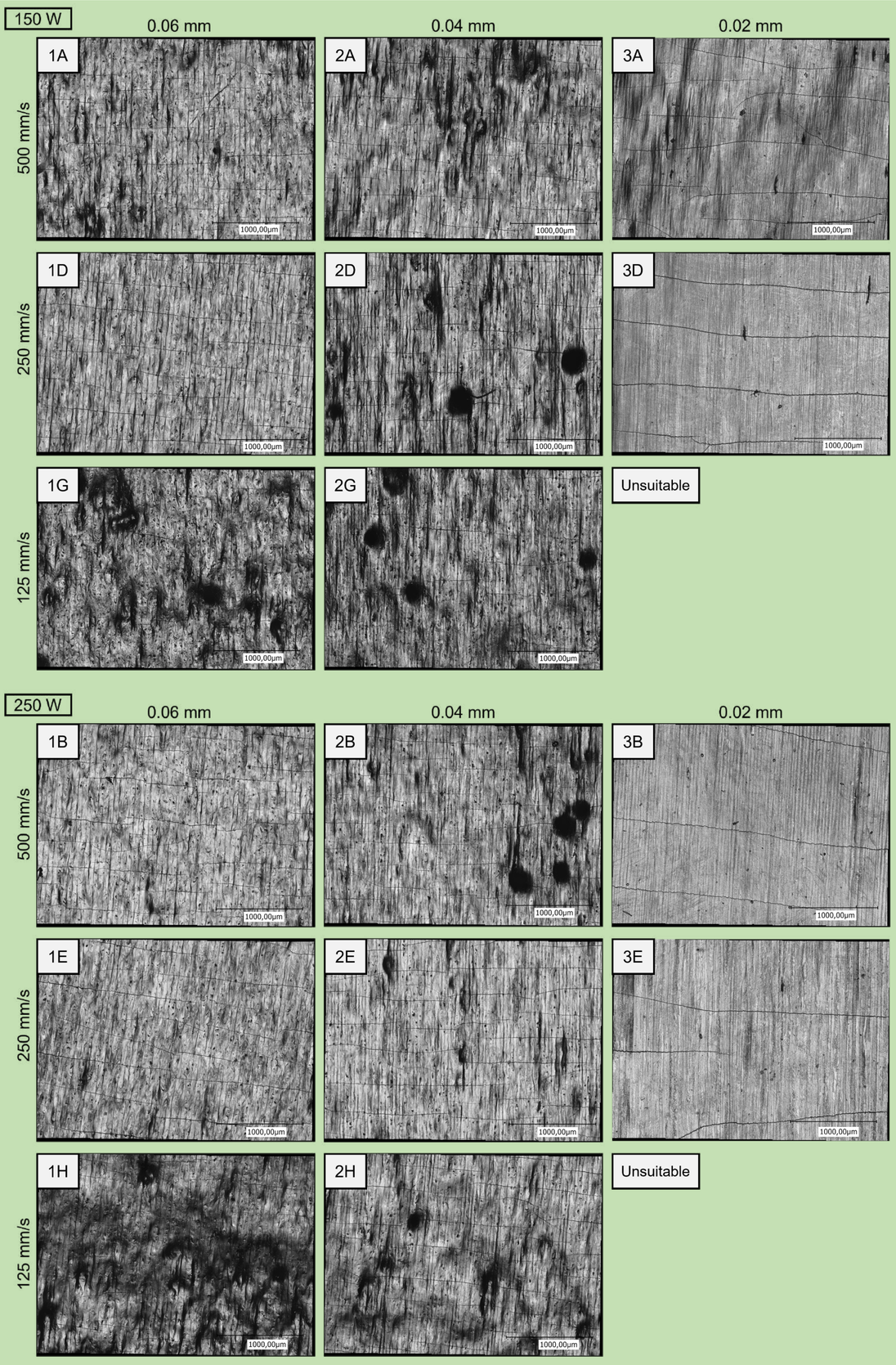

Fig. 2: Confocal laser scanning microscope top-view images of remelting parameters (the remelting parameters were grouped according the laser power).

Conclusion

It has been demonstrated that not all combinations of parameters are suitable for surface refinement and enhancing the brazing tapes quality. Increasing laser power or decreasing hatch distance significantly reduces number of powers. The most promising parameters were examined in a detailed analysis, and their performance was compared with as-brazed conditions. The corresponding results are currently in the publication process.

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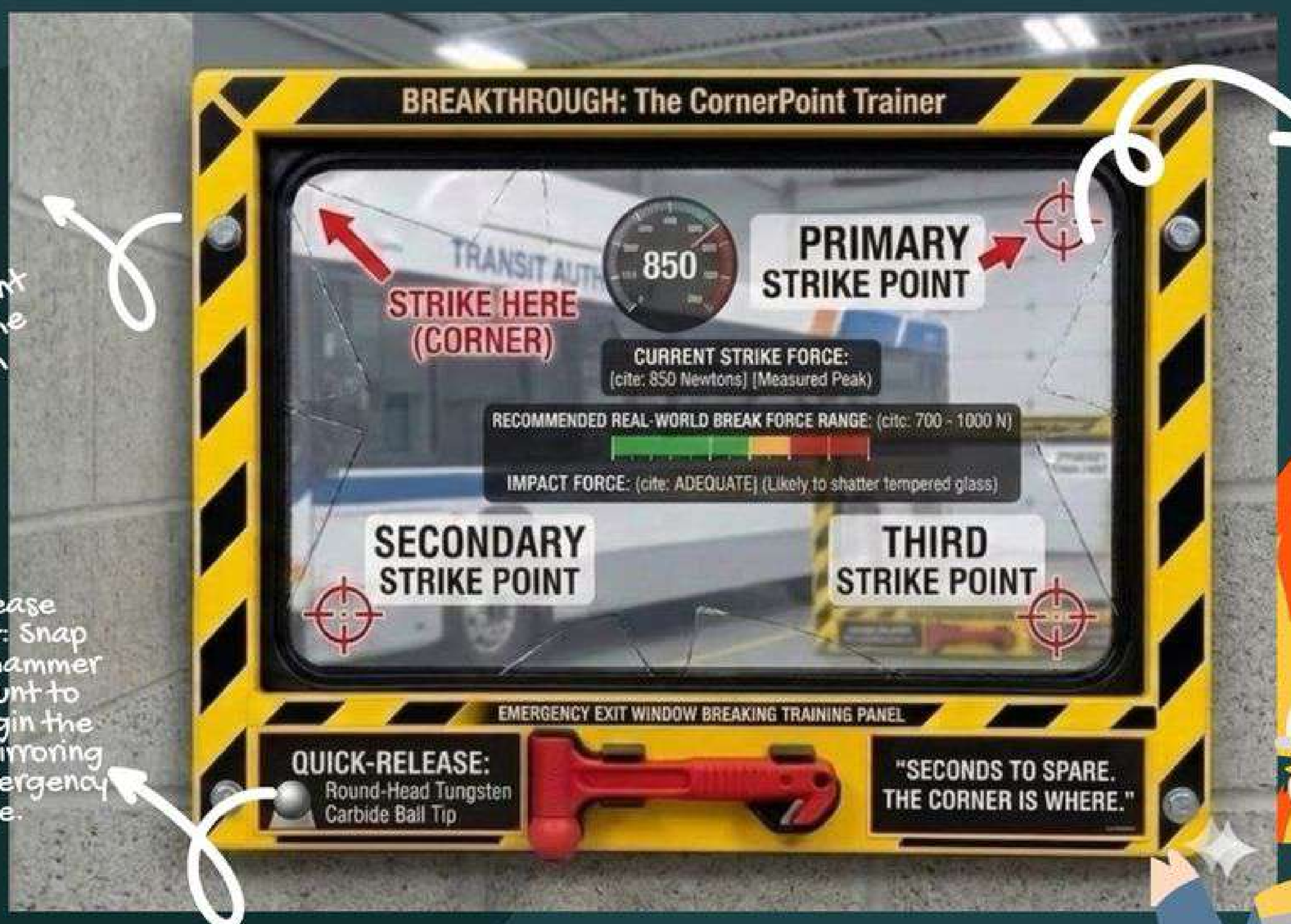
Opportunity
CORNELIUGROUP Research-Innovation Association
Creation
INVENTCOR
Realization
Power of Creative Mind
Deva ROMANIA

StrikePoint!

From PANIC to PRECISION!

B

In a crisis, survival is measured in seconds. This standardized training kit replaces "panic-driven trial and error" with "muscle-memory execution." By mastering the exact force and strike point now, users gain the decisive confidence to breach a window and save lives when every second counts.



Universal Surface Integration: Simply mount this unit directly to any wall or flat surface where you want to conduct the simulation

Quick-Release Deployment: Snap the docked hammer from its mount to instantly begin the simulation, mirroring a real-life emergency response.

Tactical Accuracy: The system validates your strike only when the corner is hit, teaching you to avoid the center where tempered glass is strongest.

Key Innovative Features

All-in-One Training Kit

Includes a docked, round-head safety hammer. The "Grab-and-Strike" design trains users to react instantly under high-stress conditions.

Live Force Analytics

Integrated meters measure strike power (Newtons). A digital display turns Green when the force is sufficient to shatter real tempered glass, and Red if the strike is too weak.

Precision Target Feedback

Sensors distinguish between the center and corners. A "Success Chime" sounds for hits on the correct corner (The Right Point), while an "Error Buzzer" alerts the user to off-target strikes.

Flush-Mount Realism

A slim, wall-mounted profile that simulates real-world bus or train windows. It is built for thousands of high-impact repetitions.

Muscle Memory Builder

Converts panic into a precise, confident action, ensuring the first strike is the only one needed in a real crisis.

Impacts and Contributions

The StrikePoint Master replaces panic with precision, using real-time analytics and sensory feedback to build life-saving muscle memory. By mastering the "Right Point" with the correct force, users eliminate hesitation to ensure a successful breach in seconds. This slim, accessible kit turns a high-stress crisis into a confident, calculated escape.

Our commercialization and future potential

In the future, the StrikePoint Master will set a global safety standard by turning panicked reactions into precise, instinctive reflexes. By using data-driven analytics to guarantee strike success, it ensures that every passenger is certified rescue-ready and capable of saving lives on the very first contact.

Your safety is your responsibility.

Purichaya Wacharaporanin
Puripat Thangsurbkul
Putana Thangsurbkul

Chulalongkorn University Demonstration School

Pandifuse

Patent/project number: 1

Category
B

Author/s:
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Miss Pirada Vongpivat
Mr. Supphanat Koolhiran
Mr. Jade Koolhiran
Mr. Tharapat Wasanapiarnpong

Description

Pandifuse is the Pandan Composite Eco-Material is an innovative, sustainable composite developed by upcycling two abundant waste streams in Thailand: pandan leaf waste from the food industry and cement dust from the construction sector. Large quantities of pandan leaves—often up to 100 kilograms per day per factory—are discarded after use in dessert production, contributing to methane emissions during decomposition. Meanwhile, cement dust generated from industrial processes contributes to PM2.5 air pollution, health risks, and environmental degradation if not properly managed.

This project transforms these underutilized wastes into a high-performance, multifunctional material by combining the natural properties of pandan fibers with the binding capability of cement dust. The resulting composite exhibits effective moisture absorption (up to 20% of its weight), high mechanical strength (bending strength up to 50 kilograms/cm^2), natural antimicrobial properties, and a mild, sustained fragrance derived from pandan compounds.

The material can be manufactured into various practical forms, including absorbent coasters, aroma pads, and eco pellets for household and agricultural applications. Notably, the product is 100% recyclable, as it can be crushed and reused as a soil additive after its lifecycle, supporting a circular economy approach.
By integrating natural organic waste with industrial by-products, this innovation offers a 2-in-1 functional solution—moisture control and fragrance release—while significantly reducing environmental impact. The Pandan Composite Eco-Material represents a new direction in advanced sustainable materials, combining functionality, environmental responsibility, and value creation from waste.

Pictures & graphics

Contact: Mr.Jeerasak Jitrotjanarak

INVESTIGATIONS ON CELLULOSIC FIBERS FOAMS CAPABILITY TO BE USED IN SOUNDPROOFING LARGE-SCALE APPLICATIONS

This project was supported by following UDJG Research Grants: GI_RF_2475/2024, GI_RF_9418/2023 and GI_RF_3646/2021

B

Authors: Silviu Marian NASTAC[1,2], Petronela NECHITA[1], Maria Violeta GUIMAN[2], Mirela IANA ROMAN[1]

[1]Dunarea de Jos University of Galati, Research Centre for Mechanics of Machines and Technological Equipment
[2]Transilvania University of Brasov / Romania

Description: This study presents an innovative highly porous materials based on cellulose fibers, using foam forming technique, and intended to soundproofing applications. Being from renewable resources, biodegradable and recyclable in the paper waste value chain, this type of materials provides a competitive alternative to actual petroleum-based foam materials/composites, currently and widely used in sound insulation. The results indicate that bio-composite materials based on foam and cellulose fibers provide acoustics insulation performances at comparative or higher level to the commercial products large scale used nowadays.

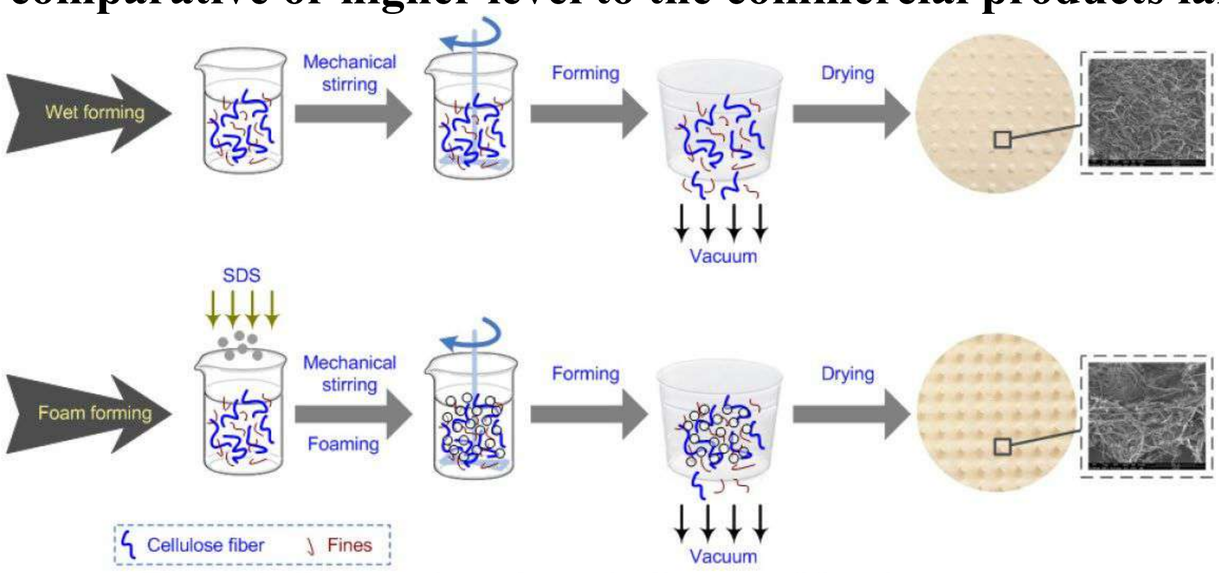

Figure 1. Comparative schematic diagram of forming processes

Figure 6. Set of samples used for investigation of soundproofing characteristics

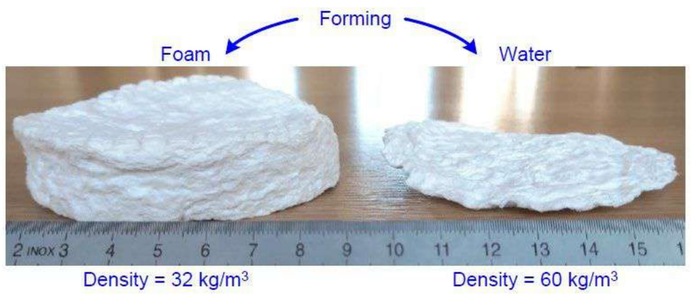

Figure 2. Foaming versus water forming processes

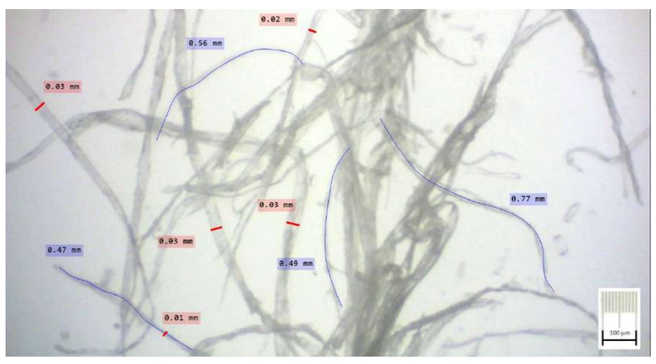

Figure 3. Cellulosic fibers

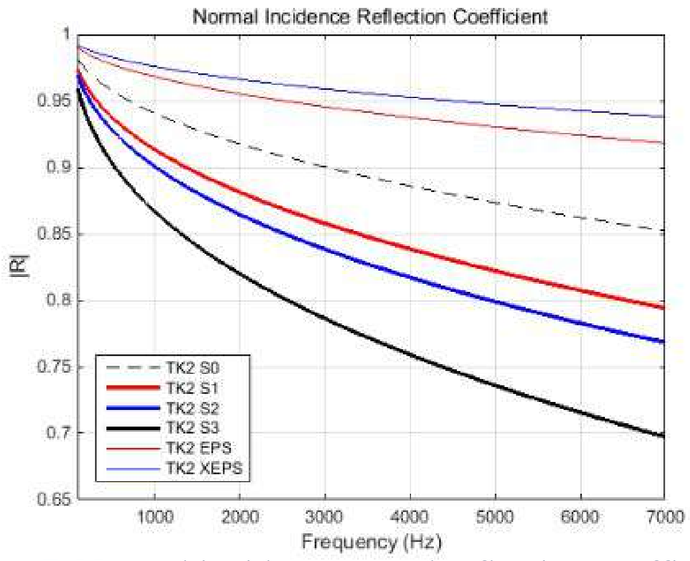

Figure 7. Normal incidence sound reflection coefficients

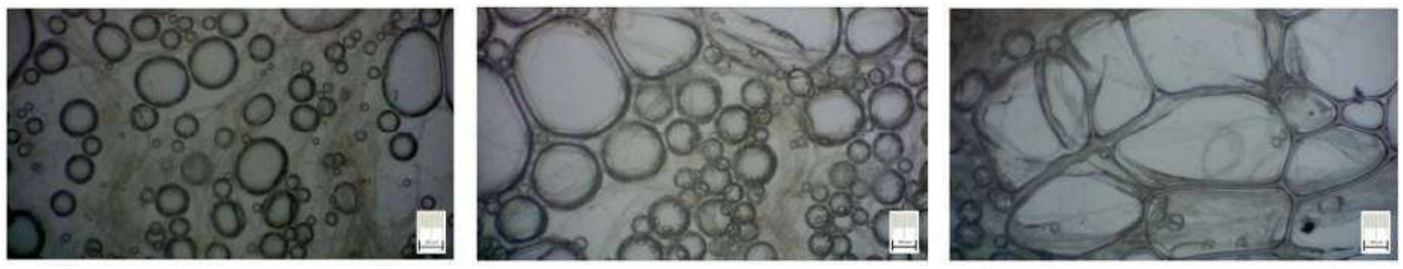

Figure 4. Micrographs of foamed cellulosic fibers with 2% SDS, 4% SDS, and 6% SDS

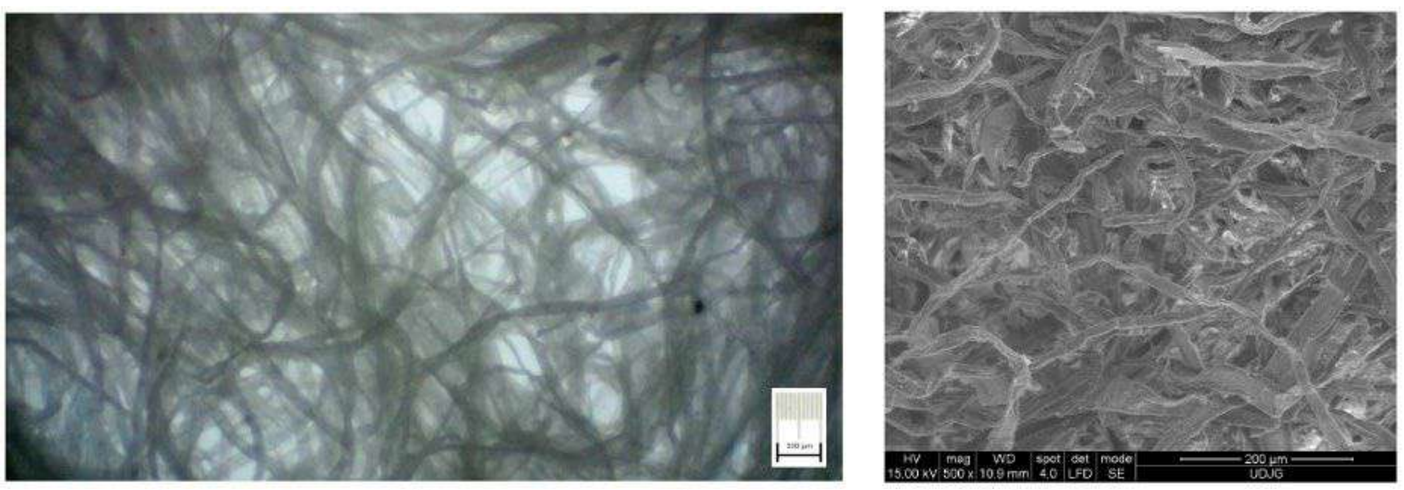

Figure 5. Internal fibrous structure of material: optical and SEM micrographs

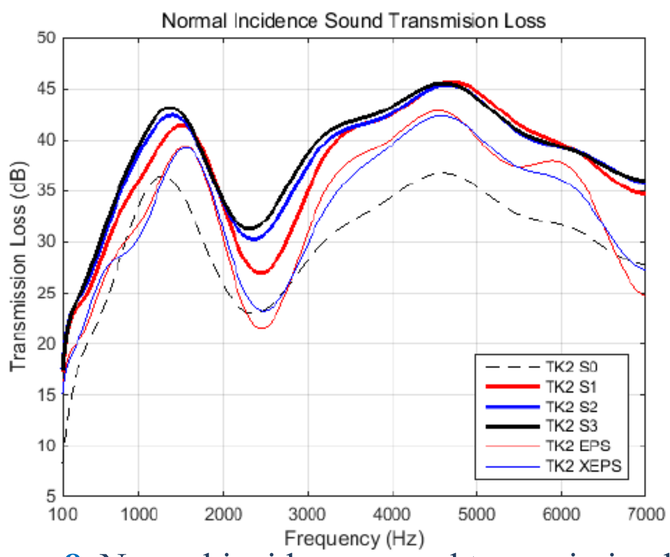

Figure 8. Normal incidence sound transmission loss

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Institutul Naţional de Cercetare-Dezvoltare în Construcţii Urbanism şi Dezvoltare Teritorială Durabilă URBAN-INCERC

INCD "URBAN-INCERC"

CUTTING-EDGE ENGINEERING SOLUTIONS FOR SUSTAINABLE CONSTRUCTION THROUGH EFFICIENT USE OF LOCAL INDUSTRIAL BYPRODUCTS

B

~~Patent~~/project number: PN 23 35 04 01

Author/s: Baeră Cornelia, Gruin Aurelian, Vasile Ana-Cristina, Bolborea Bogdan, Ion Alexandru, Varga Luiza, Barbu Alexandra Marina

This study aims to provide a comprehensive perspective on developing innovative engineering solutions for eco-intelligent construction products with advanced functionality—encompassing materials, structural elements, models, and technologies.

The focus is on efficiently and strategically utilizing by-products and waste generated by local industries, aligning with the National Strategy for Research, Innovation, and Smart Specialization 2022-2027, which supports the transition to a Circular Economy (EC).

The entrepreneurial sector within the construction industry and related fields plays a key role in this research, demonstrating direct interest in two main areas:

1. ***Integrating developed construction products into future production processes through the technological transfer of research outcomes.***
2. ***Implementing efficient recycling solutions for industrial waste and by-products (such as mineral powders, sludge, and artificial aggregates) to promote ecological production cycles and close the sustainability loop.***

Additionally, policymakers, administrative bodies, and academic institutions are actively engaged in the research process, supported by national and European strategies advocating for environmental protection and sustainability.

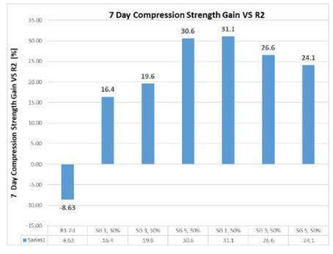
Garnet waste slurry after AWJ processing

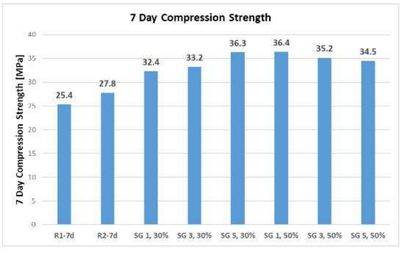
Raw Garnet sand as abrasive for AWJ

AWJ equipment

Dry raw state of Garnet wastes

Waterjet sludge





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Institutul Naţional de Cercetare-Dezvoltare în Construcţii Urbanism şi Dezvoltare Teritorială Durabilă URBAN-INCERC

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ADVANCING SUSTAINABLE CONSTRUCTION: OPTIMIZING POURED EARTH MATERIALS FOR STRUCTURAL PERFORMANCE AND DURABILITY

~~Patent~~/project number: PN 23 35 04 01

Author/s: Gruin Aurelian, Baeră Cornelia, Bolborea Bogdan, Vasile Ana-Cristina, Ion Alexandru, Barbu Alexandra Marina

This research explores poured earth construction as a sustainable alternative to cement-based materials. By using earth materials bonded with clay, it mimics concrete while offering environmental benefits like recyclability, reduced carbon footprint, and better hygrothermal regulation.

The method leverages local resources, promoting efficiency and sustainability in construction. The construction process involves pouring a controlled mix of local earth, sand, gravel, and potential stabilizers such as Portland cement or alternative additives into formworks to create both load-bearing and non-load-bearing structures.

This reduces reliance on high-energy industrial materials. However, challenges like shrinkage, durability, and mechanical performance still need further investigation. One promising solution is using dispersants, which improve settlement control and mechanical strength, though the optimal water-to-dispersant ratio requires more study.

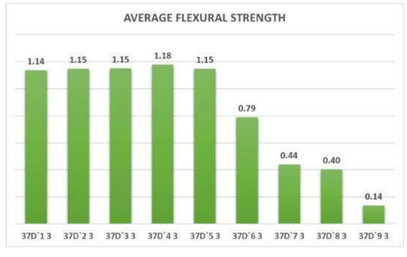
Additionally, lignin, a natural polymer, shows potential as a stabilizer, enhancing material strength.

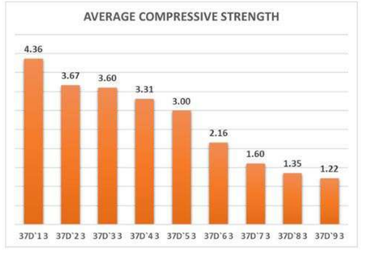
Further research on lignin concentrations and combinations with other additives could improve durability and performance.

Continued research is crucial to optimize earth-based materials, test long-term durability, and assess large-scale applications in various environments. These efforts will determine the feasibility and integration of poured earth construction in sustainable building practices.

RAW MATERIALS

Clayey Soil – local sorces (Timisoara)





Contact: aurelian.gruin@incd.ro

Institutul Naţional de Cercetare-Dezvoltare în Construcţii
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THE INFLUENCE OF CERTAIN ADDITIVES ON THE STRENGTH OF CONCRETE IN SALINE ENVIRONMENTS

Laboratory research
Mihail Chira, Carmen Teodora Florean, Brăduț-Alexandru Ionescu, Tudor Panfil Toader

B

INTRODUCTION

The sea is the main source of saline water with a salt concentration of about 3.5%. Sodium chloride causes corrosion of concrete steel reinforcement and surface efflorescence. At low concentrations the chloride ion has little effect on the stability of the concrete structure, but causes corrosion of the reinforcing steel. At high concentrations and low temperature, chlorine ion ingress causes expansion and cracking of the concrete. Degradation is usually accompanied by the formation of calcium oxychloride salts. The mechanism of this destruction is due to the thermal transformation of calcium oxychloride salts: $3CaOCaCl\cdot 15H_2O$ to $CaOCaCl\cdot 2H_2O$.

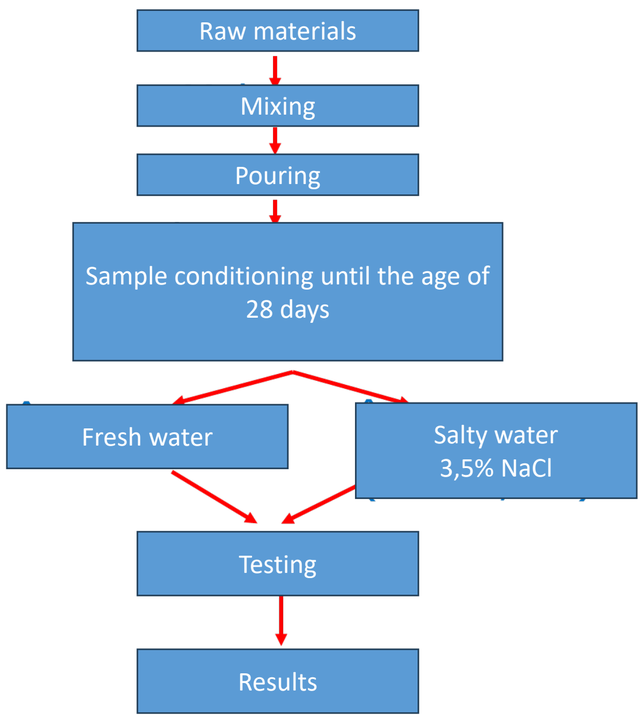
MATERIALS AND METHODS

Raw materials used for the samples:

- Portland cement
- Natural aggregates - grain sizes 0-4 mm and 0-8 mm
- Silicon dioxide
- Coal
- Ascorbic acid
- Water

Samples conditioned 28 days in fresh water

Samples conditioned 28 days in salty water

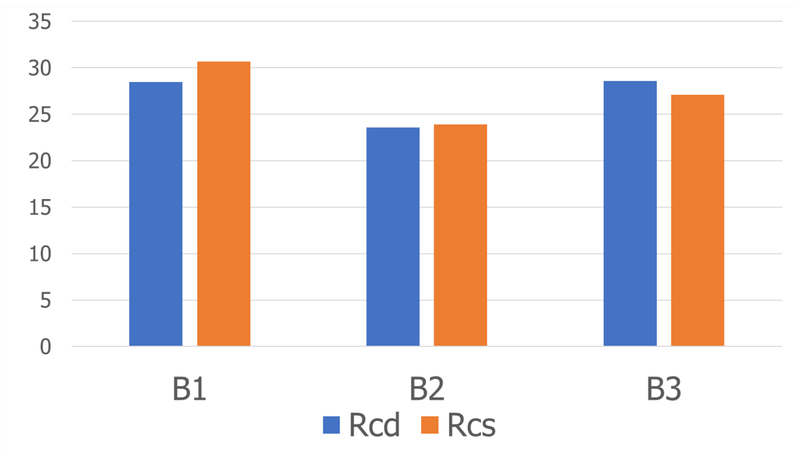


RESULTS

Cementitious composite mixtures

Mixture	Cement	Aggregates		Water	SiO_2	Coal (C)	Ascorbic acid ($C_6H_8O_6$)
		0 – 4 mm	4 – 8 mm				
	(g)	(g)	(g)	(g)	(g)	(g)	(g)
B1	366	1103,9	473,1	218,4	-	-	1
B2	366	1058,8	473,1	300,0	44	-	-
B3	366	1058,8	473,1	260,8	22	22	-

Compressive strength of cementitious composites with added ascorbic acid, silicon dioxide and charcoal at 28 days of age.



Mixture	28 days – fresh water		28 days – salty water	
	F_{med}	$R_{c,med}$	F_{med}	$R_{c,med}$
-	(kN)	(N/mm^2)	(kN)	(N/mm^2)
B1	45,7	28,5	49,0	30,7
B2	37,8	23,6	38,2	23,9
B3	45,8	28,6	43,7	27,1

Graphical representation of the compressive strengths of samples at 28 days of age, conditioned in fresh water (R_{cd}) and 3.5% salty water (R_{cs})

CONCLUSIONS

The addition of ascorbic acid in small quantities and of silicon dioxide to the concrete mass leads to an increase in the compressive strengths of specimens maintained in 3.5% salt water. The use of additions of silicon dioxide and ascorbic acid in reduced quantities influences the compressive strength.

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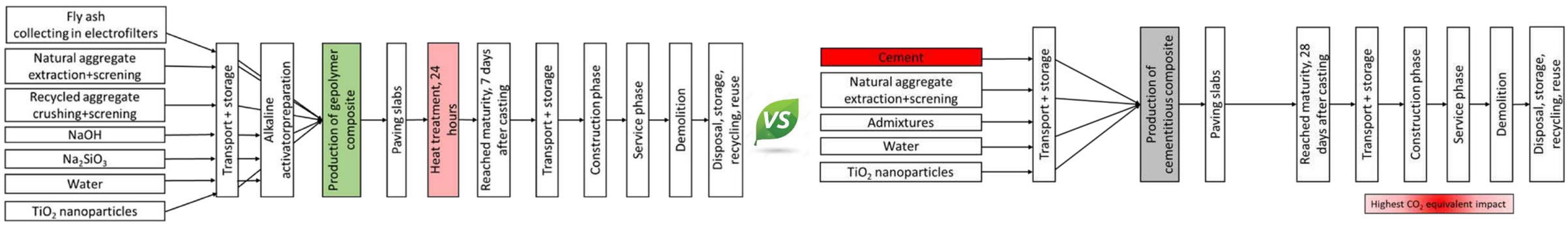
SMART AND ECO-INNOVATIVE COMPOSITE MATERIALS: INTEGRATING SELF-CLEANING CAPABILITIES AND ADVANCED RESISTANCE TO MICROORGANISMS FOR SUSTAINABLE APPLICATIONS

Project no. PN 23 35 05 01

Alexandra Csapai, Adrian-Victor Lăzărescu, Andreea Hegyi

B

AIM? Production of paving block elements produced using the concept of alkaline activation of fly ash and to present results on specific physical and mechanical characteristics. At the same time, to maximize the potential of generating smart-eco-innovative character, different types of aggregates were used to produce these elements, as well as the use of TiO_2 nano-particles into the geopolymer matrix. Finally, the present work aims to highlight an LCA calculation of the resulting CO_2 equivalent emissions by comparison with similar elements produced using traditional materials (cement) and a cost-benefit analysis of the results obtained.



EN 1388:2004 / AC:2006: Concrete paving blocks. Requirements and test methods

(1) Apparent density

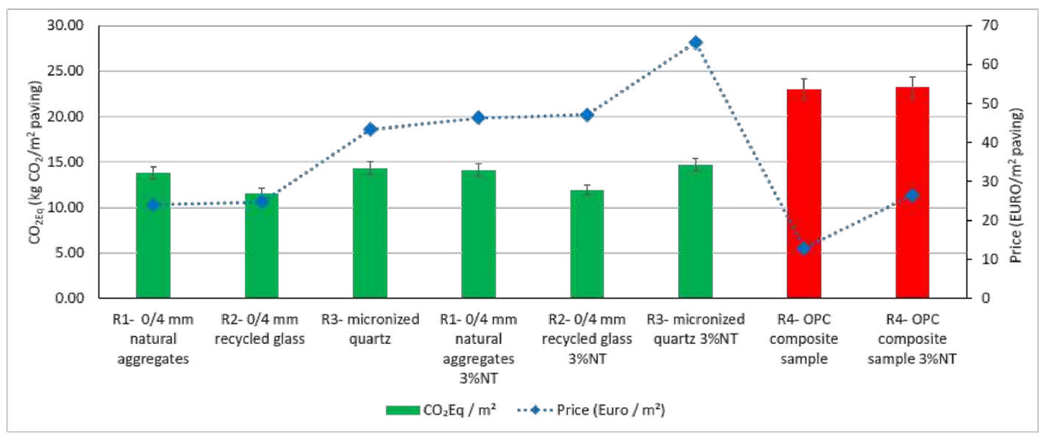
(2) Weathering resistance – total water absorption

(3) Weathering resistance – freeze-thaw resistance with de-icing salt

(4) Tensile splitting strength

(5) Abrasion resistance

(6) Slip/skid resistance



Life Cycle Assessment of geopolymer paving blocks underscores their potential as a sustainable alternative in the construction industry. While they show positive environmental attributes, ongoing research, standardization, and collaboration within the industry are necessary to optimize their production processes and further enhance their overall sustainability. Additionally, collaboration between researchers, industry professionals, and policymakers is vital to promoting the widespread adoption of geopolymer paving blocks as a sustainable construction solution.

ACKNOWLEDGEMENTS:

This work was carried out within Nucleu Programme of the National Research Development and Innovation Plan 2022-2027, supported by the Romanian Ministry of Research, Innovation and Digitalization - MCID, "ECODIGICONS"

project no. PN 23 35 05 01: "Innovative sustainable solutions to implement emerging technologies with cross-cutting impact on local industries and the environment, and to facilitate technology transfer through the development of advanced, eco-smart composite materials in the context of sustainable development of the built environment"

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RE-USE OF BLAST FURNACE SLAG WASTE AND THE INFLUENCE ON MECHANICAL STRENGTH

B

Doctoral research project
Carmen Teodora FLOREAN,
Mihail CHIRA, Brăduț Alexandru IONESCU, Adrian-Victor LĂZĂRESCU

Blast furnace slag waste is composed of silicates, aluminosilicates and calcium-aluminate silicates resulting from smelting, welding or other metallurgical processes resulting from the burning of impurities from treated metals or minerals. The resulting slag originates from iron production in blast furnaces involving coke and limestone. The slag floats on the surface of the molten metal, keeping it clean, then cools to a solid form.

- is deposited in large waste dumps, which occupy significant areas and have a negative impact on the environment.
- to reduce the environmental impact; slag can be used as a powder to partially replace cement and as a substitute for natural aggregates.

Portland Cement R 52,5

Natural aggregates
Granular class 0/4 and 4/8 mm

Blast furnace slag
Granular class 0/2 mm

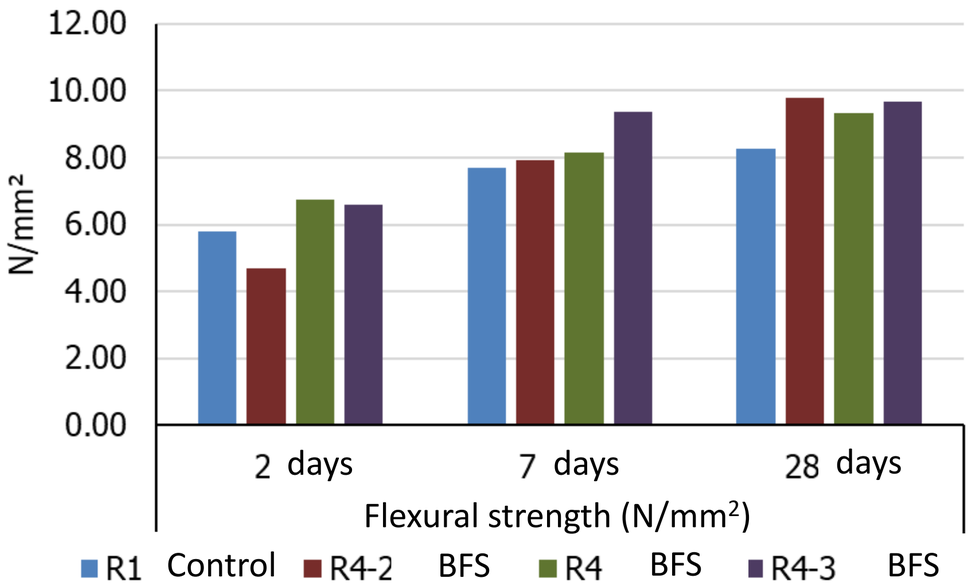
Water

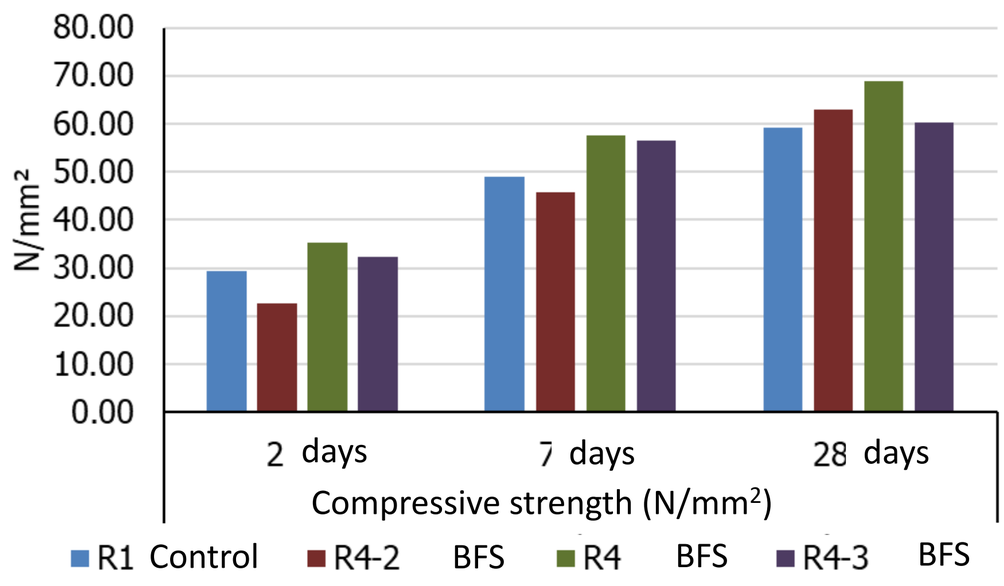
Superplasticizer

FRESH CEMENTITIOUS COMPOSITE

HARDENED CEMENTITIOUS COMPOSITE

CEMENTITIOUS COMPOSITE SECTION





Research results showed that:

- In case of using aggregates from recycled slag waste it is observed that the highest amount of slag leads to the lowest bulk density, as this slag was introduced both as a substitute for natural 0/4 mm and 4/8 mm sort aggregates.
- Tailings ponds near steel mills can be reduced through intensive exploitation and the environmental impact reduced.
- Recycled slag waste, used in the design and realization of cementitious composites for the construction industry, can contribute significantly to reducing pollution and stimulating eco-innovation.

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WALL CONSTRUCTION SYSTEM BASED ON UNFIRED CLAY

PATTENT NO. RO 134241 B1

Gabriela CĂLĂTAN, Andreea HEGYI, Henriette SZILAGYI, Vasile MEIȚĂ

B

The building system for the walls based on unfired clay is composed of the following elements: bricks, masonry mortar and plaster, respectively finishing tiles, being realized of a mixture of clayey soil, sand and hydrated lime. The purpose of this invention is to provide a complete and environmentally friendly solution for making unfired clay-based walls. The novelty of this invention consists in reducing, until eliminated, the risk of poor jointing between bricks, masonry mortars, plastering or finishing, while also providing the advantage of reducing the environmental impact of pollutants.

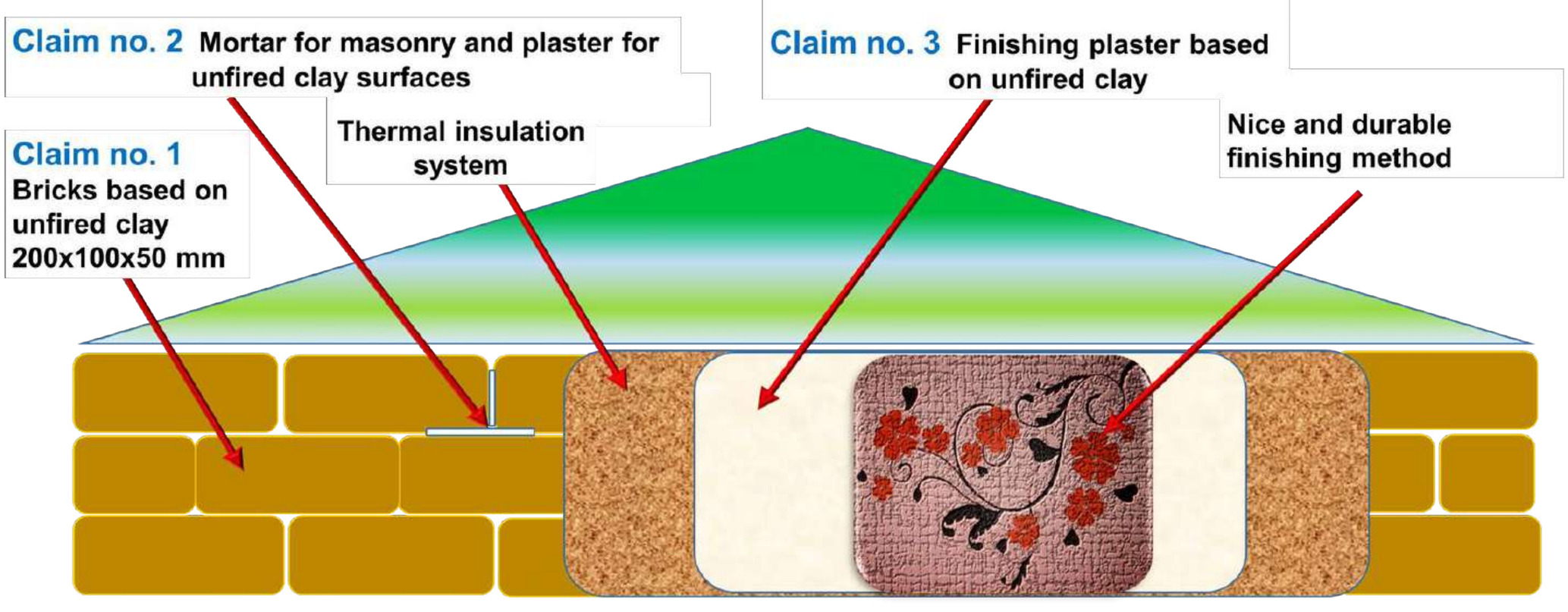
House made of natural materials, comfortable, economic, in harmony with nature

ISSUES

The aim is to ident ify opportunities to reduce environmental pollution by building system for the walls based on unfired clay. The objectives were to identify the optimal mixtures for: elements of full brick and

AREAS OF USE

The building system based on unfired clay is used for wall construction with low environmental impact.



Claim no. 4 Wall construction system based on unfired clay

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COMPOSITE THERMAL INSULATION PANELS WITH SHEEP WOOL CORE, PRODUCTION METHODS AND EXECUTION

PATTENT NO. RO 133842 B1

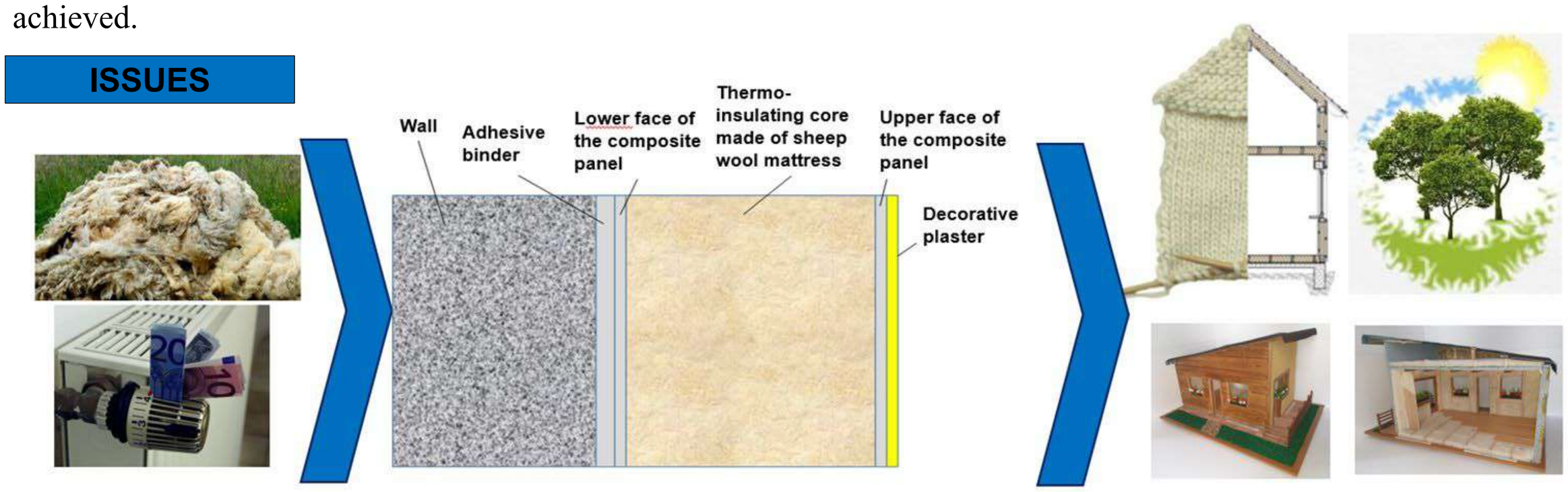
Andreea HEGYI, Henriette SZILAGYI, Carmen DICO, Vasile MEIȚĂ

B

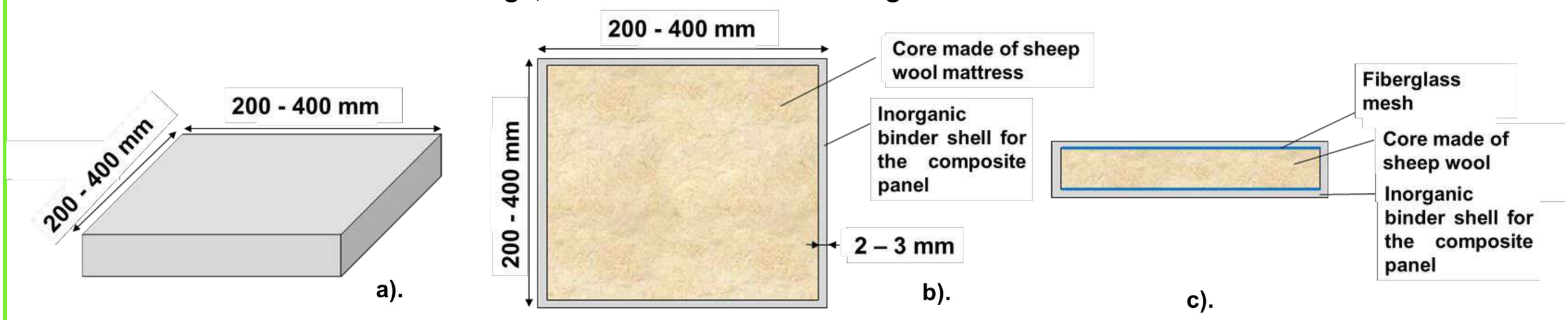
The invention refers to composite thermo-insulating panels with sheep wool core, including production methods and execution.

The innovative nature of this invention derives from the removal of mattress type products disadvantages, through a principle of embodying the mattress sheep wool core in a composite shell based on inorganic binder. In addition, following the execution process, which provides the arrangement of mineral wool strips between two adjacent panels, the re-use of mineral wool waste - a product that is not biodegradable, with a positive impact on the environment - is achieved.

ISSUES

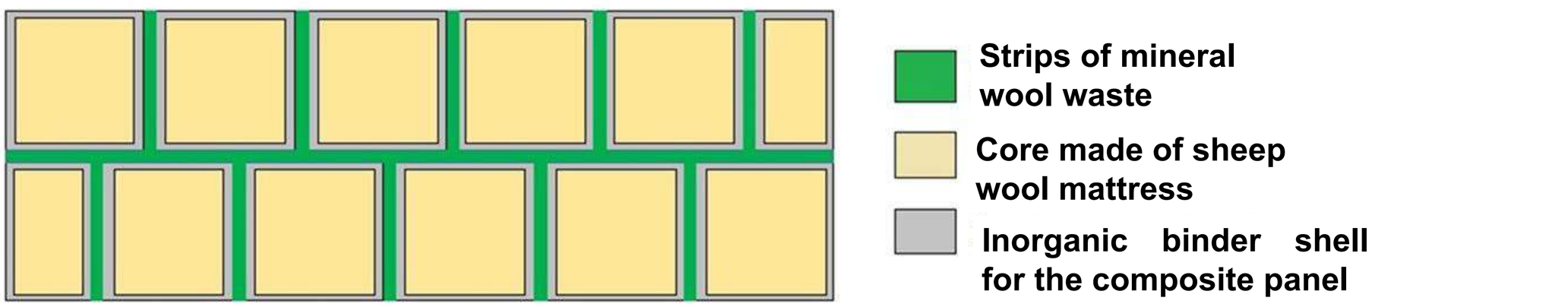


Composite insulating panels with sheep wool core and the method of execution are designed to increase the thermal insulation and thermal comfort in the living space, office buildings, indoors for industrial or agrotechnical activities.



Claim no. 1 Composite thermal insulation panels with sheep wool core Basic Scheme (a), Horizontal Section (b) Cross Section (c)

Claim no. 2 Production methods of the composite thermal insulation composite panels



Claim no. 3 Execution of composite insulating panels with sheep wool core, with insulating material (mineral wool) waste strips insertions, in order to reduce the risk of thermal bridges

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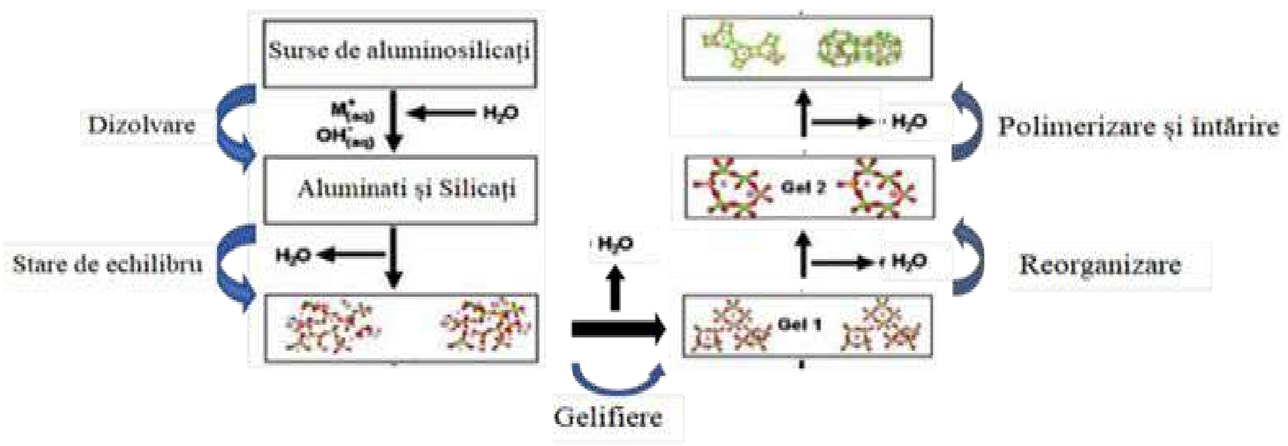
COMPRESSIVE STRENGTH OF GEOPOLYMER PASTE WITH ADDITIONS AT DIFFERENT TEST AGES

Project no. PN 23 35 05 01

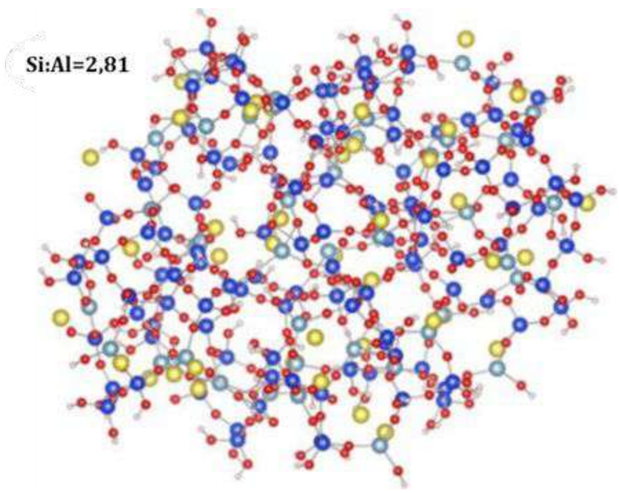
Brăduț-Alexandru Ionescu, Carmen Teodora Florean, Mihail Chira, Tudor Panfil Toader, Adrian-Victor Lăzărescu

B

INTRODUCTION



Schematic representation of the different steps of the geopolymerization process



Example of a structural geopolymer model including more than 800 atoms

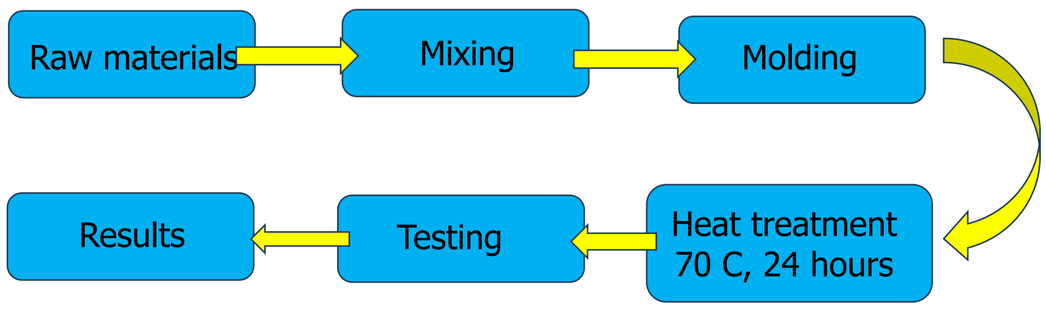
MATERIALS AND METHODS

Flz ash

Fe_2O_3

SiO_2

MgO



RESULTS

Geopolymer mixtures with different admixtures

Mixture	NaOH	Na_2SiO_3/NaOH=2	F.A.	Fe_2O_3	SiO_2	MgO
-	M	-	%	%	%	%
R40	6	2	100	1,1	24,34	10,1
R38	6	2	100	2,2	24,34	20,2

Compressive strength of geopolymer pastes with additions of iron trioxide, silicon dioxide and magnesium oxide at different test ages.

Mixture	7 days		14 days		28 days		1188 days	
	F_{med}	$R_{c,med}$	F_{med}	$R_{c,med}$	F_{med}	$R_{c,med}$	F_{med}	$R_{c,med}$
-	(kN)	(N/mm^2)	(kN)	(N/mm^2)	(kN)	(N/mm^2)	(kN)	(N/mm^2)
R40	13,4	8,4	13,92	8,7	16,64	10,4	16,93	10,58
R38	11,52	7,2	12,48	7,8	15,68	9,8	18,29	11,43

CONCLUSIONS

Increasing the percentage additions of iron trioxide and magnesium oxide lead to an increase in compressive strengths over time. The use of iron trioxide, silicon dioxide and magnesium oxide additions influences the compressive strength..

ACKNOWLEDGEMENTS:
This work was carried out within Nucleu Programme of the National Research Development and Innovation Plan 2022-2027, supported by the Romanian Ministry of Research, Innovation and Digitalization - MCID, "ECODIGICONS" project no. PN 23 35 05 01: "Innovative sustainable solutions to implement emerging technologies with cross-cutting impact on local industries and the environment, and to facilitate technology transfer through the development of advanced, eco-smart composite materials in the context of sustainable development of the built environment"

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THE INFLUENCE OF EXTERNAL RISKS IN THE SENSITIVITY ANALYSIS OF CONSTRUCTION WORKS

B

Project no. PN 23 35 05 01

Mircea-Iosif Rus

Sensitivity analysis in construction activity is an essential process for assessing the impact of different variables or factors on a construction project. This analysis is important in order to understand how changes in key parameters can influence the final results of the works such as costs, delivery times or construction quality. The assessment of external risks in construction sensitivity analysis is a crucial aspect of the construction planning and management process. External risks are factors which cannot be directly controlled by the project team but which can significantly influence the success of a construction works. These risks need to be identified and assessed in order to understand how they may affect the cost, schedule and quality of the works.

Identification of external risks
It is essential to identify all external risks relevant to the works project. These risks can be derived from historical analysis, case studies of similar projects or by consulting experts

Impact assessment of external risks
Once the risks have been identified each risk must be assessed in terms of probability and impact on the project. For example, economic risks, such as inflation, may have a significant impact on the budget, while weather risks may affect delivery times

Simulating scenarios
Using a simulation model, different scenarios can be created based on the external risks identified, i.e. one scenario may involve an increase in material prices due to an economic crisis, another may include a delay due to extreme weather events

Assessment of external risks in the sensitivity analysis

Analysis of the impact on key parameters
At this stage an analysis is made of the impact of each external risk on the key parameters of the project, and the key parameters are costs, delivery times, quality of works and workers' health and safety;

Continuous monitoring of external risks
External risks need to be monitored throughout the construction works as changes in the economic, political or social environment may occur frequently and may require rapid adjustments to the initial project plans.

Planning of mitigation measures
After the impact assessment, measures to minimize the effects of external risks will be determined, e.g. for weather-related risks more flexible working strategies can be adopted, or an additional budget can be planned for possible damages, or protective measures can be taken to reduce the impact of economic risks, such as fixed price contracts or insurance against currency fluctuations

Types of external risks in construction

- Economic factors
- Political and regulatory factors
- Meteorological and environmental factors
- Social factors
- Technological factors
- Health and safety factors

The assessment of external risks in the sensitivity analysis is essential to ensure the success of a construction project because by correctly identifying, assessing and managing these risks, project teams can reduce their impact and ensure that the project is delivered on time, on budget and to quality requirements. This approach contributes to a minimization of uncertainty and improved decision-making in construction project management

ACKNOWLEDGEMENTS:
This work was carried out within Nucleu Programme of the National Research Development and Innovation Plan 2022-2027, supported by the Romanian Ministry of Research, Innovation and Digitalization - MCID, "ECODIGICONS"
project no. PN 23 35 05 01: "Innovative sustainable solutions to implement emerging technologies with cross-cutting impact on local industries and the environment, and to facilitate technology transfer through the development of advanced, eco-smart composite materials in the context of sustainable development of the built environment"

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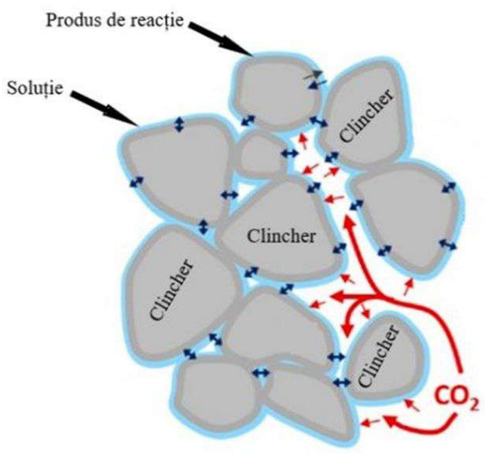
IMPACT OF CARBON DIOXIDE ON THE PROCESS OF MAKING DURABLE CONCRETE ELEMENTS

Laboratory reserach
Tudor Panfil Toader, Ioan Nicolae Scurtu, Călin Grigore Radu Mircea, Marta-Ioana Moldoveanu, Aurelia Bradu

B

INTRODUCTION

The construction industry is a significant contributor to carbon dioxide (CO_2) emissions, and through the carbonation reaction, achieved by the reaction of CO_2 with alkaline reactants (calcium hydroxide ($Ca(OH)_2$) leading to the formation of stable carbonates, namely calcium carbonates ($CaCO_3$), which are used in the CO_2 exposure conditioning stage of precast plain concrete elements. This promising method to capture carbon from the atmosphere has a global economic market potential of more than $350 billion and has the potential to reduce annual CO_2 emissions by up to 3x109 tons by 2030.



The unhydrated C_3S and β-C_2S and their hydrated products (e.g., portlandite/calcium hydroxide ($Ca(OH)_2$) and calcium silicate gel hydrate (C-S-H) react with CO_2 and water to generate $CaCO_3$ and is shown in equations (1) - (3)

$$\beta - Ca_2SiO_4 + 2CO_2 + nH_2O \rightarrow 2CaCO_3 + SiO_2 \bullet nH_2O \quad (1)$$
$$\gamma - Ca_2SiO_4 + 2CO_2 + nH_2O \rightarrow 2CaCO_3 + SiO_2 \bullet nH_2O \quad (2)$$
$$CaSiO_3 + CO_2 + nH_2O \rightarrow CaCO_3 + SiO_2 \bullet nH_2O \quad (3)$$

MATERIALS AND METHODS

Direct carbonation reaction

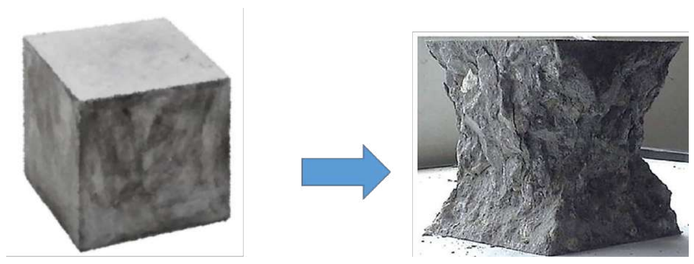
$$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$$

1. the diffusion of CO_2 through the pore network is influenced by pressure and temperature - essential parameters influencing the carbonation by immersion of materials in water;
2. Aggregate particle size and moisture content - with decreasing diameter, there is an exponential increase in CO_2 adsorption capacity at relative humidity (RH) between 50% and 70%;
3. CO_2 concentration - over-intensified carbonation at early ages compromises the performance of the final product.

RESULTS

Cement + AGGREGATES + $CO_2 + H_2O$ → **DURABLE PREFABRICATES + IMPOROVED PERFROMANCE**

CO_2 CAPTURED FROM INDUSTRIAL GAS EMISSIONS → TREATMENT OF PREFABRICATED CARBONIZATION → SMALLER FOOTPRINT → IMPROVED PERFORMANCE



The reaction between the cementitious matrix and CO_2 occurs within the first 15 minutes, with a rapid exothermic process. The conditioning mode, including the water/cement ratio, has the greatest influence on the amount of CO_2 retained in plain concrete elements at an optimum water/cement ratio of 0.36-0.43

CO_2 binding capacity is temperature dependent, followed by pressure and calcium content.

CONCLUSIONS

The realization of accelerated carbonation of precast elements highlights the mechanisms, the factors influencing this process, the industrial benefits, the applicability of accelerated carbonation and solutions for large-scale implementation. The need for further research is indicated in order to achieve theoretical maximum carbonation maxima and to improve the reaction kinetics in the production of sustainable and cost-effective building materials.

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SUSTAINABLE SOLUTIONS FOR GARDEN FURNITURE

Patent/project number: Student Project
Author: Cerasela Liţică, Mentor Ana Socalici

B

Using recycled materials in landscape design contributes to waste reduction by repurposing resources that would otherwise be discarded. This approach aligns with the principles of a circular economy, in which materials are continuously reused and recycled, thereby minimizing reliance on new raw materials and reducing overall waste generation.

The integration of recycled rubber into landscaping projects represents a strategic effort towards reducing rubber waste and promoting a circular economy. This approach repurposes materials that would otherwise contribute to landfill overcrowding, assigning them a new function in urban spaces. Recycling used rubber for household items and outdoor applications presents a sustainable solution that reduces waste. For instance, discarded tires can be processed into durable furniture, such as chairs and tables, offering an environmentally friendly alternative to conventional materials.

By incorporating recycled rubber into functional everyday objects, environmental impact is reduced, and the use of reusable materials is promoted. This approach provides both aesthetic and practical solutions for homes and outdoor spaces. Furthermore, it underscores the significance of innovation in recycling and sustainability by transforming a problematic material into a valuable resource.

Using recycled materials decreases the demand for extracting and processing new resources, activities that often contribute to environmental degradation. Recycling and repurposing rubber in landscaping projects help lower the ecological footprint associated with the production of new construction materials. Integrating recycled materials into landscape design exemplifies the principles of a circular economy, in which products and materials remain in use for as long as possible. This strategy not only reduces waste by extending resource lifespans but also encourages sustainable production and consumption systems.

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Additive technologies using high power laser sources

Patent/project number: Doctoral research project
Author/s: Andrei Cosmin RUSU
Mentor: Prof. Dr. Ing. Liviu Daniel GHICULESCU

B

DED is a laser processing technique that allows to manufacture complex geometries using Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM). During DED process, figure 1, a laser induces melt-pool is created. Then, a stream of powder is directed into the melt-pool and followed by a succession of melting-solidification effects combined with trajectory made by CAM, a new layer is created. The powders fed into the melt-pool must have particular characteristics like specific size and chemical composition and can be metallic or nonmetallic materials, alloys and MMC (Metal Matrix Composites). Depending on the application and how complex it is we can use for printing 3D parts different powders like the ones described early.

For obtain faster results, are used numerical simulation softwares with the aim of finding the optimal parameters by implying reduced amount of resources. Finite element simulation software COMSOL MULTIPHYSICS was used to define DED process characteristics. Using build in modules, Heat Transfer and Deformed Geometry combined with Time Dependent study was created a model (figure 3), which helps with finding starting values for process parameters. Physico-thermal properties for the solid phase material were taken into consideration when modeling this simulation. With the numerical model created we can observe influences of different parameters on the temperature field (figures 4) and cladding height (figures 5).

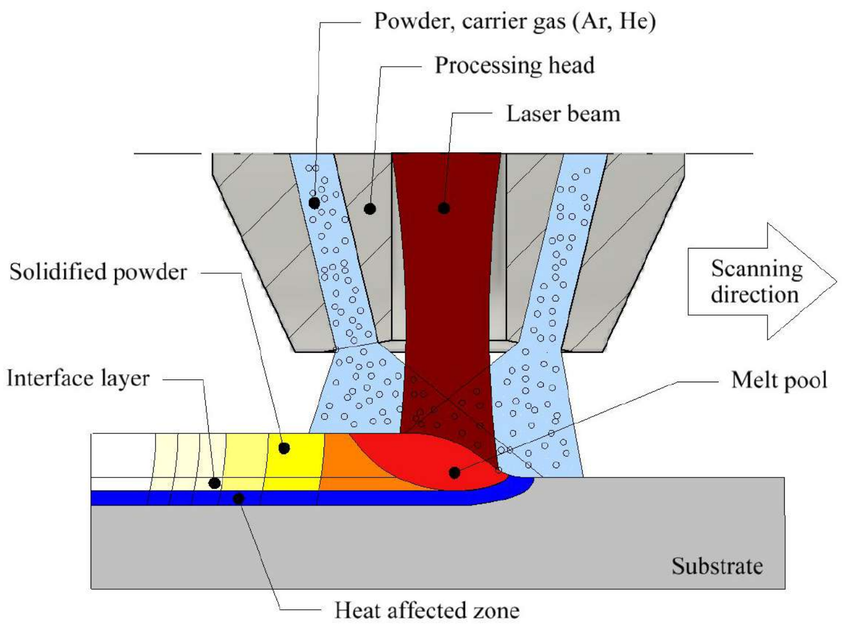

Figure 1. DED process principle

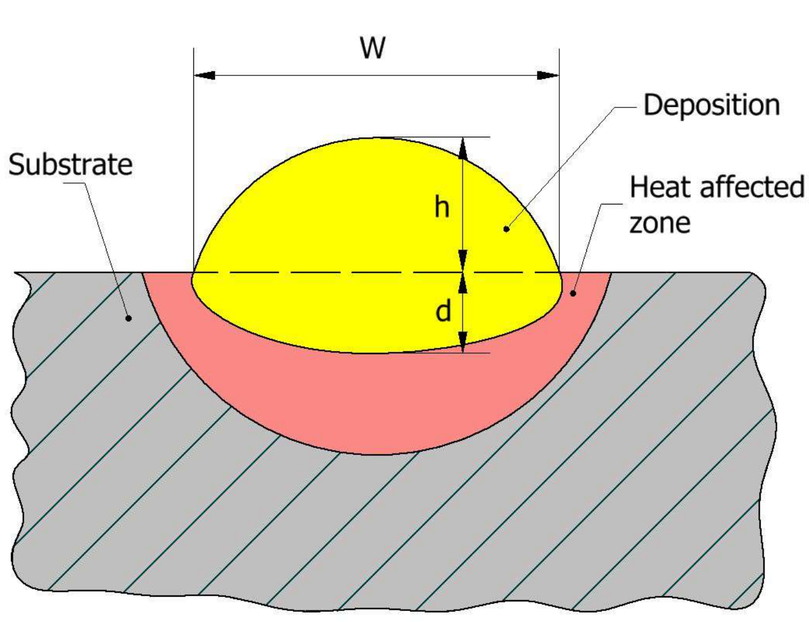

Figure 2. Deposition during DED process

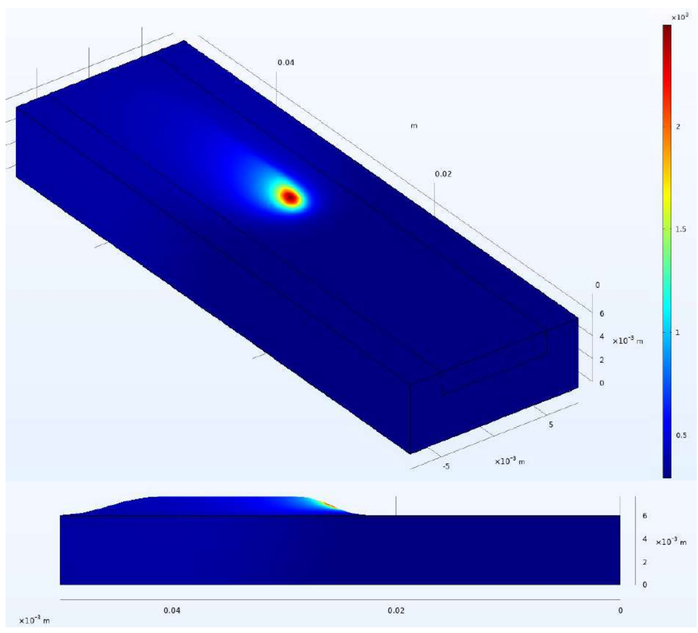

Figure 3. Modeled DED process in COMSOL MULTIPHYSICS

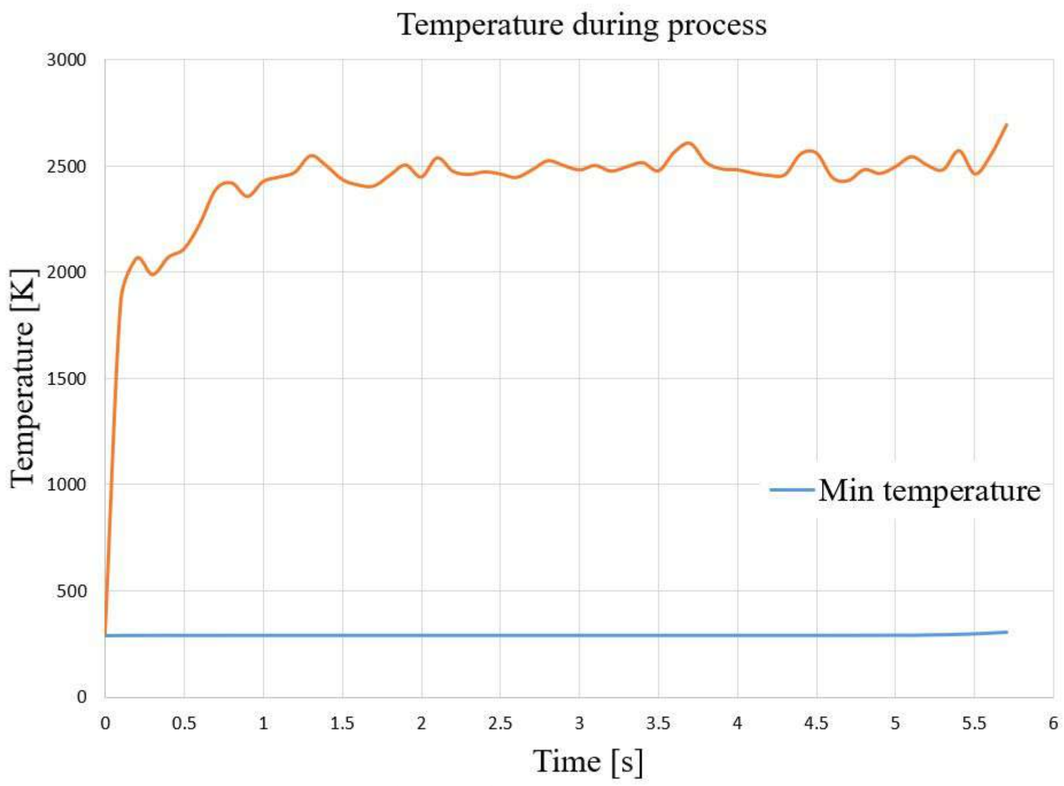

Figure 4. Chart of min and max temperatures

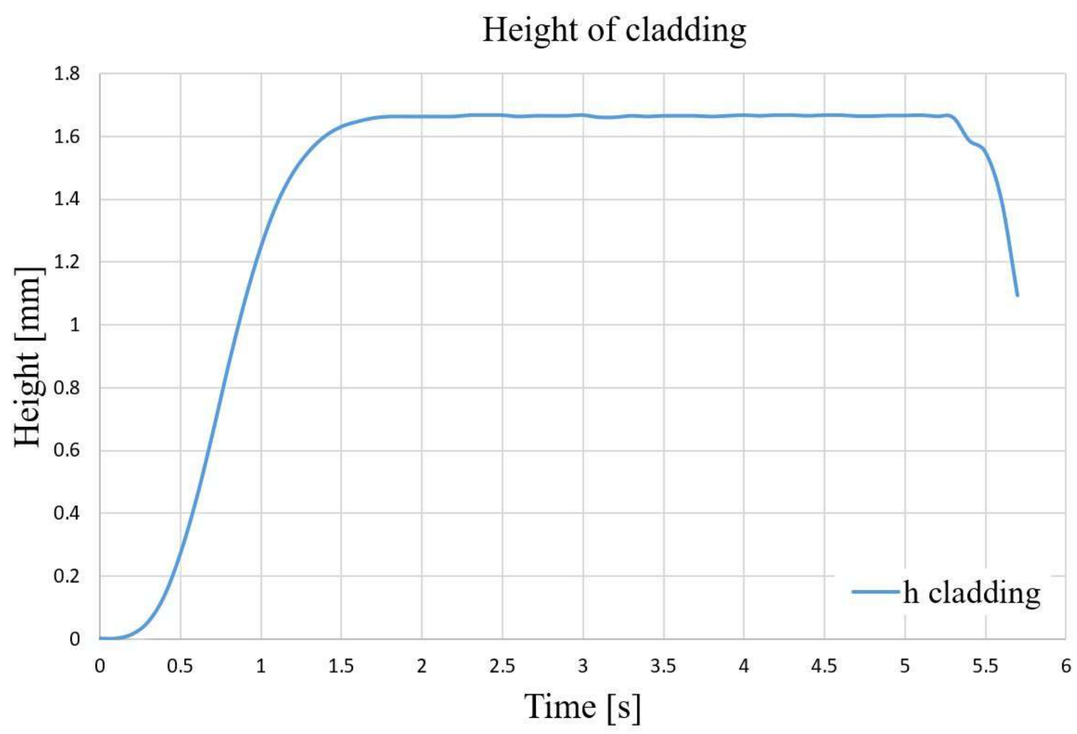

Figure 5. Chart of cladding height

The innovation within my research consist in studying mechanical and physical properties of parts created with laser DED technique using metal matrix composites powders or other metal alloys materials. By optimizing the manufacturing process parameters and using a specific combination of materials (metallic and ceramic particles), can obtain new parts with specific properties like increased electric conductivity, thermal conductivity and higher corrosion resistance. With the help of simulation softwares we can find starting parameters in an easy way, by saving a lot of time and resources, in comparison with the trial-and-error methods by performing the experiments.

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PHASE CHANGE MATERIALS COMPOSITE PANEL WITH HIGH THERMAL EFFICIENCY

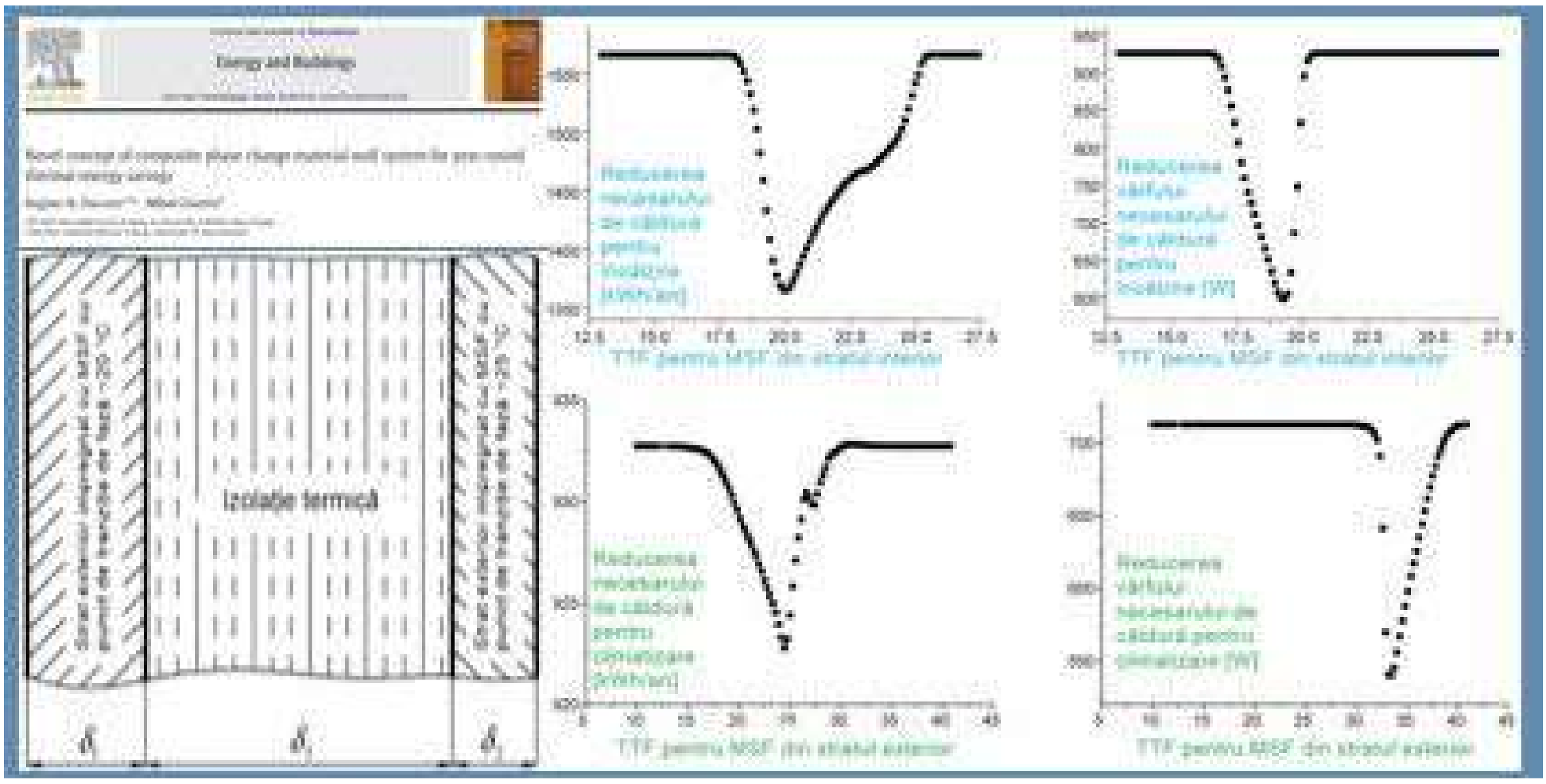
Patent : **RO 126853 B1/ 30.07.2013**

Authors: Diaconu Bogdan Marian, Cruceru Mihai, Gorun Adrian, Popescu Georgeta Luminița

B

The invention relates to an exterior wall construction element that ensures more efficient energy management for heating and air conditioning, compared to conventional (Sandwich-type) walls for modular constructions.

The novel feature of the invention lies in the integration of two layers impregnated with phase change materials (PCM) with different phase transition temperatures (PTT) into its structure. The exterior layer – exposed to the ambient environment – is impregnated with a phase change material with a PTT around 20 °C, while the interior layer – exposed to the living space – is impregnated with a different type of PCM, with a PTT of approximately 25 °C. The exterior layer is active during the heating season, while the interior layer is active during the season requiring energy for air conditioning.



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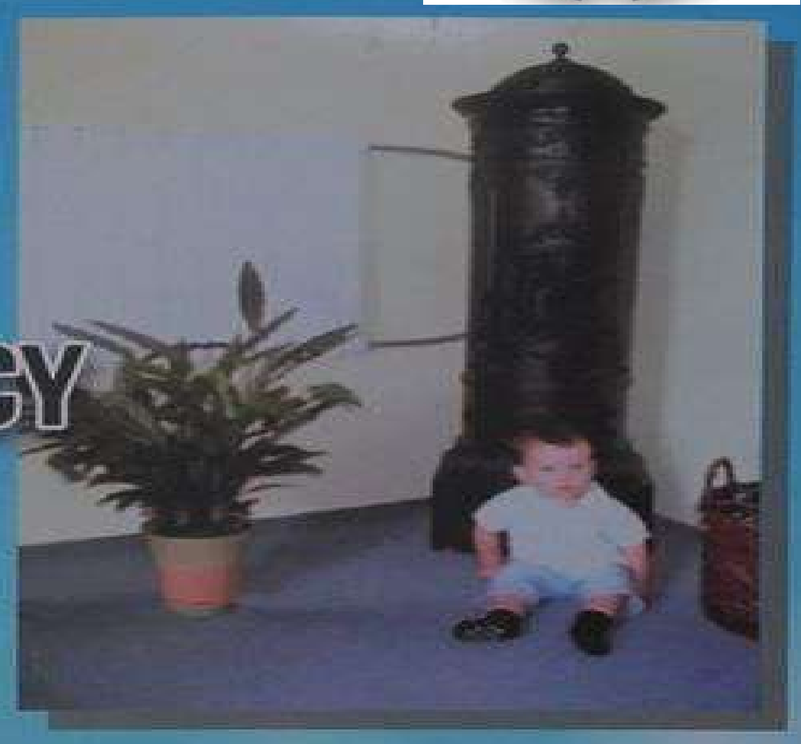
Author:
Lajos Vásárhelyi



AESTHETIC

GREAT EFFICIENCY

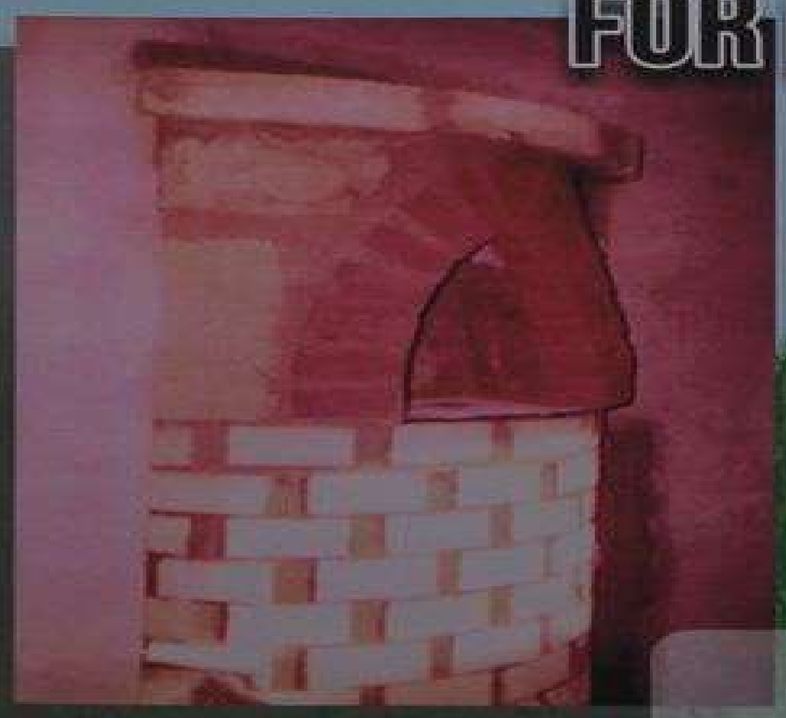
3 IN 1
STOVE &
CENTRAL HEATING &
WATER HEATER

B

ECONOMICAL

STORE THE HEAT
UP TO 6 HOURS

FOR MASS PRODUCTION



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RESISTIVE SENSOR FOR RELATIVE HUMIDITY

B

Patent application OSIM no. A/00476/28.01.2022
Authors: ȘERBAN BOGDAN-CĂTĂLIN, BUIU OCTAVIAN, COBIANU CORNEL

RH sensors have received increasing attention in the last years due to their importance in a large variety of residential, industrial, and commercial applications. One can mention some of those: controlling and sensing humidity in offices and homes, medical field (gas supply infrastructure, incubators, sterilizers), food/beverage processing, chemical industry (dehumidifiers, smelting furnaces, dryers), pharmaceutical processing, electronics (semiconductor fabrication plants, clean room controls) agriculture (drip irrigation), weather station, textile, and paper industry, automotive industry (engine tests beds).

This patent application refers to the development of resistive relative humidity (RH) sensor, employing a sensing layer based on a binary nanocomposite comprising oxidized carbon nanohorns (CNHox) (Fig.1) –tannic acid (Fig. 2), oxidized carbon nanoonions (CNOox - Fig.3) - tannic acid or ternary nanocomposite comprising oxidized carbon nanohorns (CNHox), oxidized carbon nanoonions (CNOox) and tannic acid. The RH sensor includes a Si/SiO_2 substrate, interdigitated electrodes and a sensing layer obtained via spin coating method. The RH monitoring capability of the sensing layers was investigated by applying a current between the two electrodes and measuring the voltage at different values of the oxygen concentration at which the sensing layer was exposed. The resistance of the sensitive layer varies with RH level.

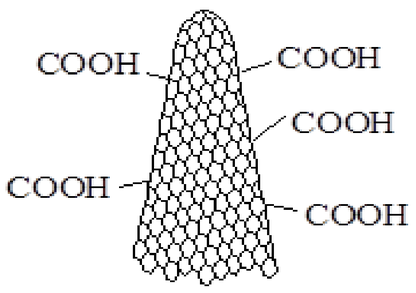

Fig. 1 – Structure of oxidized carbon nanohorns (CNH_{OX})

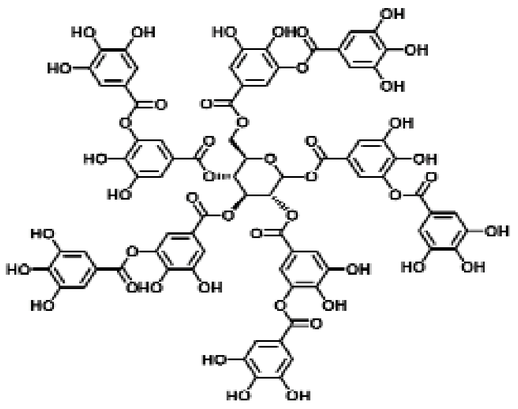

Fig. 2 – Tannic acid

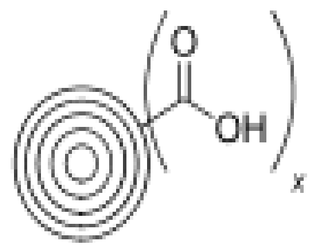

Fig. 3 – Oxidized carbon nanoonions

Synthesis of the sensing layer

The raw materials necessary for the synthesis of the sensitive layer are, in the first case, tannic acid (Sigma Aldrich), oxidized carbon nanohorns (Sigma Aldrich), deionized water, acetone, ethanol.

1) The Si/SiO_2 substrate is cleaned for 10 minutes in the ultrasonic bath using sequentially equal volumes of acetone, ethanol and finally deionized water.

2) The solution of tannic acid in water is prepared by dissolving 20 mg of biopolymer in 100 mL of deionized water, under magnetic stirring (10 minutes, at room temperature).

3) Subsequently, 80 mg of oxidized carbon nanohorns are added to the previously prepared solution and the magnetic stirring is continued for 60 minutes at room temperature.

4) The solution obtained is deposited by the "drop casting" method, using a Si / SiO_2 substrate with linear electrodes or interdigitated electrodes (after previously masking the contact area).

5) The obtained sensitive layer, deposited on the substrate, is dried in an oven at 50 °C in a vacuum for 30 minutes.

Advantages

The new synthesized sensing layer used in the manufacturing of resistive RH sensor have several significant advantages: • the presence of CNHs-ox and CNOox ensures a high specific surface area / volume ratio as well as a substantial affinity for water molecules; • tannic acid can form hydrogen bonds with both the hydrophilized substrate (Si/SiO_2) and oxidized carbon nanohorns • detection at room temperature; • rapid response.

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Title

INNOVATIVE USE OF SHEEP WOOL AND POLYURETHANE FOAM FOR OBTAINING MATERIALS WITH SOUND-ABSORBING PROPERTIES

Inventor/s - Contact

OVIDIU NEMEŞ, SIMONA IOANA BORLEA (MUREŞAN), ANCUŢA-ELENA TIUC, GYORGY DEAK
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Patent/ Application number

Patent OSIM no.: RO136050- B1/30.05.2024

Short presentation

The aim of this work was to obtain materials with sound-absorbing properties using sheep wool and rigid bicomponent polyurethane foam. Four materials with three layers were obtained. A layer of sheep wool previously processed by hot pressing at 80°C and 5 MPa, with final thicknesses of 2, 4, 6 and 12 mm; a layer of polyurethane foam, with a thickness of 8....37 mm and a transition layer, 1...20 mm thick, resulting from the migration of polyurethane foam during the multilayer panel manufacturing process into the wool layer and/or the migration of wool into the polyurethane foam layer. Wool and polyurethane foam are the combination of sound insulation and sound absorption - wool absorbs sound and reduces it, and due to the rigid structure of polyurethane foam (closed pore structure), it does not allow sound to travel further, resulting in sound insulation.
The obtained materials have very good sound absorption properties with acoustic absorption coefficient values over 0.7 for the frequency range 800 ÷ 3150 Hz; the results prove that the sheep wool has a comparable sound absorption performance to that of mineral wool.

Applicability

The study explores alternative usage of sheep wool as a construction material with improved sound absorbing properties beyond its traditional application as a sound absorber in textile industry or using of waste wool in the textile industry as a raw material. Sound absorbing materials can be used to reduce noise and to obtain an adequate acoustic for enclosed spaces. They can have many uses, both outdoors and indoors: in industry, commercial areas, relaxation and leisure areas, in areas used for education, in constructions, on building sites, highways, roads and streets, airports, ports, railways, etc. Materials studied in this research can be used to reduce noise impact, as decorative panels with sound absorbing role, to improve acoustic conditions, and to reduce or stop reverberations.

Images

A

B

Fig.1. Processing phases:
A: Phase I - Wool plate hot formed ;
B: Phase II - Finale structure of the plate

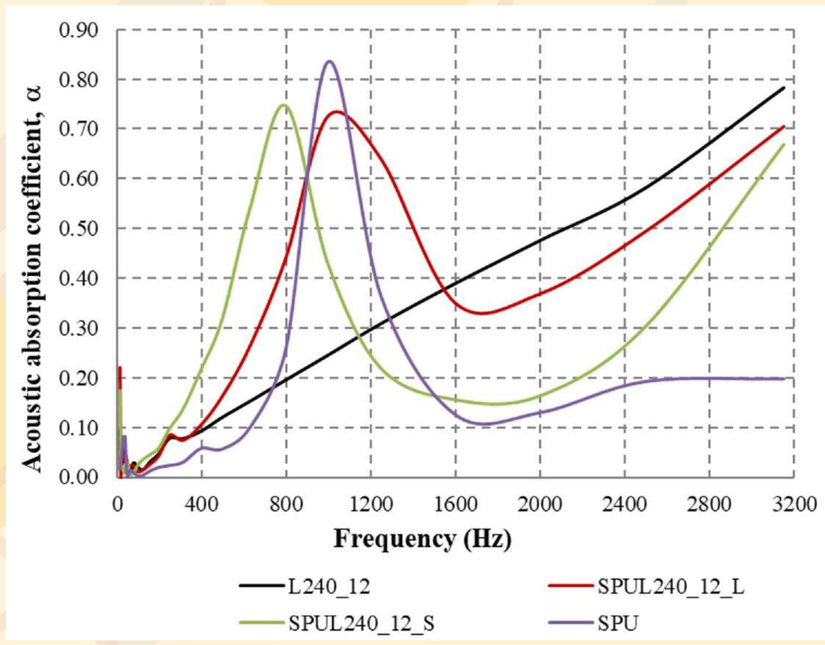

Fig. 2. Variation in the acoustic absorption coefficient with frequency for multi-layer materials in comparison with rigid polyurethane foam (SPU) and the layer made of pressed sheep's wool (L240_12).

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Title

PROCESS OF MANUFACTURING CUSTOMIZED MULTI-STRUCTURE MEDICAL IMPLANTS BY ADDITIVE MANUFACTURING TECHNOLOGIES

Inventor/s - Contact

Leordean Vasile Dănuț [a,*], Radu Sever-Adrian [b,*], Cosma Sorin-Cosmin [c,*], Cuc Stanca [d], Vilău Cristian [e,*], Rusu Mircea-Aurelian-Antoniu [f,*]
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Patent/ Application number

Patent OSIM no.: RO132908- B1/28.02.2024

Short presentation

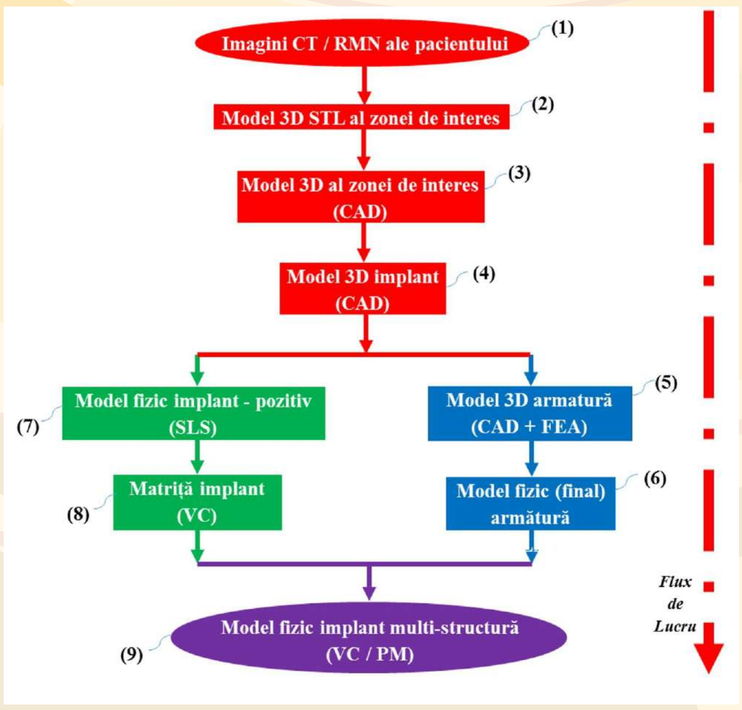
The invention is related to the development of a process (technology) for manufacturing customized implants made of biocomposite material, reinforced with metallic structures produced by SLM. The resulting multi-structure implants (metal/biocomposite) are tailored to individual patients and can be used to prosthesis any area of the human bone system. The process is based on CT data from which the 3D model of the affected area is extracted. The final shape and resistance structure (metal reinforcement) of the future implant will be designed using CAD and FEA programs.

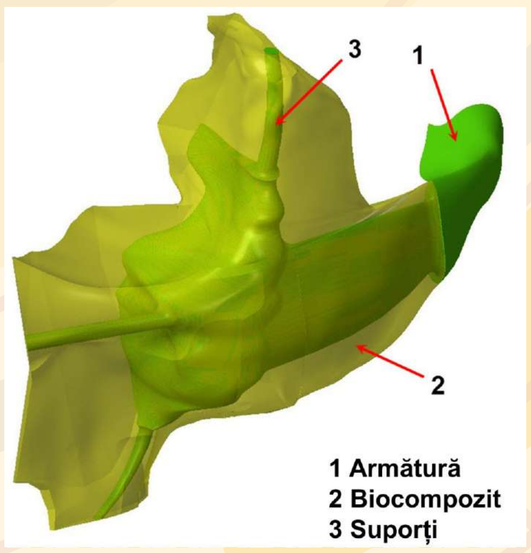
The manufacturing process consists of two stages. In the first stage, two AM technologies are used: SLM is employed to create the metal reinforcement, while SLS and Vacuum Casting are used to produce the silicone rubber mold that will shape the final implant. In the second stage, the reinforcement is placed into the silicone mold, and the final customized implant is created through casting or injection, depending on the material composition.

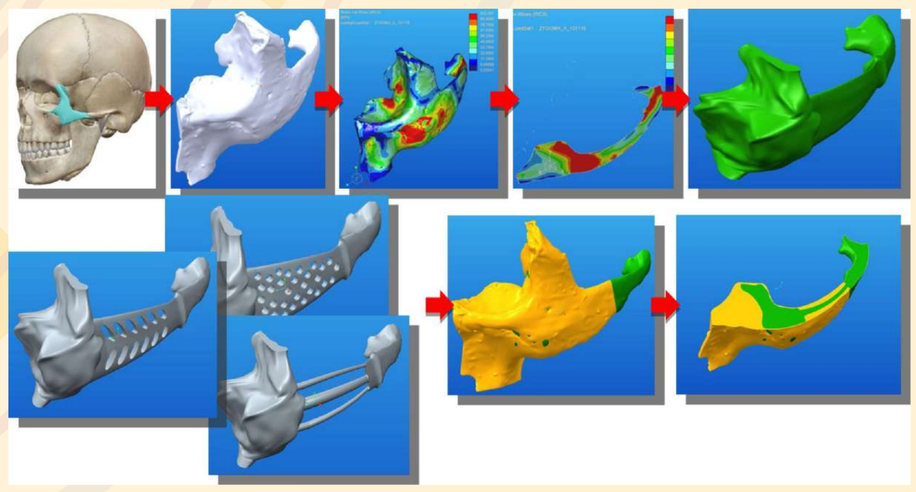
Applicability

Medical applications, Medicine

Images







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Title

SHEEP WOOL BASED MODULAR PANEL AND THE METHOD USED FOR OBTAINING IT

Inventor/s - Contact

DÉNES Tünde-Orsolya, TĂMAȘ-GAVREA Daniela-Roxana, IŞTOAN Raluca, TIUC Ancuţa Elena, MANEA Daniela Lucia, VASILE Ovidiu

Patent/ Application number

Patent OSIM no.: RO135991- B1/30.05.2024

Short presentation

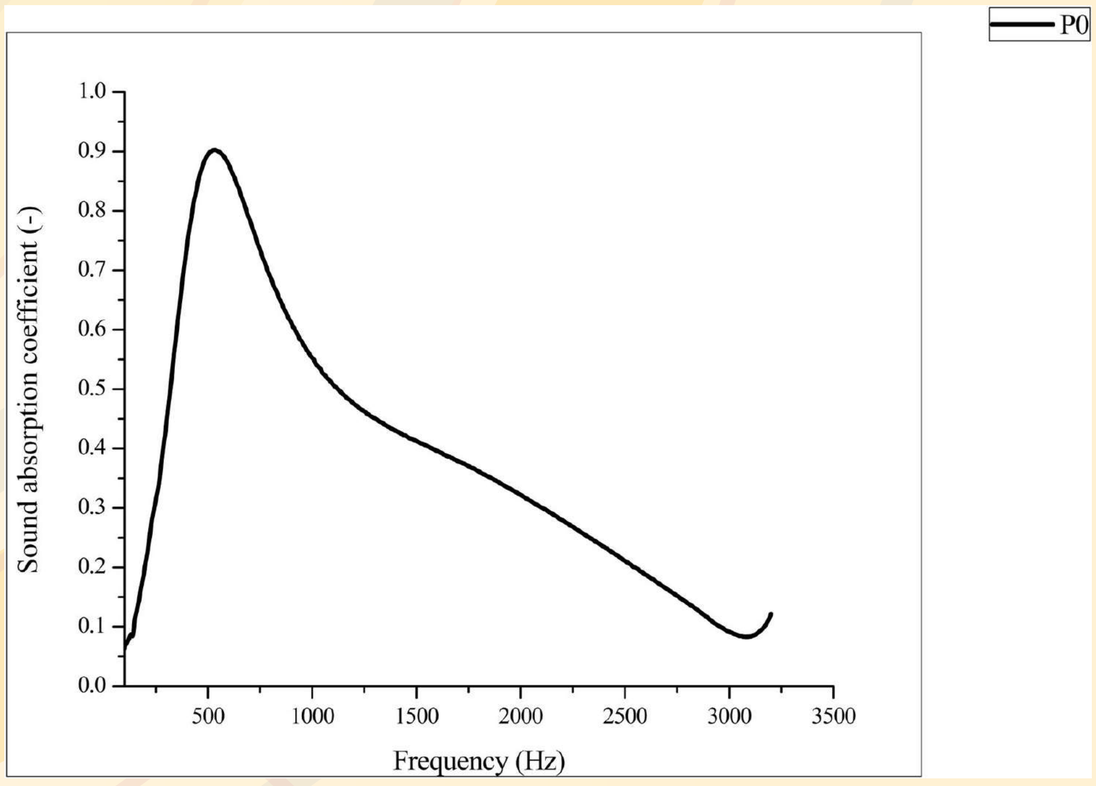
The invention relates to a modular panel based on sheep wool fibers, and the method of obtaining it, in order to meet the requirements of quality in construction regarding noise protection and the sustainable use of natural resources. Each module consists of a triple layered panel, having a composition similar to that of sandwich panels. The structure of the layered panel is made of two outer layers of hydrated lime-based plates, which delimit a mattress made of sheep wool fibers placed between them.
The weighted sound reduction index of the modular panel is Rw (C;Ctr) = 38 (-2, -8) dB.
The layered panels have high sound absorption coefficient values at low frequencies. The maximum value is 0.90 at the frequency of 524 Hz.

Applicability

The invention consists in obtaining of a modular panel for vertical partition walls in buildings, with acoustic and thermal properties comparable to the existing sound insulating, sound absorbing and thermal insulating composites by using sheep wool, which is a viable natural alternative to synthetic fibers.

Images

Modular panel



Variation of sound absorption coefficient

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Title

SOFA SIDE MADE BY THERMOFORMING PROCESS AND ITS ACCOMPLISHING PROCESS

Inventor/s - Contact

Ciupan Cornel, Filip Ioan, Cionca Ioan, Ciupan Emilia

Patent/ Application number

Patent OSIM no.: RO133392 -B1/29.03.2024

Short presentation

The invention relates to the structure of a sofa side made of composite material based on natural fibers (hemp 50-60%) mixed with polypropylene (40-50%). The material is obtained by interweaving. The sofa side has the shape of a box and is made up of an inner shell, an outer shell and a rib that is mounted between the two shells. It replaces a classic side made mainly of wood which was made up of 21 pieces. The process presents the phases and parameters of thermoforming of the three components and the way of assembling them.
The thermoforming process consists of the following phases: tailoring, heating to 210-220ºC, transfer to the core mold and calibration by pressing with the cavity mold. After cooling, the piece is extracted from the mold and it is finished on the contour.

Applicability

The invention was developed in collaboration with specialists from the Technical University of Cluj-Napoca and TAPOARO SA from Targu Lapus and is applied in the upholstered furniture industry. The main advantages: replacing wood with environmental protection effects, reducing the weight of the product, significantly reducing the number of parts and using a single material (composite), simplifying the manufacturing process and increasing productivity, resulting in a reliable product at a low cost.

Images

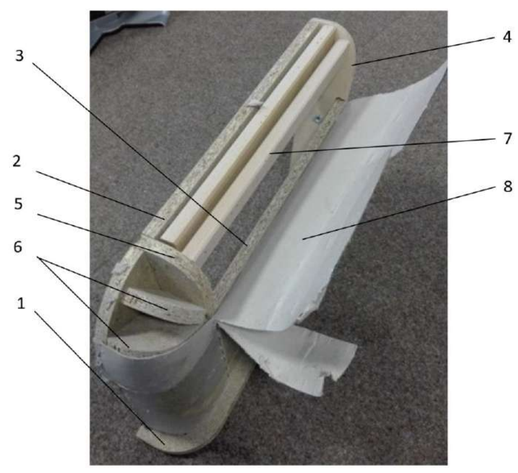

Fig. 1 Old version of the sofa side

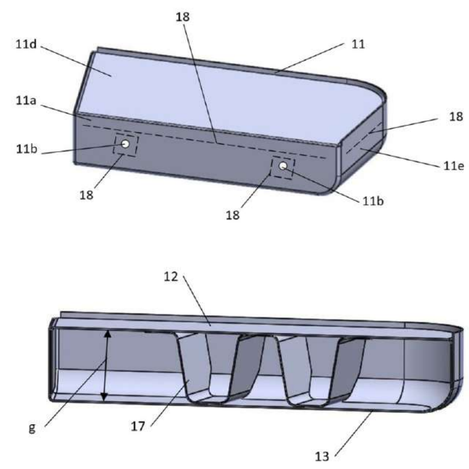

Fig. 2 New version of the sofa side

Fig. 3 Sofa sides on the production flow

Fig. 4 Sofa sides – laboratory tests

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Title

ECOLOGICAL ROAD CONCRETE BASED ON CEMENT, GLASS POWDER AND AGGREGATES FROM RECYCLED CONCRETE WASTE FOR APPLICATIONS IN THE FIELD OF CONSTRUCTIONS "BcR_G"

Inventor/s - Contact

CORBU Ofelia-Cornelia; PUSKAS Attila

Patent/ Application number

Patent OSIM no.: RO137345- B1/30.07.2024

Short presentation

The road concrete of the invention is an environmentally friendly concrete composed of natural aggregates (NA), recycled concrete aggregates (RCA) and waste glass powder form (WGP) that replaces part of Portland cement, RCA and WGP as an alternative to conventional materials. The concrete design was carried out so that, in addition to other durability characteristics, a remarkable resistance to abrasion was obtained. It falls into the resistance class BcR5. The microstructure and compositional characteristics of the concrete were also investigated, to confirm the efficiency of WGP. This new composite offers several advantages in terms of reducing existing and potential volumes of mineral waste both economically and visually, reducing pollution and minimizing the consumption of natural resources and energy. By applying it in the construction industry, it makes it possible to move from a linear economy to a circular economy.

Applicability

Application in the construction field with applicability for roads, sidewalks, pavements, alleys, etc

Images

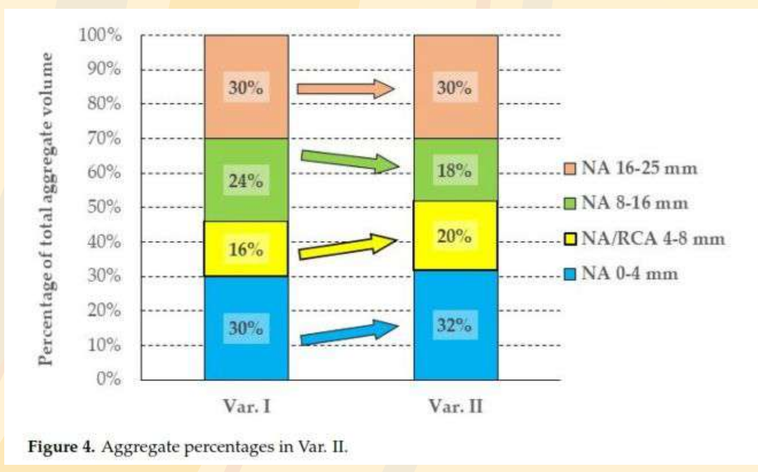

Figure 4. Aggregate percentages in Var. II.

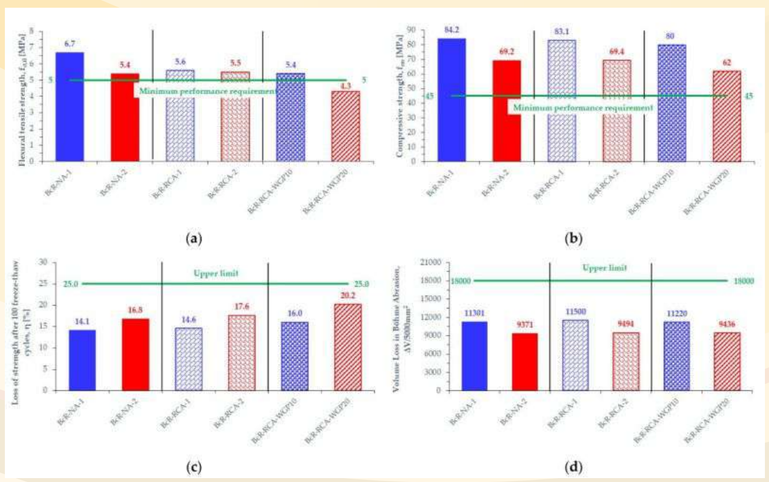

Figure 23. Hardened BcR composites' properties (both variants);
(a) flexural strength, (b) compressive strength;
(c) loss of strength after 100 freeze–thaw cycles;
(d) volume loss in Böhme abrasion.

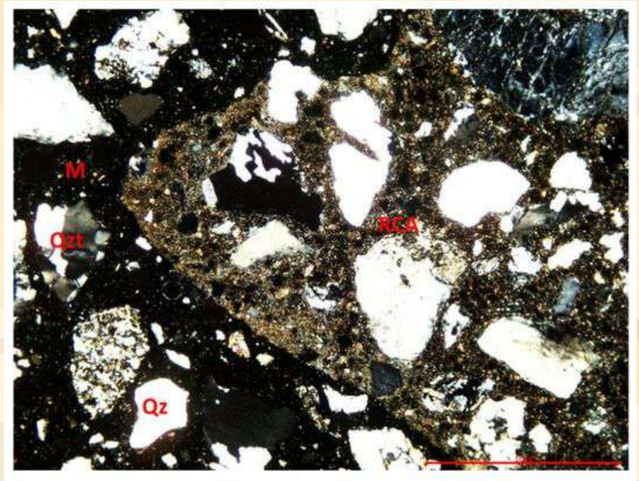

Figure 15. Microscopic image of the sample BcR-RCA-WGP10 at crossed pollars with porphyroclastic texture. The clasts consist of recycled concrete (RCA), quartzite (Qzt), fragments of quartz, etc. embedded into the matrix, black in color. The scale bar is 1 mm.

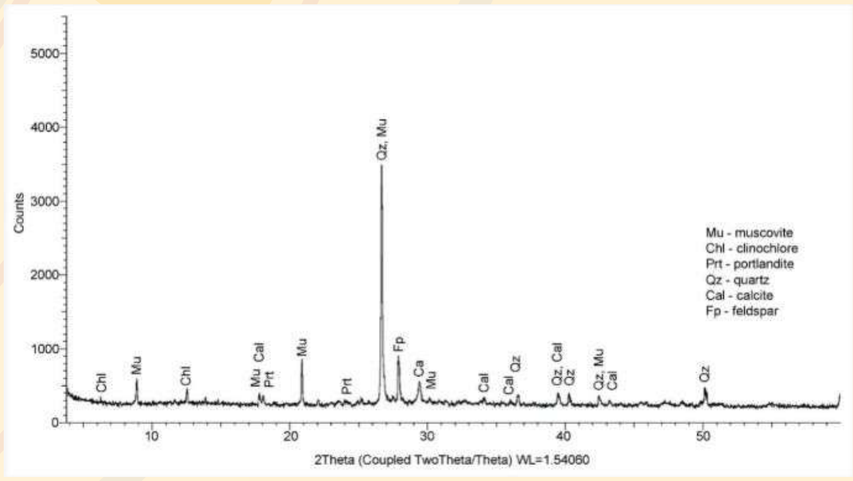

Figure 18. The X-ray spectra of the sample BcR-NA-1 with the typical line for quartz, muscovite, calcite, albite, clinochlore, gypsum, portlandite, and orthoclase.

[1] Coatings 2023, 13(10), 1710; https://doi.org/10.3390/coatings13101710

Ultrasonic weldability of composites created through additive manufacturing

B

Authors: ***Emilia DOBRIN, Gabriela-Victoria MNERIE, Ileana Lavinia SÎRBU***

Ultrasonic welding is a sustainable and non-toxic joining process widely utilized by leading industrial manufacturers and aligned with European circular economy regulations. This study investigates the ultrasonic welding behavior of additively manufactured composites reinforced with materials such as glass fiber, Kevlar (K), and copper wire. These composites are structured in a sandwich configuration with varying reinforcement types and welded using ultrasonic technology. The welded samples were analyzed and compared to the base material through non-destructive (NDT) and destructive testing, including visual inspection, microscopic and macroscopic analysis, tensile testing, hardness testing, and bending tests. The results provide insights into the mechanical performance and structural integrity of ultrasonic-welded, additively manufactured composites.

Test specimens resulting from PETG deposition

Kevlar fabric

Reinforced specimens while being welded with US

Results:

Specimen	E_t [MPa]		σ_m [Mpa]		ε_m [%]		ε_b [%]		b [mm]		h [mm]		A_0 [mm²]	
	No Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev	**No** Kev
No. 1	3620	3440	37.2	46.1	0.98	1.3	0.98	1.3	10.25	10.44	4.08	4.25	41.8	44.4
No. 2	3580	3590	41.5	46.5	1.2	1.2	1.2	1.2	10.16	10.25	4.09	4.14	41.6	42.4
No. 3	3320	3450	38.4	48.9	1.2	1.4	1.2	1.4	10.38	10.34	4.2	4.27	43.6	44.2
No. 4	3560	3690	36.5	54.0	0.98	1.4	0.98	1.4	10.25	10.3	4.15	4.52	42.5	46.6

Advantages of the process:

Reduces human involvement in the 3D printing production process. Eliminates certain production steps, as they are integrated into the 3D printing workflow. Ultrasonic treatment enhances the mechanical properties of the final parts without altering the 3D-printed material.

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Opportunity
CORNELIUGROUP Research-Innovation Association
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ISIM
TIMIȘOARA
National Research & Development Institute for Welding and Material Testing - ISIM Timișoara

Research on submerged friction stir processing of rolled and cast aluminum alloys

Project no. PN 23 37 01 02 (part 1/2023-2024), Program Nucleu 2023-2026

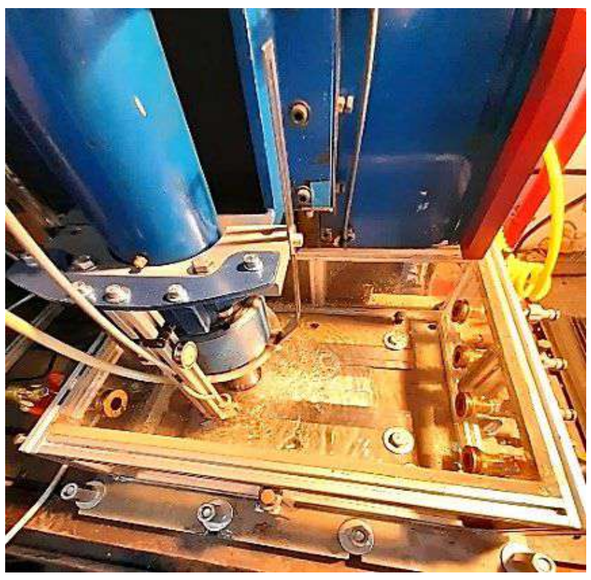
Authors: Lia-Nicoleta Boțilă, Ion-Aurel Perianu, Iuliana Duma

B

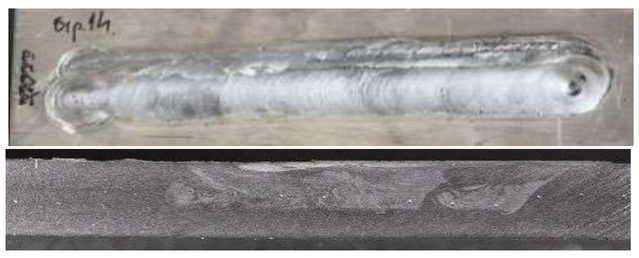
Objective: research on the possibilities to change the mechanical properties of the rolled and cast aluminum alloys sheets, on a limited area, using the ecological and innovative method of submerged friction stir processing SFSP

Experimental research:
SFSP processing in a single pass or in multiple passes for:
- rolled aluminum alloys EN AW 1200, EN AW 5754, EN AW 6082 and EN AW 7075, 3-5 mm thickness
- cast aluminum alloy EN AC 5083, 5-6 mm thickness

Friction stir welding and processing system FSW/FSP equipped with module for submerged friction stir welding and processing SFSW/SFSP



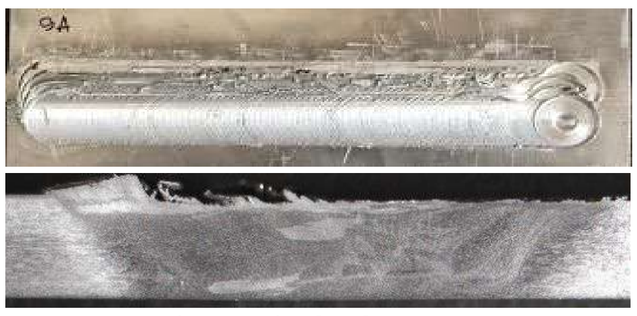
EN AW 1200 (5 mm), SFSP multiple passes



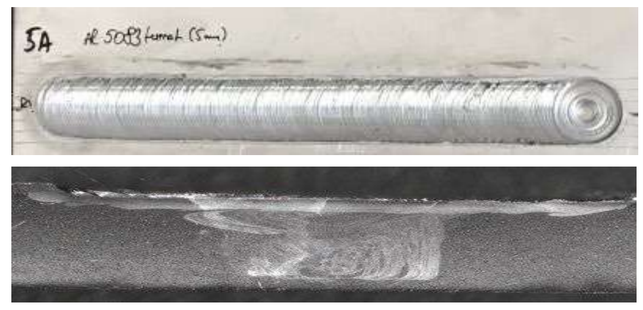
EN AW 5754 (3 mm), SFSP multiple passes

EN AW 7075 (5 mm), SFSP multiple passes

SFSP processed samples and macroscopic appearance, for rolled and cast aluminum alloys

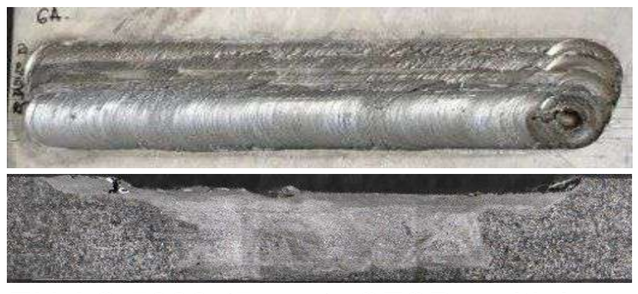


EN AW 6082 (5 mm), SFSP multiple passes

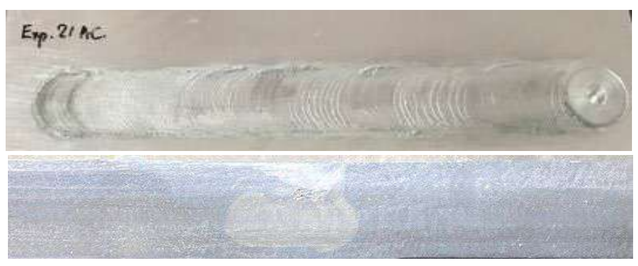


EN AC 5083 (5 mm), SFSP single pass

EN AW 7075 (5 mm), SFSP single pass



EN AC 5083 (5 mm), SFSP multiple passes



EN AC 5083 (6 mm), SFSP single pass

Effects of SFSP processing applied on aluminum alloys sheets:
- improvement of the microstructure and mechanical properties of the processed materials;
- microstructure refinement of rolled and cast aluminum alloys;
- increase of the material deformability degree by SFSP processing in multiple passes, on a limited area;
- change in hardness values in the processed areas.

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TIMIȘOARA

National Research & Development Institute for Welding and Material Testing - ISIM Timișoara

PROCESS FOR SINTERING POWDERS USED IN THE MANUFACTURE OF ELECTRICAL CONTACTS

B

Patent application **No. A2024 00448 / 30.07.2024**

***Authors:* Sorin Vasile SAVU, Ionel Dănuț SAVU and Nicușor-Alin SÎRBU**

It is known that sintering of composite materials can be achieved by various processes. In switchgear systems in the energy industry, the active elements of electrical contacts are subjected to particular thermal and electrical actions. Microwave sintering of composite materials is an innovative process because of the way in which the heat required to reach the sintering temperature is developed inside the materials. The phenomenon known as dipole rotation under the action of the high-frequency microwave electromagnetic field leads to mechanical friction within the materials and hence to heat development. Specific to microwave sintering is the rapidity with which heat is developed in the materials.

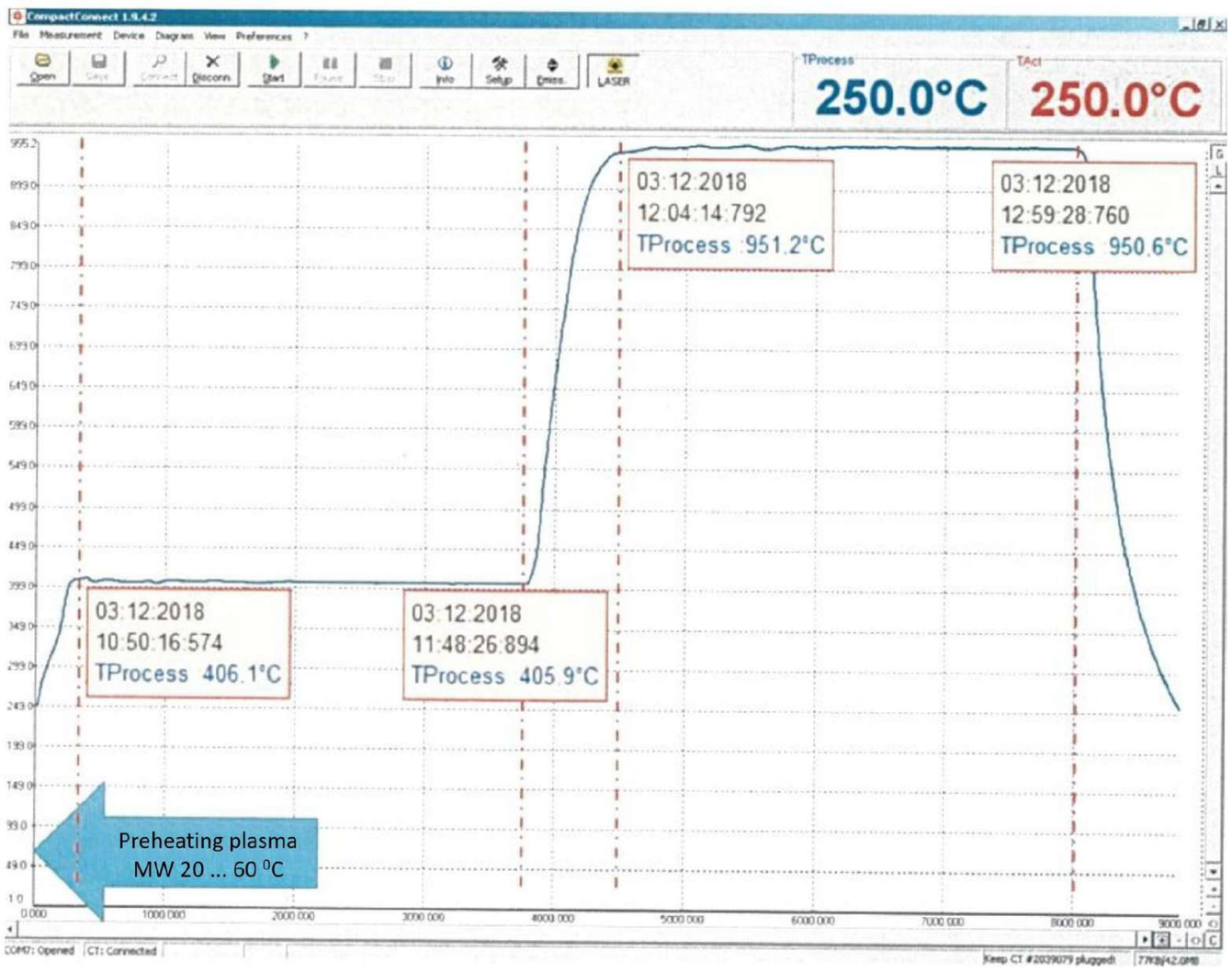
Another aspect of the microwave sintering process is energy efficiency.

Object of the invention:

A process for sintering powders used for making electrical contacts in which a W-Cu-Cr based composite material, obtained by mechanical alloying in a planetary ball mill and compacted in a cylindrical mold, is subjected to a sintering process characterized in that in order to increase the process reliability, reduce time and energy consumption the sintering is done in a microwave field conditioned by preheating in microwave activated argon plasma using a microwave generator.

The technical problem solved by invention:

- The technical problem of the invention consists in the realization of a process for manufacturing electrical contacts by sintering, whereby to obtain a reduction in manufacturing time, energy consumption and reduced risk of cracking of the composite material.



Cyclogram of the microwave field sintering process assisted by microwave activated argon plasma thermal conditioning of the composite material

Advantages:

- Maximum simultaneous power consumption from the mains supply reduced by 70% compared to conventional electric calciners, which represents a significant reduction in investment costs in the plant's power supply circuits;
- The electrical energy consumed is reduced by 78% due to the high heating rate in the microwave field, which means a much lower production cost;
- The total sintering time is reduced by 36% due to the high heating rate, resulting in much lower labor costs and higher productivity;
- The sintered material has similar physical and mechanical properties to those obtained by conventional sintering.

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COMPOSITE MATERIAL FOR ORGANIC POLLUTANTS REMOVAL USING MATERIALS BASED ON FOOD WASTE AND METHOD OF OBTAINING IT

A

Patent number: A00673/2024

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The present invention refers to a material and procedure for the removal of organic pollutants. The procedure is based on the use of a phosphatic material (obtained from the valorization of food wastes-shells of *Mya arenaria* Linnaeus, 1758 - the most encountered edible clam on the Black Sea shore), decorated with metallic oxides (Cu or Ni) developed using a rapid approach, further formulated as an active coating. The material proved to be effective at low concentrations against the model organic pollutant (dye) Methylene Blue.

Synthesis

***Mya arenaria* Linnaeus, 1758**
(Clams - *Food waste*)

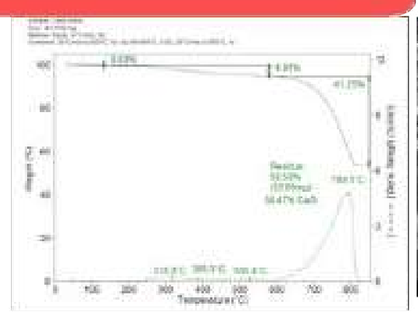
Grinding

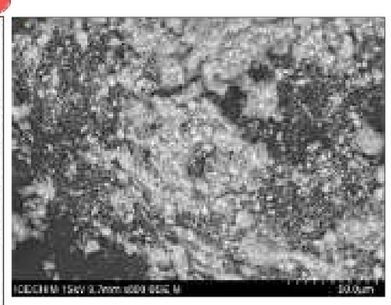
Used as CaO precursor in phosphatic material synthesis

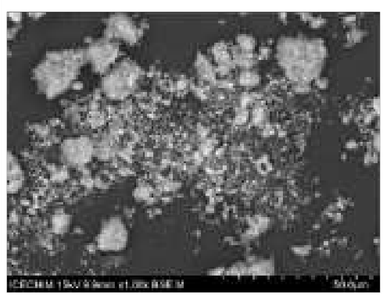
Obtained materials:

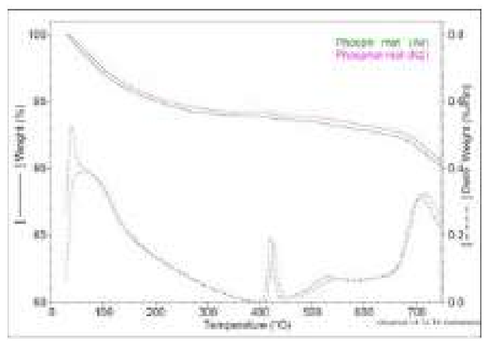
- Bio-derived phosphatic material/Cu
- Bio-derived phosphatic material/Co

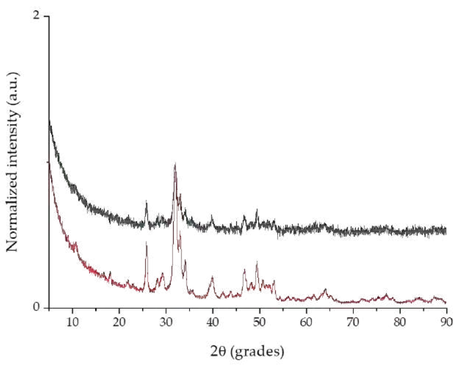
Characterization



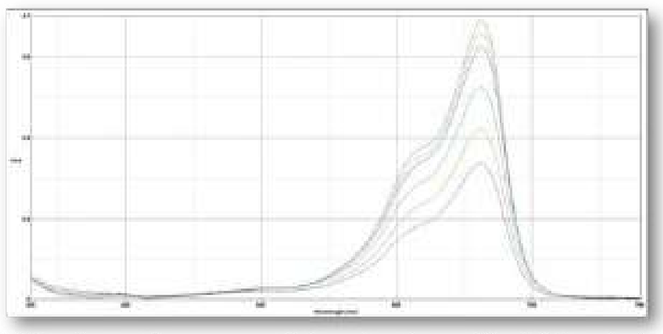




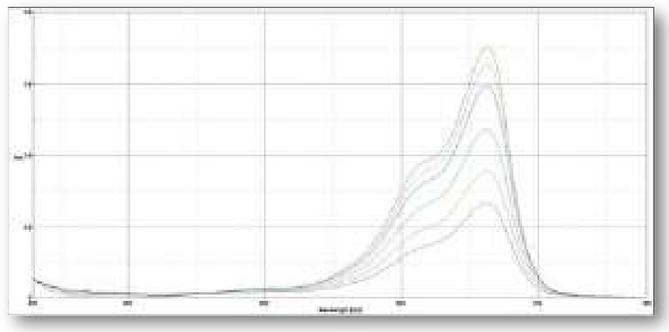




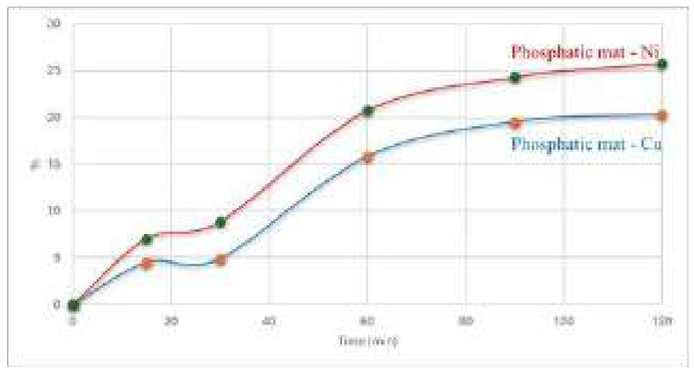
Applications



MB photodecomposition in time (0–120 min) using coatings containing: Phosphatic material-Cu



MB photodecomposition in time (0–120 min) using coatings containing: Phosphatic material - Ni



Photodecomposition degree of methylene blue using coatings containing phosphatic materials

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ADVANTAGES

- **A method to capitalize food (clams) wastes into value-added compounds**
- **A rapid method for decorating the phosphatic material**
- **Efficient in the removal of organic pollutants**
- **An easy method to practically use the decorated materials**
- **Easy scalable to industrial production**

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REINFORCING CONCRETE WITH RECYCLED PLASTIC WASTES

PhD Thesis

Author/s: Andrei-Mihai BACIU, Imre KISS

B

SOLID WASTE is one of the many factors that negatively affect the environment. The PLASTIC is an important type of solid waste with a strong environmental impact, all types of plastic used in daily life becoming, sooner or later, waste. Therefore, increasing consumption of various types of plastic products is one of the most important challenges in environmental protection. From different perspectives, WASTE REUSE is important because it helps to recycle in the production process, reduces environmental pollution, and helps sustain and conserve non-renewable natural resources.

On another hand, many constructions require precise techniques and technologies that can utilize a number of new materials. Also, the lightweight building material industry is considered useful in promoting reused materials. In this context, the use of SIMPLE CONCRETE and REINFORCED CONCRETE is somewhat restricted by specific phenomena such as: cracking, fire resistance, shrinkage, shock resistance, wear resistance, durability, etc. For this reason, an improvement in the performance of the concrete can be obtained by adding in their mass of reinforcements dispersed in the form of fibres from different materials. The DISPERSED REINFORCED CONCRETE results in the inclusion of a variable amount of DISCONTINUOUS FIBRES in the concrete mass. These fibres can be of different types and sizes and have different properties. This type of reinforcements has become a major research subject in recent years.

Therefore, using plastic waste in the materials industry is an environmental solution to minimize the proportion of landfills used in waste incineration. REUSING PLASTICS as concrete additives could also redirect old water and soda bottles, the bulk of which would otherwise end up in a landfill. Research has focused on the impact of adding plastic material to fresh and hardened concrete. This study aims to investigate the use of POLYETHYLENE TEREPHTHALATE (PET) WASTES in concrete.

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POSSIBILITIES FOR VALORIZATION OF IRON ORE WASTE IN INDUSTRY

PhD Thesis

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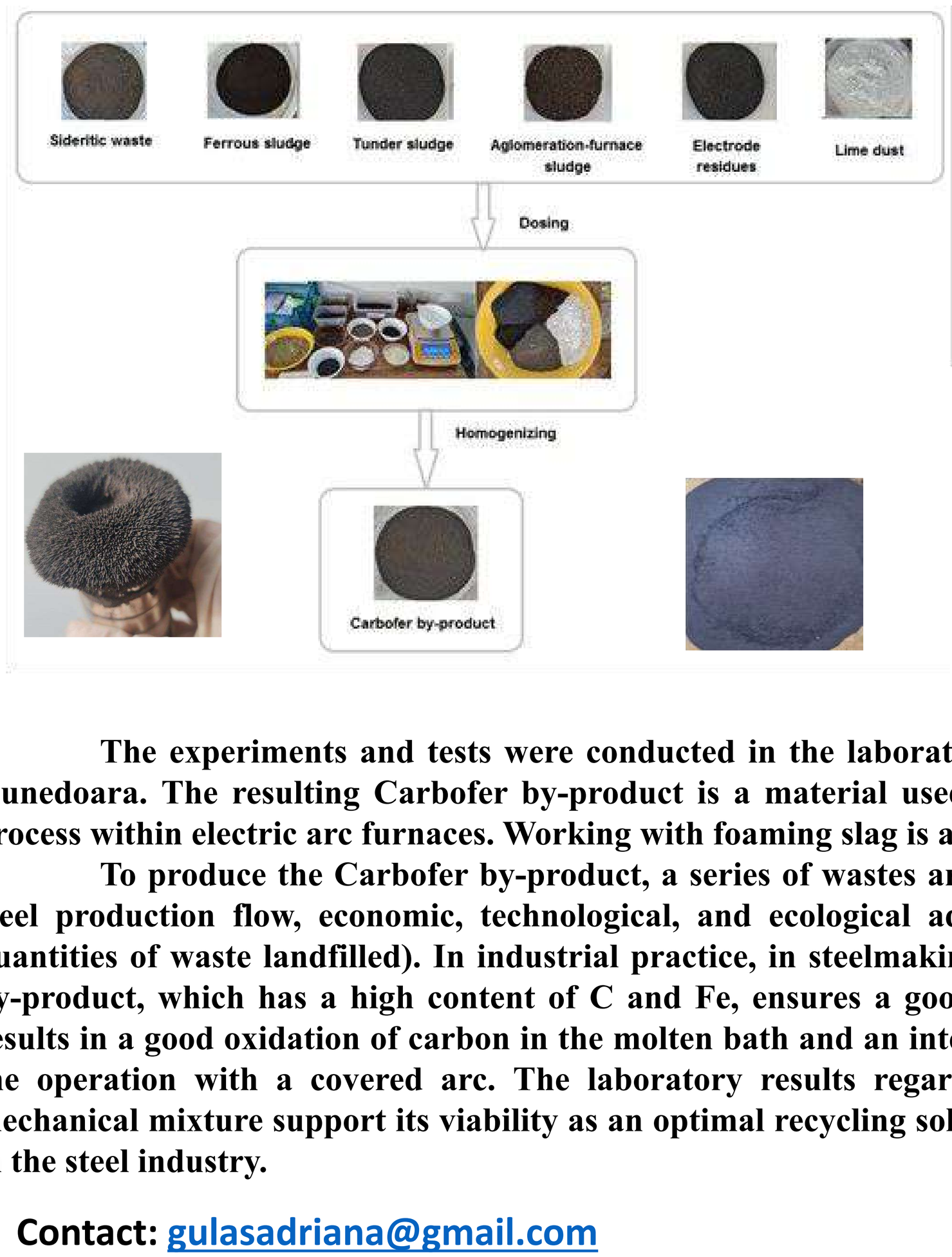
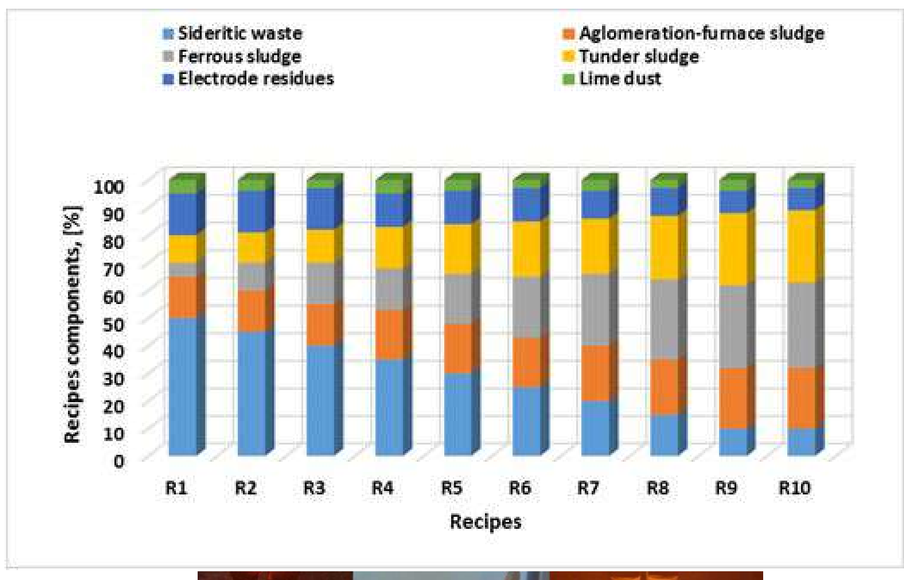
The Carbofer process represents a viable solution for utilizing powdery wastes (tailings from the mining industry, sludges and dust from the steel industry, slags resulting from secondary steel treatment, etc.) generated by the steel and mining industries. The steel industry produces significant quantities of powdery wastes rich in iron and carbon, a substantial portion of which is still being landfilled. Some of these wastes can be successfully used to produce the Carbofer by-product. This product is used as a foaming agent for slag in steel production, thereby recycling the waste in a manner that is environmentally, technically, and economically sustainable. The Carbofer product is also effectively used in blast furnaces for pig iron production.





The experiments and tests were conducted in the laboratories of the Faculty of Engineering in Hunedoara. The resulting Carbofer by-product is a material used for slag foaming in the steelmaking process within electric arc furnaces. Working with foaming slag is a common practice in electric furnaces.

To produce the Carbofer by-product, a series of wastes are used. By reusing these wastes in the steel production flow, economic, technological, and ecological advantages are obtained (reducing the quantities of waste landfilled). In industrial practice, in steelmaking aggregates, the use of the Carbofer by-product, which has a high content of C and Fe, ensures a good dissolution of FeO in the slag. This results in a good oxidation of carbon in the molten bath and an intense foaming of the slag, thus ensuring the operation with a covered arc. The laboratory results regarding the production of the Carbofer mechanical mixture support its viability as an optimal recycling solution for the analyzed powdery wastes in the steel industry.

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NEUTRALIZATION DEVICE WITH LIQUID JET OF IMPROVISED EXPLOSIVE DEVICE (DNJLDEI)

Patent/project number: CBI A 2023 00178

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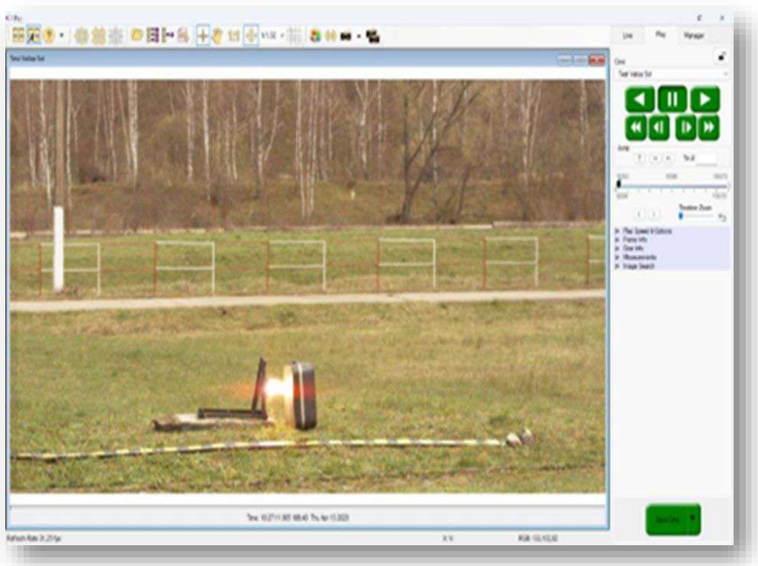
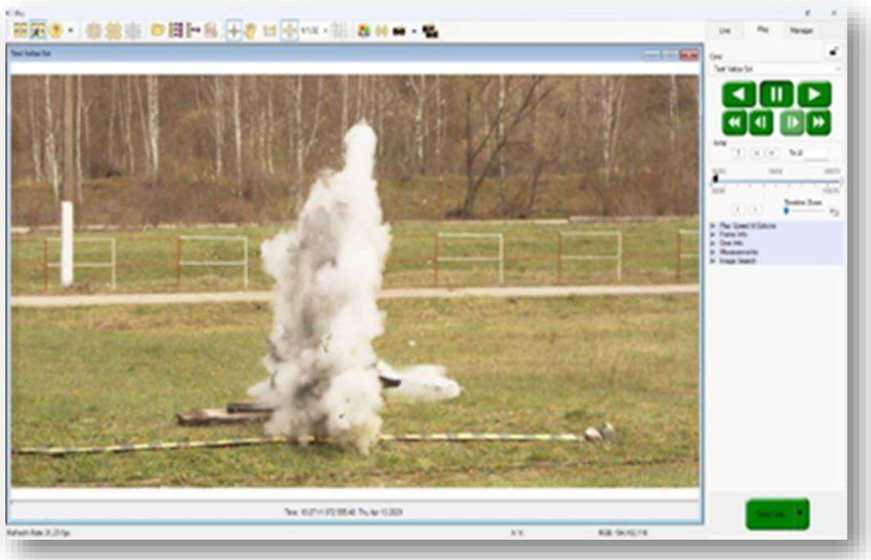
The invention relates to a neutralization device with liquid jet of improvised explosive device (DNJLDEI), by propelling a quantity of liquid at high speeds, over 500 m/s, in the direction of the target, DEI explosive device with the help of low-explosive charges, detonated remotely. The device, consists of an assembly consisting of a reinforced metal base (mortar), provided with a carrying handle, a base that has an adjustable frame, with perforated arms and fixing screws to various degrees of inclination (from horizontal to vertical working position), having a centrally positioned cylindrical plug (reinforced around the perimeter and at the bottom) for mounting the specially shaped plastic container (cylinder equipped with legs and fixing disc with both flat closing surfaces or with one flat end and one hemispherical end), removable container, with a threaded cap, in which there is a volume of liquid, as well as a reduced charge of plastic explosive, moulded on the lower surface of the dry compartment intended for it, into which an electric detonating staple is inserted for initiation, connected to a detonator operated by an operator from a safe distance.





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AUTOMATED TEST STAND FOR EVALUATING OXIDATION RESISTANCE AND THERMAL SHOCK OF THERMAL BARRIER COATINGS

Patent A/00129

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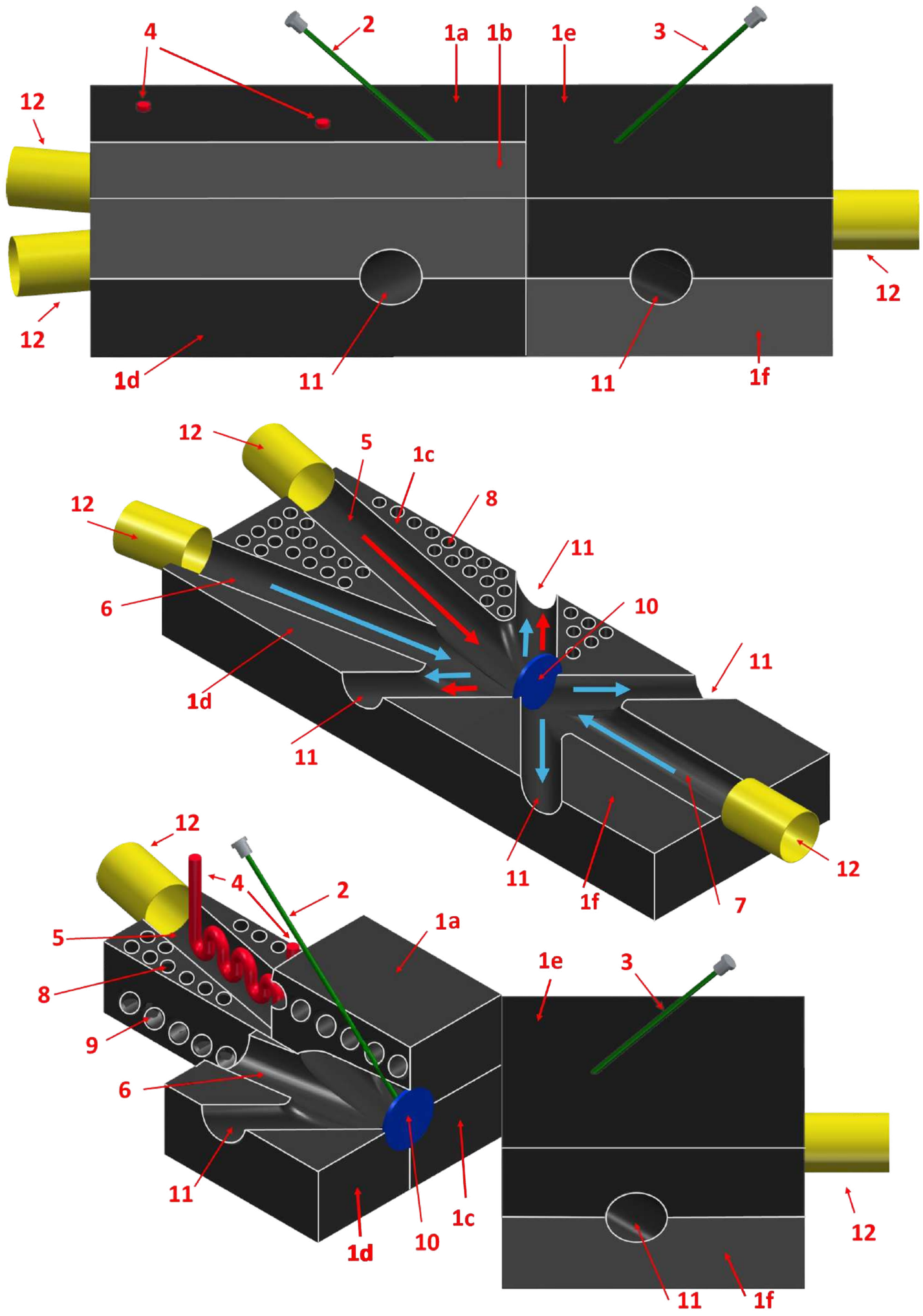
An automated stand for oxidation and thermal shock testing of thermal barrier coatings is built using six graphite blocks (1 a-f). It includes a heating channel (5) with an electric heating element (4) and cooling channels for both the sample (6) and substrate (7). The design also incorporates hot/cold exhaust channels (11), contact thermocouple holes for monitoring sample (2) and substrate (3) temperatures, and a sample positioning slot (10). Additionally, energy recovery channels (8-9) and three ventilation systems (12) ensure adequate hot and cold air flow.

Advantages

- ✓ The automated stand allows thermal barrier coatings to undergo thermal shock and oxidation testing across a wide temperature range, from 23°C to 1600°C. It simulates realistic operating conditions while providing substrate cooling.
- ✓ The stand's long lifespan is ensured by the absence of mechanical or heat-sensitive components.
- ✓ The stand offers high energy efficiency thanks to the vertical and horizontal heat recovery channels located around the electric heating element.
- ✓ Allows for determining coating efficiency by tracking temperature changes on the substrate throughout the process, in correlation with the initial temperature.
- ✓ The automated stand provides precise and controlled cooling of the layer and substrate by adjusting airflow based on the temperature readings from the thermocouple.
- ✓ The permanent contact thermocouples allow for precise temperature measurements of both the sample layer and the substrate.
- ✓ The system provides automated precision testing along with remote control features. In a safe remote testing mode, the test can be halted by simply disconnecting the power source.



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Root Cause Analysis of a Heat Exchanger Failure

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Mentors: **Dr. rer. nat. Gabriela Marginean, Prof. Dr.-Ing. Klaus Mecking, M. Eng. Dino Woelk**

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1. Problem & Investigation Methods:

A heat exchanger showed leakage at the fixed bearing shortly after commissioning. A transverse crack, propagating from the outside inward, was identified. To determine the root cause, we conducted dye penetrant inspection, laser scanning microscopy, microstructural analysis (SEM), hardness testing, and mechanical design evaluation on the sample shown in Figure 1.

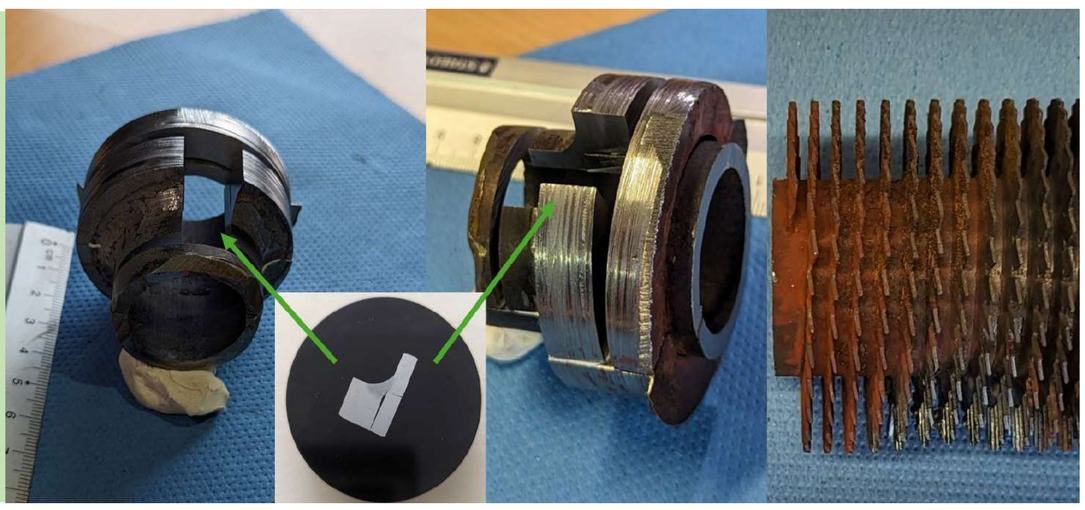


Fig. 1: Sample from the broken pipe

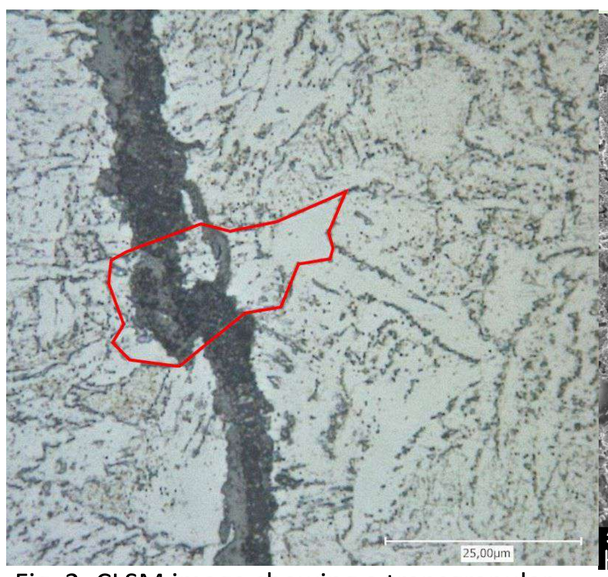


Fig. 2: CLSM image showing a transgranular fracture

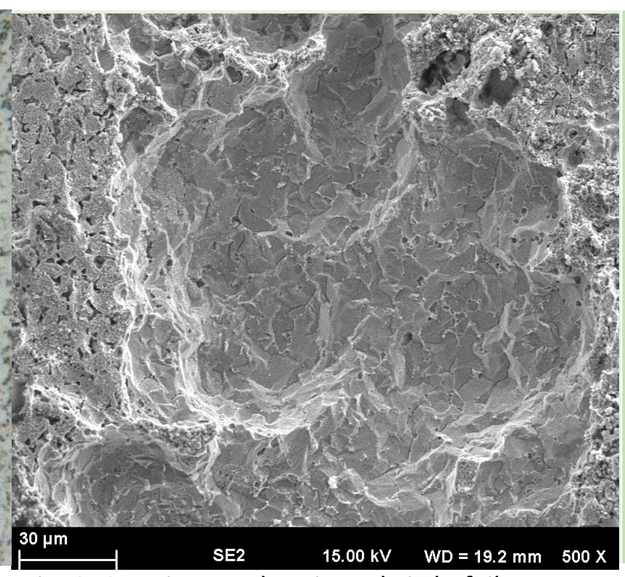


Fig. 3: SEM image showing a brittle failure

2. Crack Characteristics & Material Analysis

The crack exhibited a transgranular fracture (Fig. 2) with intergranular components, indicating a brittle failure. SEM analysis confirmed these characteristics (Fig. 3). This is unusual for the pipe material, which suggested that increased hardness played a significant role in the crack formation.

3. Hardness & Welding Impact

Vickers hardness testing (Fig. 4) confirmed significantly higher hardness in the weld's heat-affected zone (HAZ). This excessive hardness increased brittleness, accelerating crack propagation despite not being the primary cause.

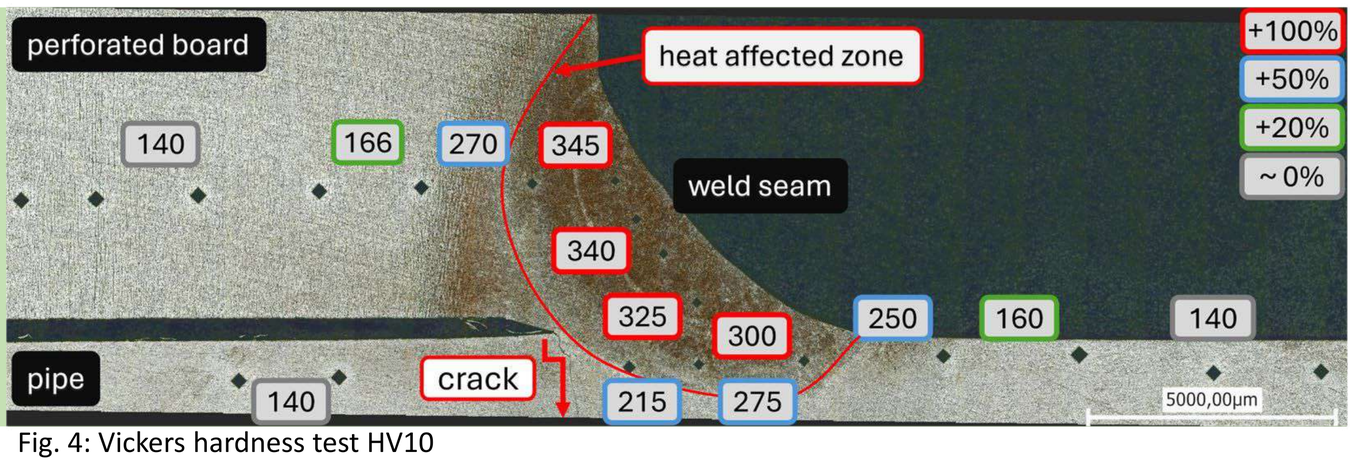
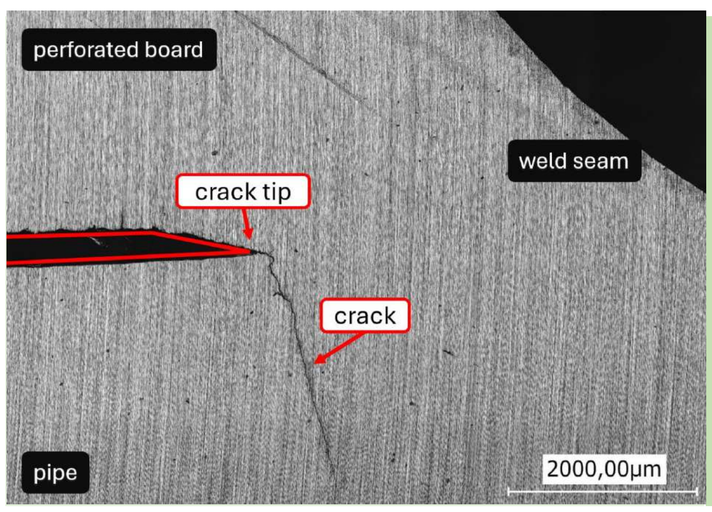


Fig. 4: Vickers hardness test HV10



4. Mechanical & Design Weaknesses

The investigation of the design revealed two major structural flaws. First, the pipe was welded off-center to the tube sheet, causing uneven stress distribution and localized overloads. Second, the crack originated at the sharpest point of the structure, where stress was highly concentrated (Fig. 5). This suggests that the extreme stress at this location was the primary factor in the crack initiation and subsequent failure.

Fig. 5: Construction of the crack tip

5. Conclusion & Prevention

The crack likely originated from extreme stress concentration at the sharpest point of the structure, making it the most vulnerable to failure. While excessive weld hardness and misalignment may have contributed, they are not the primary cause. To reduce risks, minimizing sharp geometries and optimizing welding processes to lower hardness could improve structural integrity.

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6th International Exhibition
INVENTCOR
3-5 April 2025 – Deva, Romania

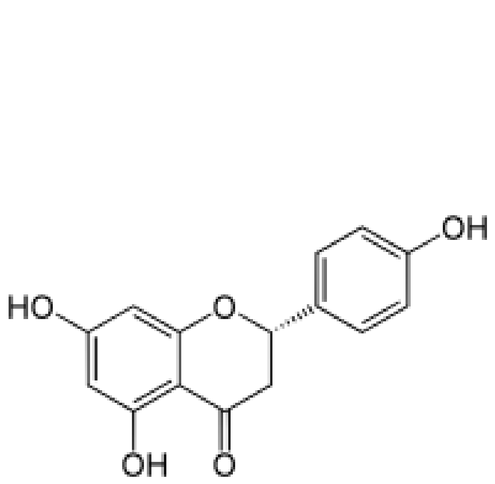
Green method for obtaining silver nanoparticles-based dispersion using naringenin as reducing agent

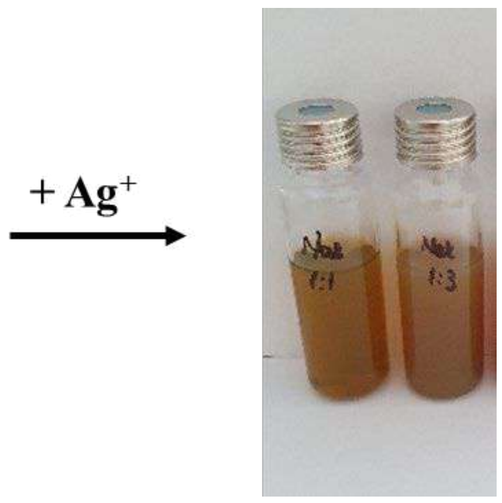
Patent A/00635/31.10.2023 Core Program TEX-PEL-CHALLENGE 2026, Project number PN 23 26 01 04, acronym Tex4Age

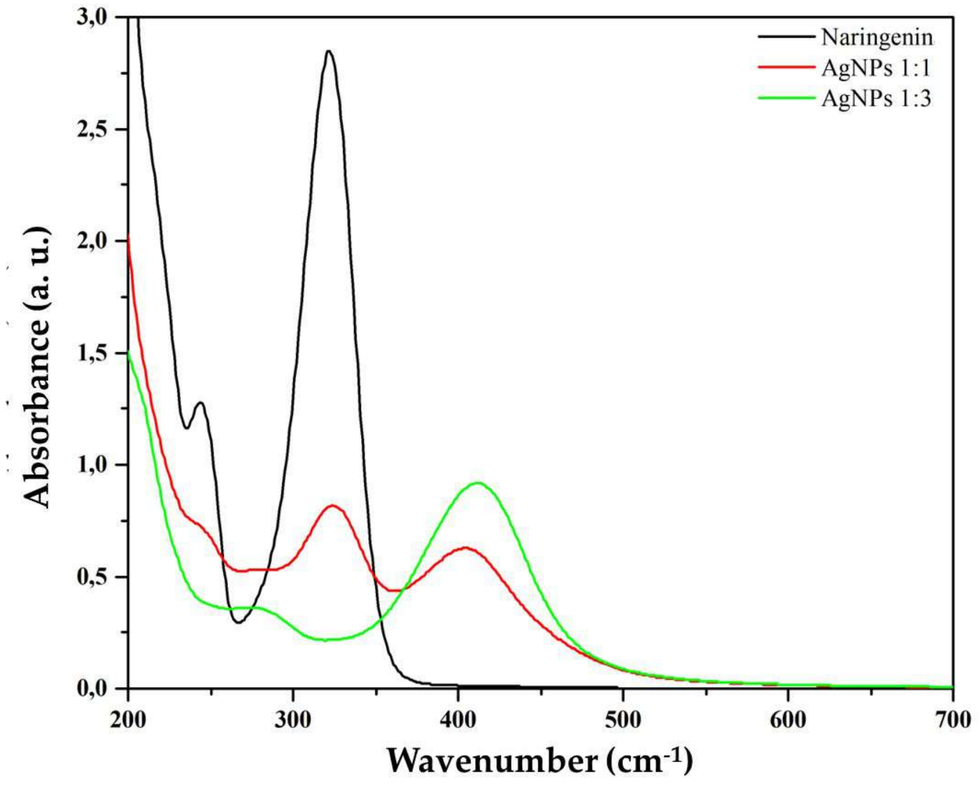
B

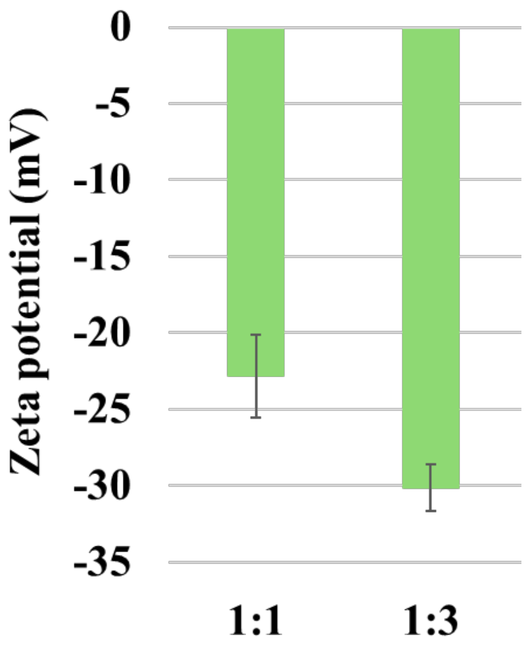
Authors: Lite Mihaela-Cristina, Chirilă Laura, Popescu Alina

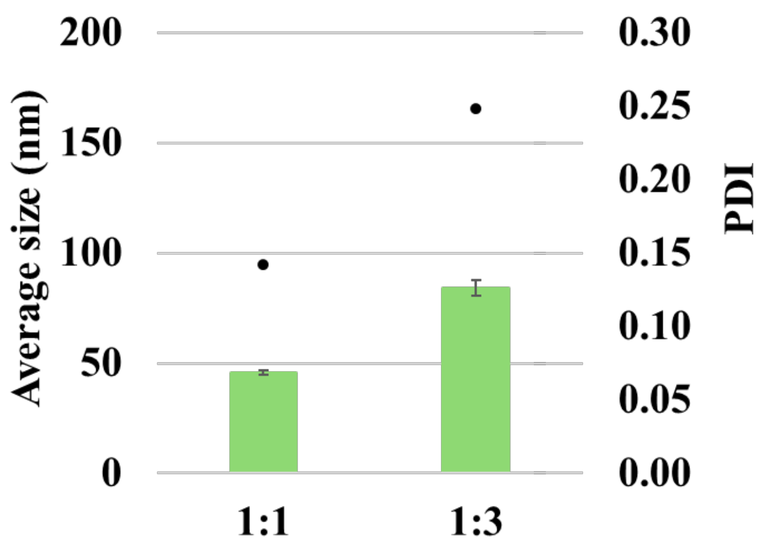
The method refers to an ecological process for producing silver nanoparticles in a stable dispersion, using the flavonoid compound called naringenin. The obtained dispersion exhibits antibacterial properties, demonstrated when deposited on textile fabrics (cotton and wool). The advantages of the invention include reduction of toxicity, environmental-friendly reducing agent, constant chemical composition, reproducibility of the synthesis, accessibility, ecological raw materials, without toxic potential for human or animal health, simple technological process, without additional stages of purification, extraction or filtration of the raw material.

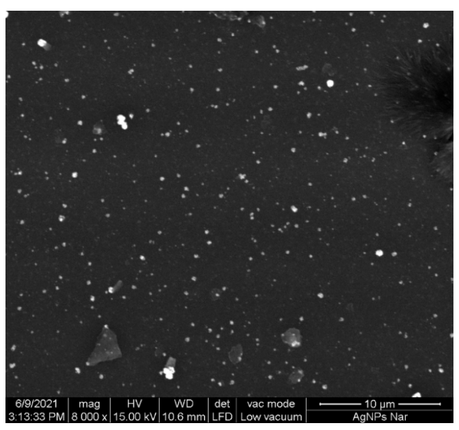


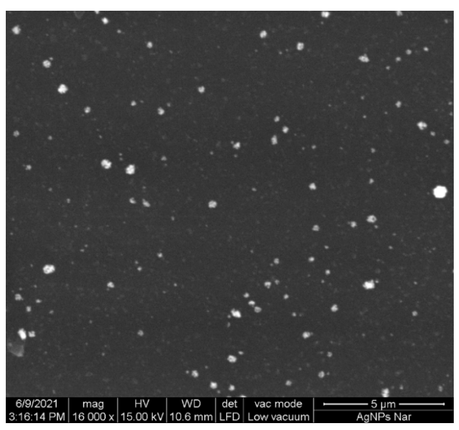












Bacterial strain	*S. aureus*		*E. coli*		*B. subtilis*	
Textile material	Initial inoculum concentration T_0=1x10^5 [CFU/mL]					
	CUF/mL after 24 h	R (%)	CUF/mL after 24 h	R (%)	CUF /mL after 24 h	R (%)
Cotton	6	99,87	9	99,84	4	99,93
Wool	15	99,67	18	99,68	0	100,00

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Comparison of Wear Resistance of Thermally Sprayed WC-Co-Cr Coatings from Recycled Powders and Conventional WC-Co-Cr Coatings

Patent/project number: Master's thesis

B

Author/s: Dino Woelk and Dr. Gabriela Marginean

In addition to the ever-increasing demands in the industry, environmental aspects and human health are coming to the forefront. Not only in Germany but also at the European level, regulations are being enacted that industrial companies must adhere to. For instance, primary energy consumption is expected to be reduced by 80–95% by 2050 to achieve the desired climate goals [1], [2].

Various strategies are being pursued in the field of thermal coating. Among them is the recycling of filter dust. By using these materials, less new raw material is required (conserving resources), and transport routes are eliminated, reducing overall energy consumption [3].

Figure 1 presents a comparison between a coating made from filtered cermet material (GC), which primarily consists of WC-Co-Cr, and a conventional WC-Co-Cr coating, which appears significantly more homogeneous. The high-velocity oxy-fuel (HVOF) spraying process was used for coating. The EDX mapping in Figure 2 shows that the chemical composition of the GC coating is diverse and, in addition to carbides, also contains oxides.

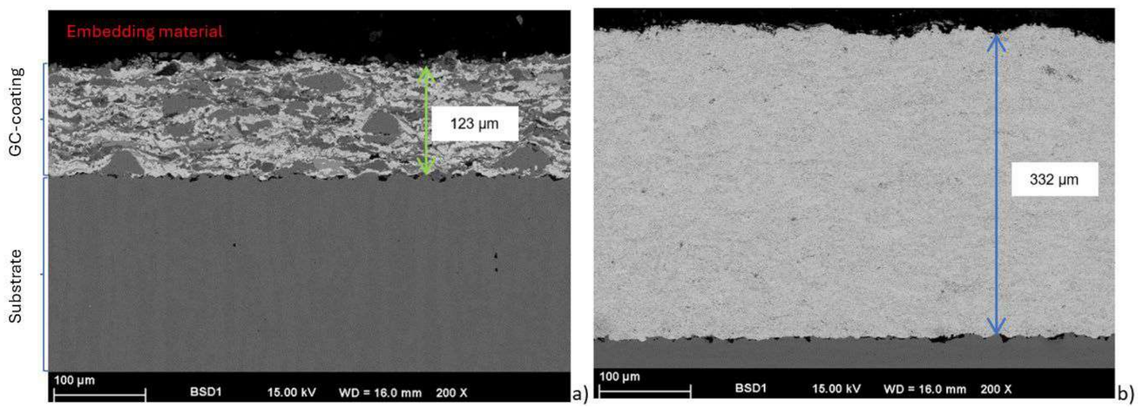

Figure 1: SEM cross-sectional images at 200x magnification in BSE mode: (a) GC coating and (b) WC-Co-Cr coating for overview purposes.

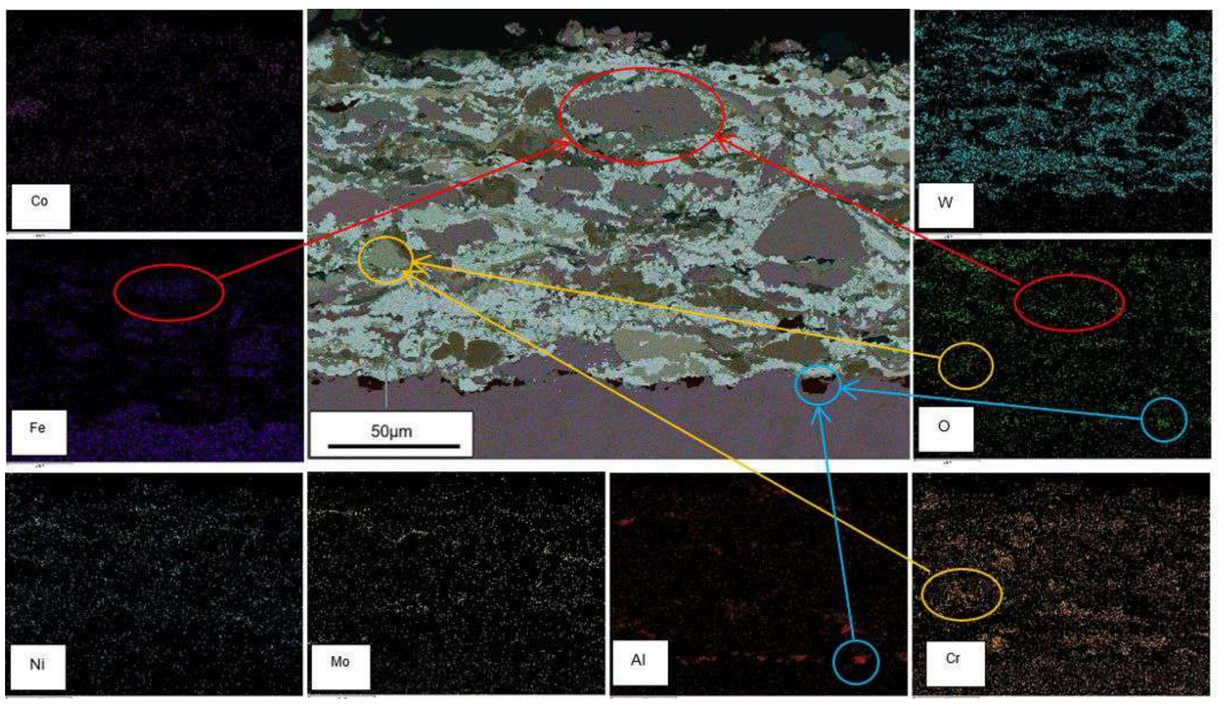

Figure 2: SEM cross-sectional image of a GC coating at 500x magnification; EDX mapping with individual electron images.

Hardness measurements were conducted using both nanoindentation (with loads in the mN range) and the Vickers method. The results are compared in Figure 3. Due to the higher applied load in the Vickers method, an average hardness value for the coatings is determined, leading to a lower standard deviation.

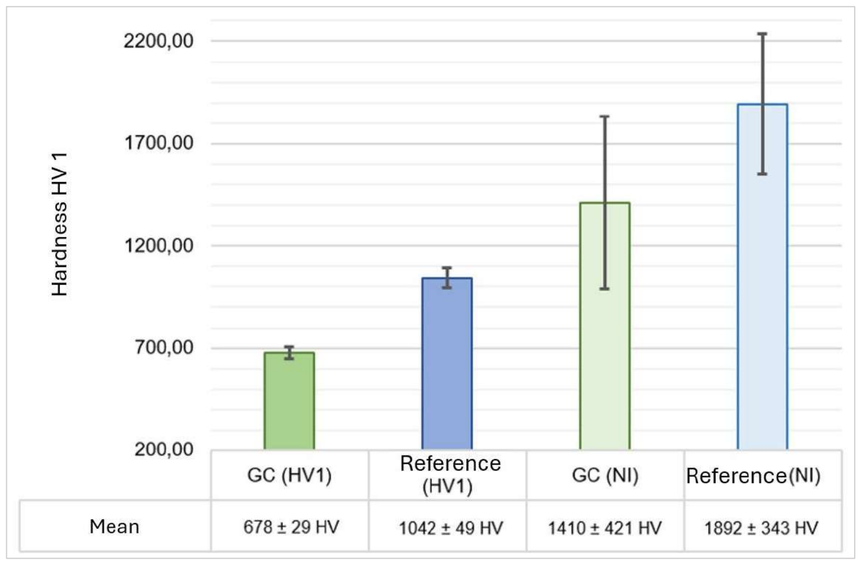

Figure 3: Bar chart of mean values and standard deviations for HV1 and NI converted to HV.

In addition, nanoindentation allowed for the determination of the elastic modulus, as shown in Figure 4. The elastic modulus of the GC coatings is significantly lower, which also indicates a higher tendency for crack formation. This tendency is markedly greater in the GC coatings compared to the reference coatings. However, the test did not result in the delamination of the GC coatings.

Figure 5 reveals that the friction coefficient of the GC coatings is significantly higher than that of the reference coatings and has a longer run-in phase. However, both coatings reached a steady-state condition within the measurement interval.

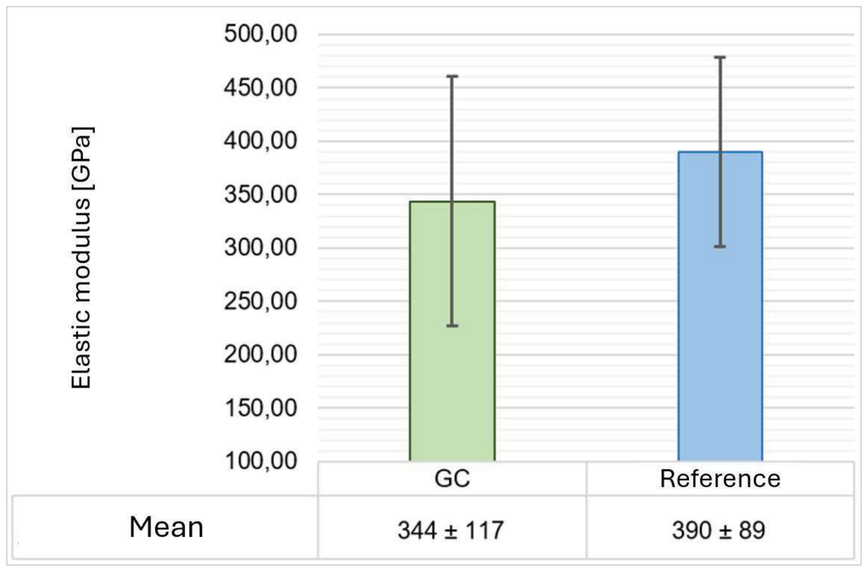

Figure 4: Bar chart of the averaged elastic modulus for the GC and reference coatings.

Conclusion:

The GC coatings exhibit significantly lower performance compared to the reference coatings in terms of mechanical and tribological properties. However, due to their hardness and stability against crack propagation, GC coatings provide sufficient wear protection for standard applications.

Figure 5: CLSM image at 50x magnification, crack tendency test of a GC coating (Brinell indenter Ø 2.5 mm; test load 31.625 kp).

References:

[1] Xi Tan, Jungui Zhang, Huichao Zhu, Zhongcheng Zhang, Xiagao Zhu, Weibang Ni, Tongyi Li, Tongchun Kuang, Hongliang Dai, Xiaofeng Zhang, "Double layer HVAF-sprayed WC-CoCr coatings for optimal properties," Ceramics International, 2022, doi: 10.1016/j.ceramint.2022.07.349.

[2] Tobias Schmeja et al., "Klimaschutzplan 2050 - Klimaschutzpolitische Grundsätze und Ziele der Bundesregierung - Diskussionsbeitrag des Umweltbundesamtes," Umweltbundesamt, 2016.

[3] European Commission, Directorate-General for Environment, "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions," Document 52020DC0474, 2020.

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C

Computer sciences

Electronics

Electrical engineering

TEST STAND FOR IGNITING THE EXPLOSIVE DUST/AIR ATMOSPHERE BY CAPACITIVE ELECTROSTATIC DISCHARGES

C

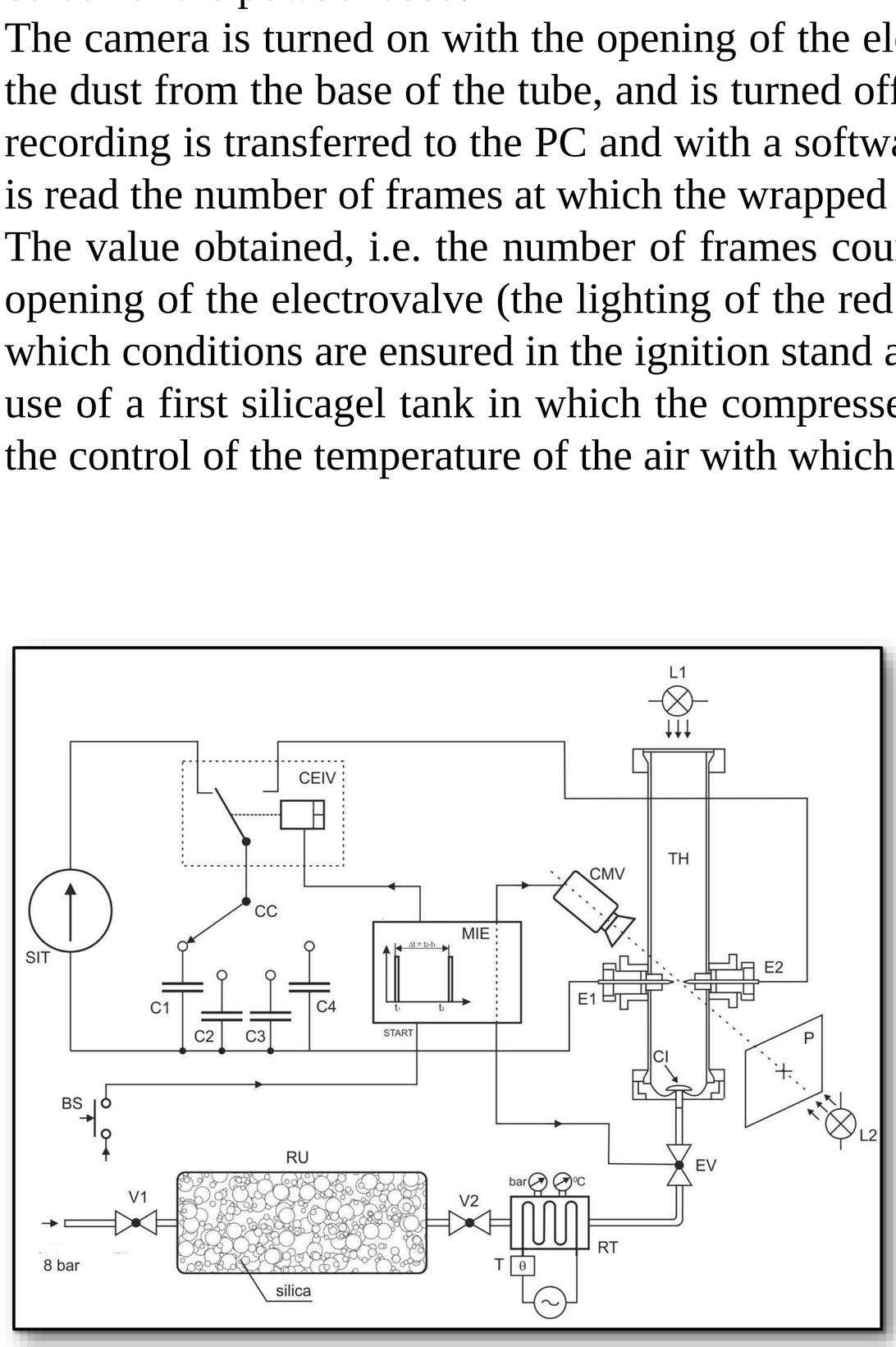
Patent number: A 134260/2025

Author/s: *Gabor Dan Sorin, Găman George Artur, Ghicioi Emilian, Pupăzan Daniel, Darie Marius, Lucian Moldovan, Irimia Alin, Vătavu Niculina, Părăian Mihaela, Magyari Mihai, Grecea Dănuț Nicolae, Csaszar Tiberiu Atila, Jurca Adrian Marius, Păun Florin Adrian, Colda Ioan Cosmin.*

The test stand for ignition of the explosive dust/air atmosphere by capacitive electrostatic discharge uses an explosive test mixture of air and combustible dust. The mixture must have a concentration that is between the lower explosion limit and the upper explosion limit, which is ignitable by an electrostatic discharge. The stand optimises the initiation process of the dust/air explosive atmosphere by accurately determining the delay between the start of dust clouding and the moment of electrostatic discharge and by providing test conditions similar to those in industrial environments. The solution to optimise the dust/air explosive atmosphere initiation process is to mount a high-speed video camera capable of recording 1000 frames per second and transferring the images to a PC. The camera is mounted at the discharge electrodes on one side of the vertical glass tube. On the other side is positioned a screen, white or black depending on the colour of the powder used.

The camera is turned on with the opening of the electrovalve that releases air into the glass tube, air that wraps the dust from the base of the tube, and is turned off after 1000 frames, i.e. after a period of 1000 ms. The video recording is transferred to the PC and with a software that allows the viewing and counting of the video frames is read the number of frames at which the wrapped dust cloud is optimal for initiation.

The value obtained, i.e. the number of frames counted, will be the value in ms of the delay required from the opening of the electrovalve (the lighting of the red LED) and until the generation of the spark. The solution by which conditions are ensured in the ignition stand as close as possible to those in industrial environments, is the use of a first silicagel tank in which the compressed air is dehumidified and a secondary thermostatic tank for the control of the temperature of the air with which the dust will be wrapped.



Contact: dan.gabor@insemex.ro

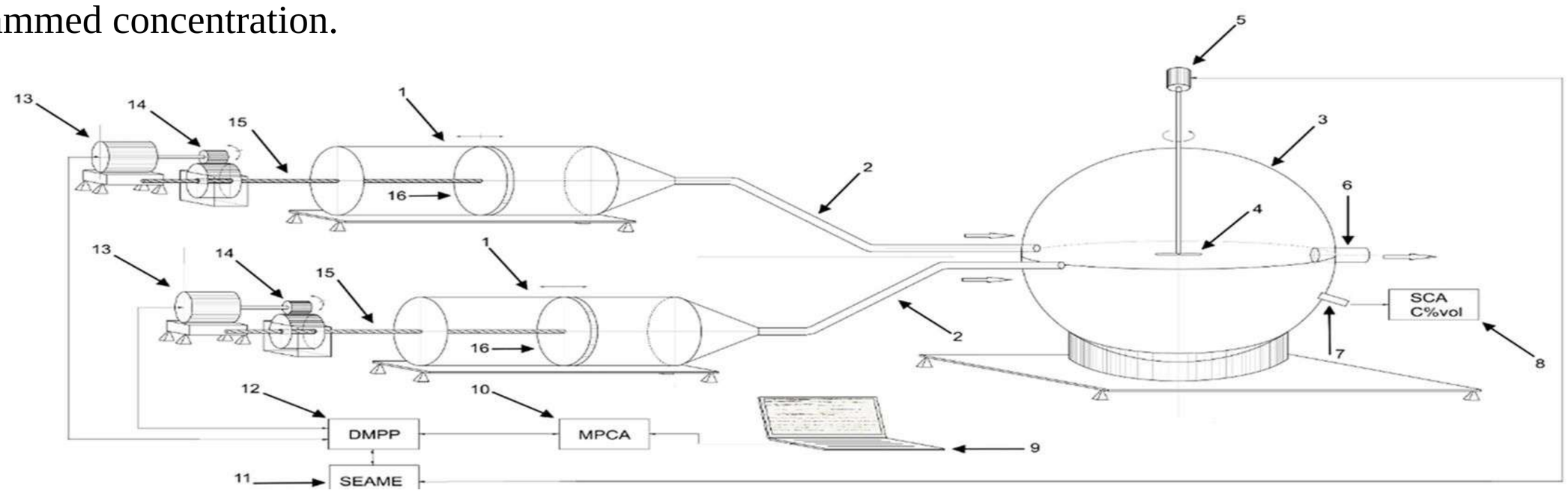
COMPUTERIZED STAND FOR THE PREPARATION OF A MIXTURE OF FLAMMABLE/TOXIC/ASPHYXIATING GASES

C

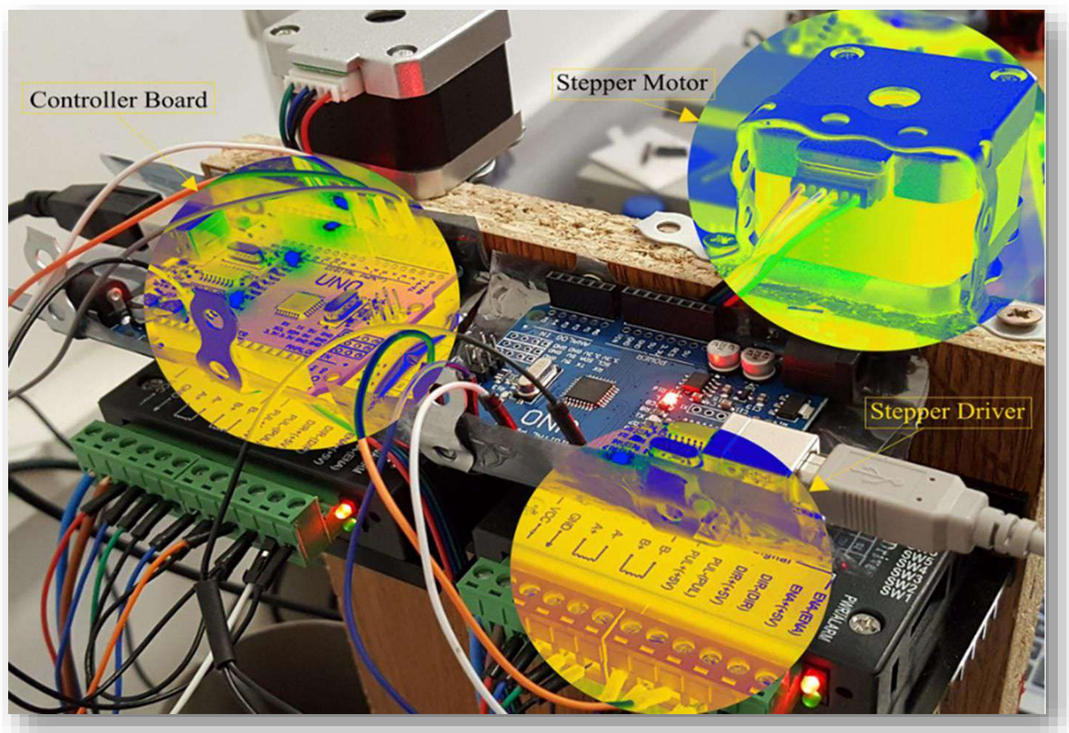
Patent number: 134944/2025

Author/s: *Șimon-Marinică Adrian Bogdan, Găman George Artur, Ghicioi Emilian, Pupăzan Gheorghe Daniel, Găman Angelica-Nicoleta, Păsculescu Vlad Mihai, Vlasin Nicolae-Ioan, Laszlo Robert, Burian Constantin Sorin, Florea Gheorghe-Daniel, Prodan Maria, Cioclea Doru, Șuvar Marius Cornel, Vass Zoltan, Moldovan Lucian, Simion Alexandru Florin*

The invention relates to a computerized stand for the preparation of a mixture of flammable /toxic/explosive gases, with the purpose of obtaining gas mixtures at concentrations in the explosive range. The operating principle of the stand is based on mixing two volumetric flows, controlled by programmable microprocessors, at which the gases are stored and circulated at atmospheric pressure with the aid of cylindrical injectors, driven by stepper motors so that the gas circuit does not require valves and at the outlet there is a homogenization chamber with agitator and dedicated flammable/toxic/explosive sensor to confirm the programmed concentration.



Inside the injector cylinders [1] we can find gases A and B at a known concentration. The initial volume of the cylinders being 10 cubic decimeters with an inside diameter of 1 decimeter, were the gases flow into the circuit without valves [2] and reach into the homogenization chamber [3], where the agitator propeller [4], driven by an electric motor [5], performs the homogenization. Then the mixture is discharged for use through the outlet nozzle [6], at the required concentration verified with the sensor [7], which transmits a signal to the mixture concentration display system [8].



This concentration value is first programmed by means of the computer [9] communicating unambiguously with the microprocessor [10] for the control of the mixer, respectively the control of the driver [12] and stepper electric motors [13], which are supplied with electricity from the multiple electric source [11]. With the help of mechanical couplings [14] and the mechanical assembly [15] the rotational motion is transformed into a translation motion so that the actuated injectors pistons [16] are actuated to obtain the discharged volumes, according to the predetermined calculation program, introduced into the mixing and homogenization chamber.

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BELGRAND ScoreMaster
Integrated Sports Event Management System

Patent/project number: 091103/2026

Author: Milan Aleksić / Savez inovatora Republike Srpske / Republika Srpska - Bosnia and Herzegovina

C

SR/ BELGRAND ScoreMaster je savremeni softversko-hardverski sistem namijenjen upravljanju sportskim semaforima, obradom rezultata i digitalnom prezentacijom sportskih događaja u realnom vremenu. Sistem povezuje LED displeje, kontrolne uređaje i aplikacije u jedinstvenu platformu koja omogućava precizno, pouzdano i vizuelno atraktivno vođenje takmičenja.

Ključne funkcionalnosti:

- **Prikaz rezultata i vremena u realnom vremenu**
- **Automatsko generisanje statistike I zapisnika**
- **Upravljanje LED semaforima i video displejima**
- **Prikaz animacija, obavještenja i sponzorskog sadržaja**
- **Mrežno povezivanje više sportskih objekataIntegracija sa TV prenosima i medijskim sistemima**
- **Podrška za više sportova (fudbal, košarka, odbojka, rukomet, tenis i dr.)**

BELGRAND ScoreMaster unapređuje organizaciju takmičenja, smanjuje mogućnost greške i podiže nivo vizuelne komunikacije sa publikom, čineći sportski događaj tehnološki savremenim i profesionalno vođenim. Sistem je namijenjen stadionima, sportskim dvoranama, školskim salama, sportskim centrima i organizacijama koje zahtijevaju pouzdano upravljanje takmičenjima i digitalnom infrastrukturom.

EN/ BELGRAND ScoreMaster is an advanced software-hardware solution designed for scoreboard control, results processing, and real-time digital presentation of sporting events. The system connects LED displays, control units, and applications into a single platform, enabling precise, reliable, and visually dynamic event management.

Key Features:

- **Real-time score and time display**
- **Automatic generation of statistics and reports**
- **Control of LED scoreboards and video displays**
- **Presentation of animations, announcements, and sponsor content**
- **Network connection of multiple sports venues**
- **Integration with broadcast and media systems**
- **Multi-sport support (football, basketball, volleyball, handball, tennis, etc.)**

BELGRAND ScoreMaster improves event organization, reduces the risk of error, and enhances visual communication with the audience, delivering a modern and professionally managed sports experience. The system is designed for stadiums, sports halls, school gyms, sports centers, and organizations requiring reliable competition management and digital infrastructure.

Contact: +387 65 483 960 Ljubiša Pašić, sinrs@blic.net; +387 63 038 722 Milan Aleksić, milan@belgrand.net

PLC-IOT cloud-edge-terminal collaborative communication technology empowers innovative applications of energy interconnection for distribution network users

CAI No. ON04 **C**

Patent No.: *ZL202411698871 5、ZL202310683573 8、ZL202310683591 6、ZL202120983409 5*

Authors: *Pan Lingzhi, Li Shengzhu, Jiang Lian, Meng Qingwei, Wang Xueying, Zhang Yifeng, Yin Chengdong, Liu Xiaoliang, Yang Zheng, Ji Dapeng.*

Company: *State Grid Jilin Electric Power Co., Ltd. Yushu Power Supply Company*

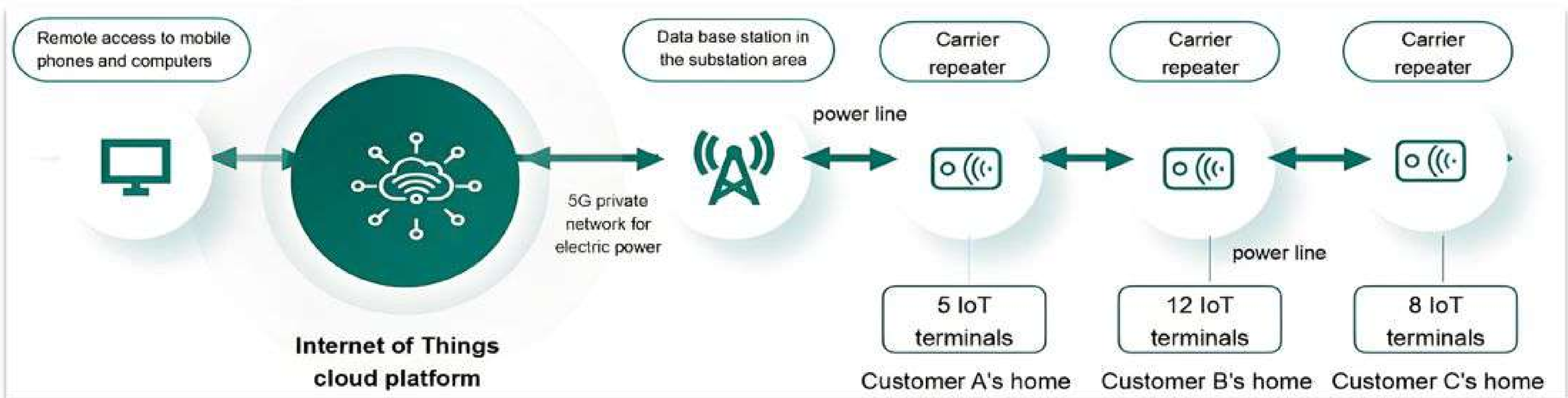
Description :

This project tackles the core bottleneck of load forecasting and peak regulation efficiency constrained by IoT communication gaps in distribution networks. It develops PLC-IoT cloud-edge-end collaborative communication technology to provide critical support for smart grid upgrades.

The system innovatively employs a PLC repeater-enhanced networking architecture, optimized with ant colony algorithm routing to achieve 10-km coverage per transformer substation and 99% data transmission success rate. Its multi-tier security framework and multi-protocol gateway effectively address equipment access challenges and data security vulnerabilities. The plug-and-play smart device solution has been deployed at scale in Yushu City's 99,500 ㎡ electric heating network, resolving critical issues including insufficient transformer substation capacity and unstable heating supply.

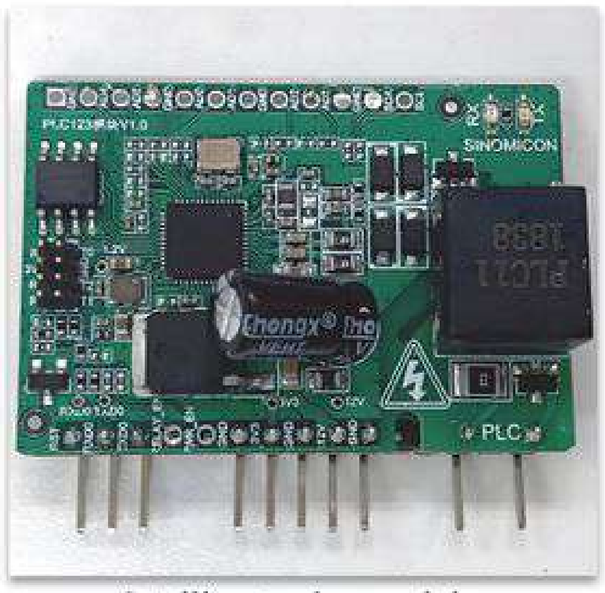
Technically, it has obtained 4 patents and 2 software copyrights, published 3 EI papers, and reached China's leading level in appraisal. Economically, the technology licensing revenue was 1.146 million yuan, saving customers 1.118 million yuan in wiring costs and driving an additional 5.6511 million yuan in grid income. Socially, it replaced 8,324 tons of scattered coal combustion, reduced 27 tons of pollutants, ensured energy supply for people's livelihood, and provided solutions for smart energy in urban and rural areas.

The initiative will be implemented in three tiers—household, neighborhood, and city—leveraging its advantages of no additional wiring and multi-device compatibility to drive development. For residents, it reduces annual electricity costs by 10%-15% while enabling one-touch control of appliances. For society, it provides precise load data to support grid peak shaving and supply assurance, facilitates renewable energy integration, and achieves over 30% annual carbon reduction in urban and rural areas. This serves as a cornerstone for achieving the "dual carbon" goals and advancing the new power system.



PLC-IOT Platform server

Edge data base station



Intelligent relay module

Contact: Tel:0086-15568881696 Email: 346703637@qq.com Website: http://www.sgcc.com.cn/

国家电网公司 STATE GRID CORPORATION OF CHINA

Frequency-Voltage Active Support Technology for Large-Scale Wind Power Integration into Weak Receiving-End Power Grids

CAI No. ON05 **C**

Patent No.: *ZL202310379025.6; ZL202310534248.5*

Authors: *Shen Yangwu; Jin heping; Huang Jiuding; Liu Jie; Guo Mianming; Ning Dezhi; Li Zilin*

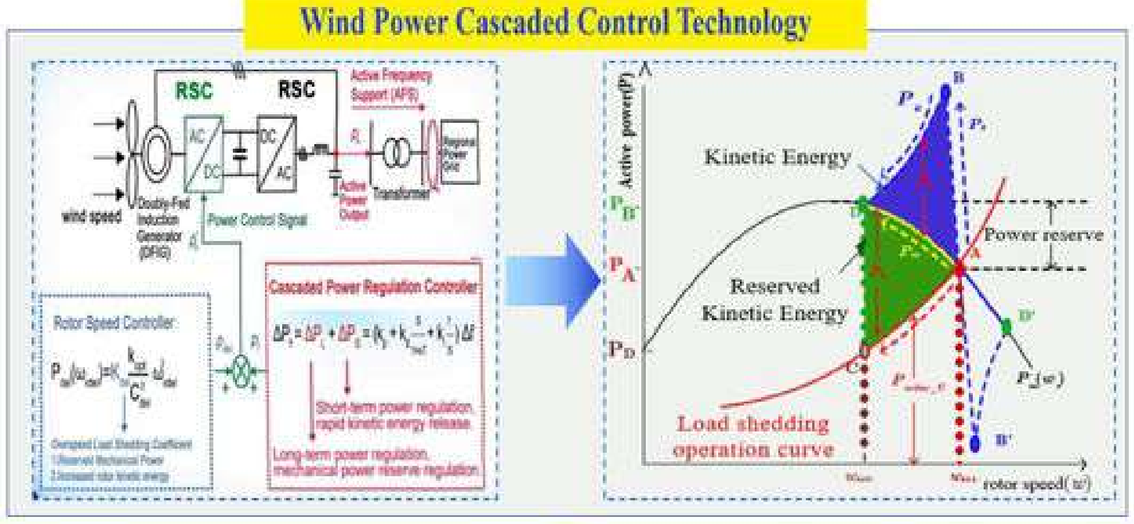
Company: *China Three Gorges Corporation; Dalian University of Technology*

Description

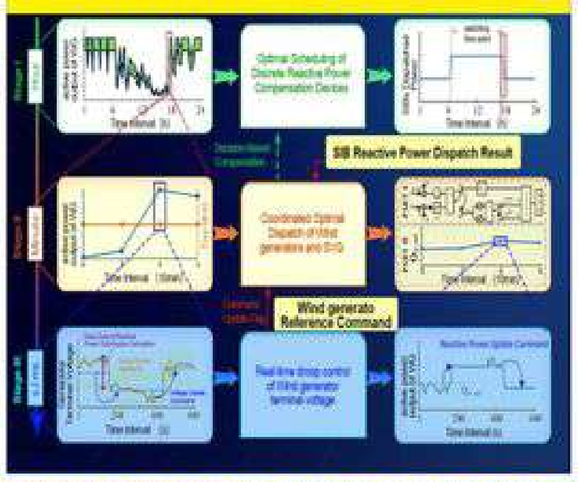
This project has achieved breakthroughs in key technologies, such as plant-regional coordinated voltage control for mountainous wind farms in complex scenarios,active power-frequency cascaded control technology for wind generator to improve system frequency dynamic response, and active robust damping control of wind generator for enhancing system stability. These innovations have significantly strengthened the capability of large-scale mountainous wind farm for supporting grid voltage and frequency regulation, ensuring secure and stable operation of wind farms and regional power grids. The project achievements have been deployed by more than 10 entities, such as State Grid Corporation of China and China Three Gorges Corporation, in over 100 wind farms across Hunan and Sichuan. In the past three yeaes, the project has newly added 5.5 TWh clean electricity, and generated economic benefits exceeding USD 1.02 billion. Its implementation and conversion drive transformation and upgrading of the energy industry structure, so as to meet global demands for enhanced environmental governance, thereby contributing to the goals of carbon peaking and carbon neutrality。

Methodology and Highligts

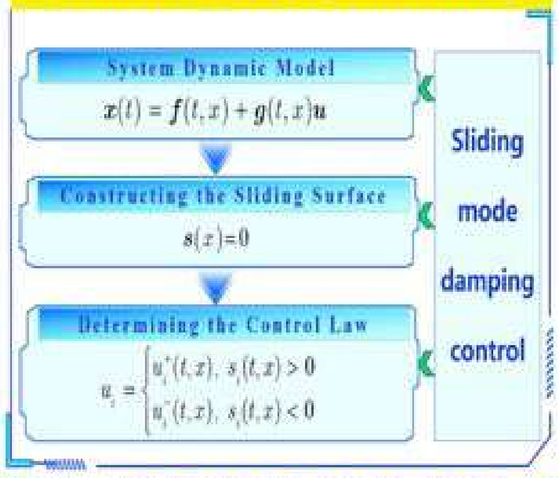
Wind Power Cascaded Control Technology



Multi-level Coordinated Voltage Control Technology



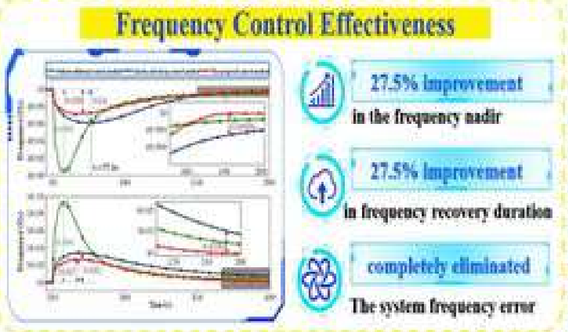
Novel Active Robust Damping Control Technology



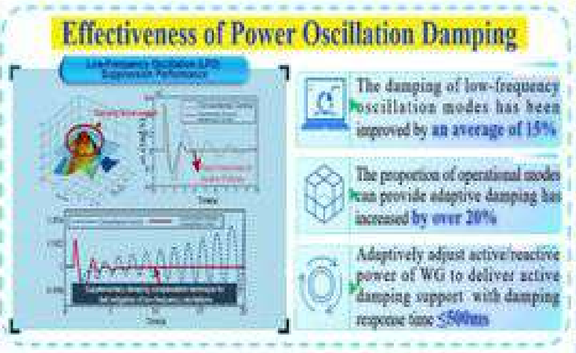
Operational Results

Voltage Control Effectiveness

Frequency Control Effectiveness



Effectiveness of Power Oscillation Damping



Patents and Awards

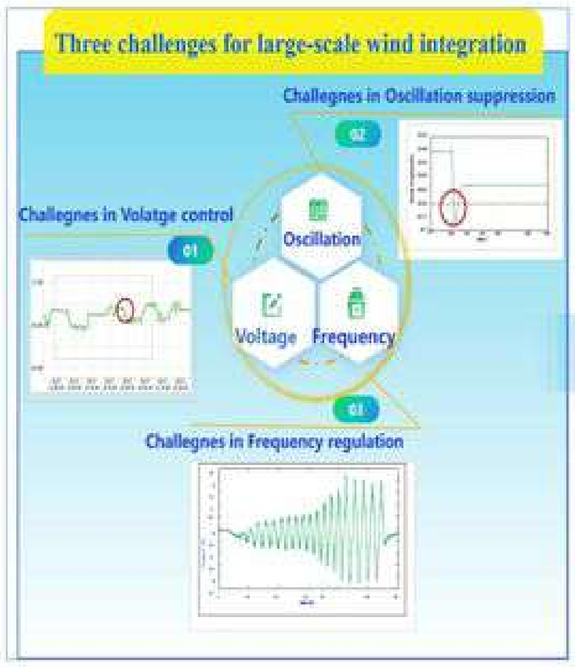
Patents

Papers and Standars

10+ SCI-Indexed Papers | 4+ National/Industry Standars | 3 Achievement Evaluation Report

Impotant honors and awards

Three challenges for large-scale wind integration



Solution

1. **Multi-level Coordinated Voltage Control Technology**
   Resolving Voltage Control Difficulties Caused by Geographically Dispersed Wind Power Disturbances in Regional power Grids.
2. **Wind Power Cascaded Control Technology**
   Addressing Frequency Regulation Challenges in Low-Inertia Regional Power Grids.
3. **Novel Active Robust Damping Control Technology**
   Mitigating Oscillation Suppression Challenges Under Inadequate Damping Resources in Regional power Grids.

Contact: Tel：0086-19918962441 Email：shenyangwu@126.com

中国长江三峡集团有限公司
China Three Gorges Corporation

H4: Key Techniques and Equipments of Guard Model based Sensing High-hidden Threats in Electric Power Network

Patent No.: *ZL202311244021.3*

CAI No. 01 **C**

Authors: *Zhihong Tian, Rixuan Qiu, Yuan Liu, Ruixiang Fan, Peijing Cai, Na Cao, Zhibin Zheng, Chenyuan Zhang, Zhiyuan Luo, Chunjiao Huang, Sitong Jing.*

Company: *State Grid Jiangxi Information and Telecommunication Compa-*

Description :

Cyber attacks, especially those orchestrated through Advanced Persistent Threats (APT), are distinguished by their profound levels of stealth, sophistication, and endurance, presenting formidable challenges to global cybersecurity efforts. Traditional defense mechanisms often focus on preventing system breaches, which can be insufficient against such advanced threats. In contrast, our approach introduces a novel defensive paradigm—the safeguard mode. This strategy emphasizes the early detection of attackers through covert and deceptive techniques, enabling the protection of the victim system by identifying and neutralizing potential threats before they can inflict harm. This proactive and preemptive defense mechanism not only enhances system security but also shifts the focus from passive protection to active threat intelligence and management. We have made breakthroughs in technologies such as trap-based probing, preemptive threat observation, collaborative transformation, and hunting deception. There technologies have been successfully transformed into market-ready equipments, namely HoneyPoint, HoneyProxy, HoneyTrace, and HoneyCenter, correspondingly. providing a robust and adaptive defense solution against sophisticated and persistent threats. The H4 system was initially rolled out and showcased in a comprehensive deployment in Jiangxi, China, in 2017. The related technological achievements have been widely adopted, covering 27 out of 34 provincial-level power grids in China, along with power generation enterprises and critical industries including banking and government. In the past three years, this system has yielded direct sale income surpassing 5.7 billion CNY (around 780 million USD).

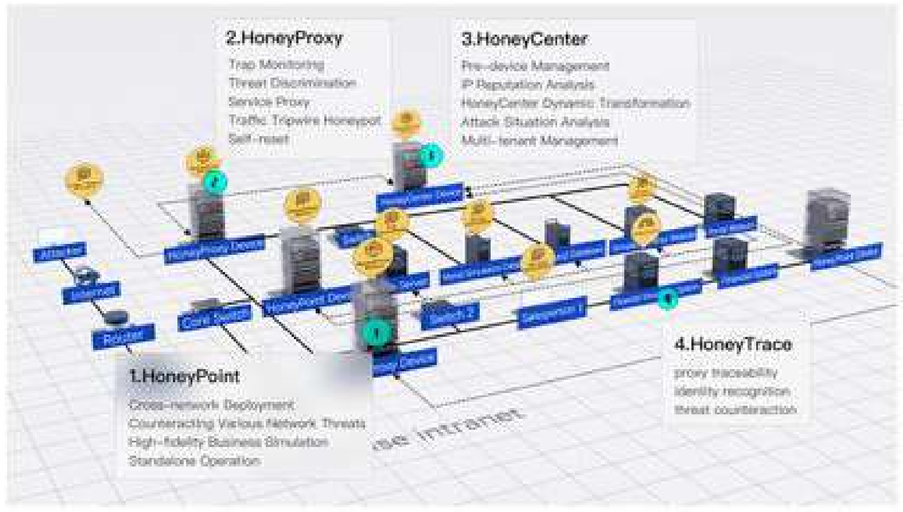


Figure 1 H4 panoramic view

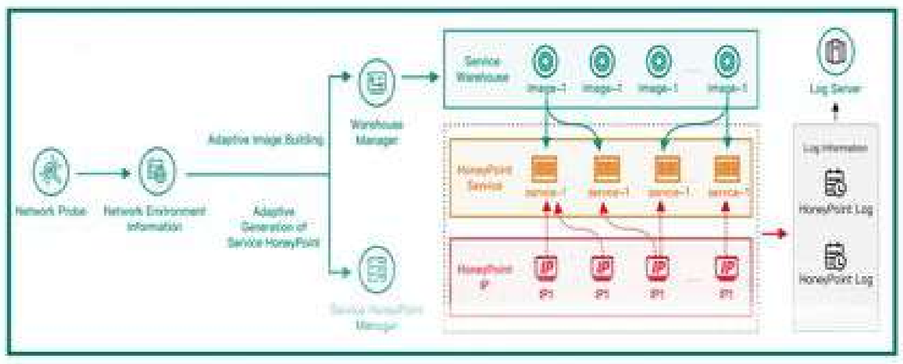


Figure 2 HoneyPoint Technology

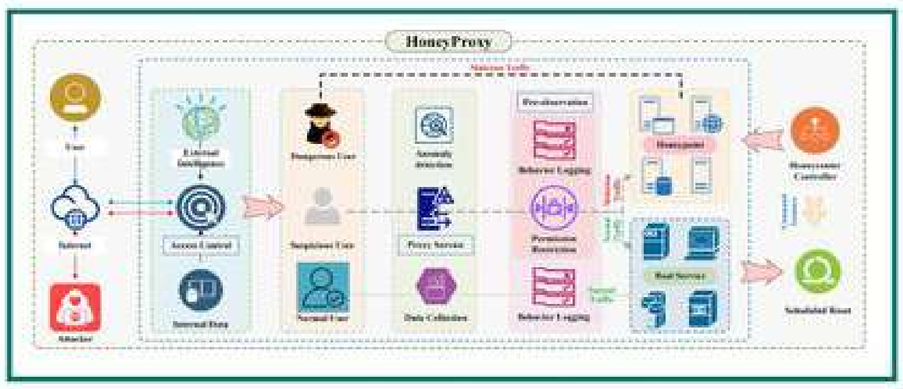


Figure 3 HoneyProxy Technology

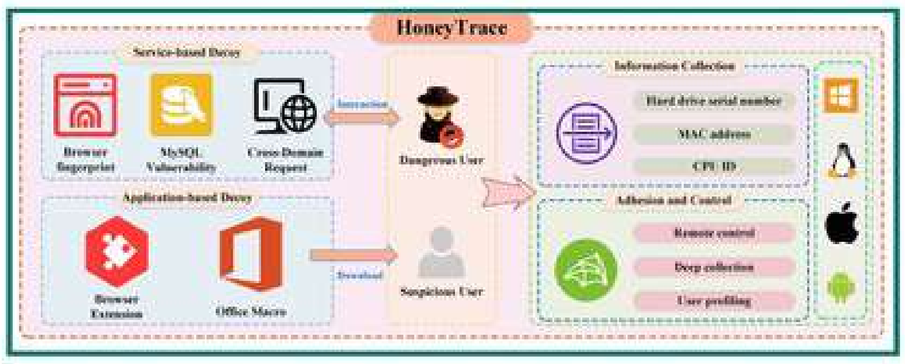


Figure 4 HoneyTrace Technology

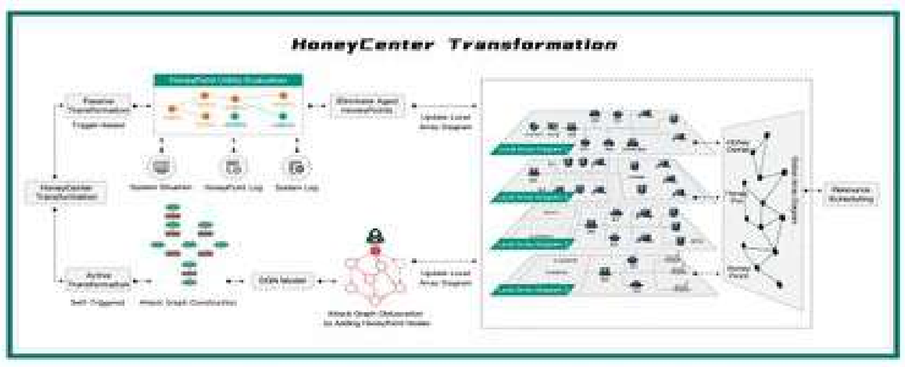


Figure 5 HoneyCenter Technology

Figure 6 physical object image

The network security engineer is conducting joint debugging of the H4 devices in the computer room.
Figure 7 On site operation diagram

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国家电网 STATE GRID

国网江西省电力有限公司信息通信分公司
STATE GRID JIANGXI INFORMATION & TELECOMMUNICATION COMPANY

A conceptual framework for AI-assisted financial audit in Agribusiness

Patent/project number: PhD thesis
Author/s: Ștefana – Beatrice PĂDURARU, Lilia SARGU
Mentor – Prof. univ. dr. Gabriela IGNAT,

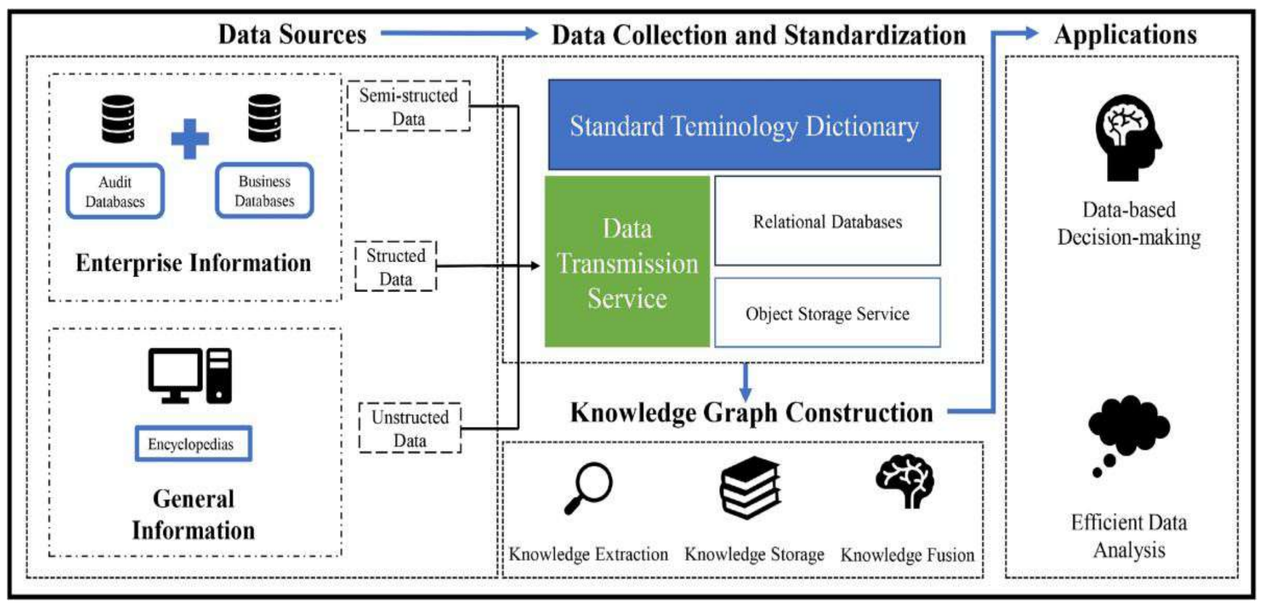
C

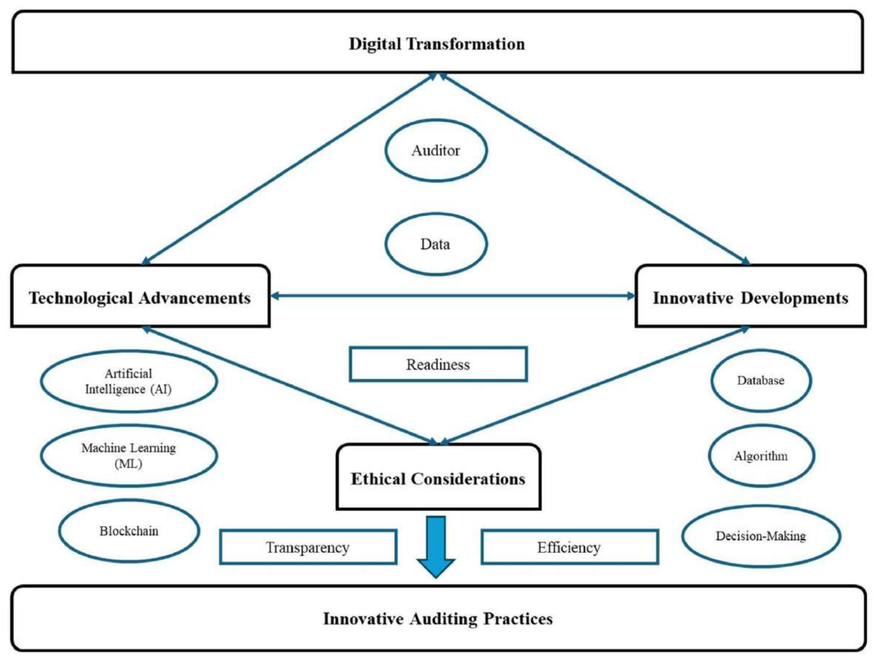
The rapid advancement of digital technologies has accelerated the adoption of artificial intelligence (AI) in financial and auditing processes across various economic sectors. In agribusiness, AI integration offers significant opportunities to enhance audit quality, improve data processing efficiency, and support more accurate risk evaluation. However, the agricultural sector presents unique operational and informational challenges due to data heterogeneity, seasonal production cycles, and environmental dependencies.

This research proposes a conceptual framework for AI-assisted financial audit in agribusiness entities, emphasizing responsible technology adoption and decision-support mechanisms. The framework integrates advanced data analytics, automation tools, and predictive modeling approaches to improve financial transparency and operational monitoring.

Special attention is given to ethical considerations, cybersecurity protection, and the balance between algorithmic automation and professional judgment in audit processes. The study also addresses potential limitations related to implementation costs, skill requirements, and system reliability.

The proposed framework aims to support sustainable financial management and promote trustworthy AI applications in agribusiness auditing environments.





The framework integrates diverse agribusiness data into AI-assisted financial audit processes, where advanced analytics support anomaly detection, risk assessment, and decision-making. It emphasizes that effective digital transformation requires not only technology, but also auditor expertise, ethical governance, and regulatory compliance. Overall, AI-assisted auditing in agribusiness represents a systemic shift that enhances efficiency, transparency, and sustainable financial management.

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Key Technologies and Industrialization of DC Bias Mitigation for UHV/EHV Transformers

Patent No.: *ZL201610877568O, ZL201710504721X, ZL202210141987.3, ZL201810488048.X, ZL202310264910.X.*

CAI No. 02 **C**

Authors: *Yuan Tiejiang, Liu Yong*

Company: *Dalian University of Technology, Anhui Zhengguangdian .*

Description :

1.Three technological innovations of the invention project:

(1) In response to the problem that the existing Hall sensors have large errors and weak anti-interference ability when collecting DC due to the strong magnetic field environment around the transformer and the interference of AC and DC mixed currents, a high-precision DC current sampling technology based on a self-compensation circuit is proposed. A compensating current is manufactured through artificial circuit design, which can eliminate the interference of the electromagnetic environment to the greatest extent and improve the sampling accuracy.

(2) The quick-switch parallel zinc oxide serves as the bypass protection system for the entire device. It is required that the switch be closed before the system relay protection operates, so that the neutral point of the transformer is directly grounded. The function of the quick switch is to close rapidly when an asymmetric short circuit occurs in the system, short-circuiting the capacitor and the zinc oxide group. This time should be controlled within 15 milliseconds. This poses a rather high demand on switch technology. The quick switch adopted by this device uses the rapid turbine drive technology. The opening time of the quick switch used in this device is less than 5ms, and the closing time is less than 12ms.

(3) Considering the problems of overvoltage and overcurrent at the neutral point, the use of large-capacity zinc oxide nonlinear resistors can limit overvoltage and meet the overcurrent flow capacity. Limit the voltage across the capacitor to no more than 900V and its current-carrying capacity to over 50kA. The technology that requires a large number of resistance valve plates to be connected in series and parallel can become the core point. If the uniform energy technology is adopted, the linearity of the valve plate is over 95%.

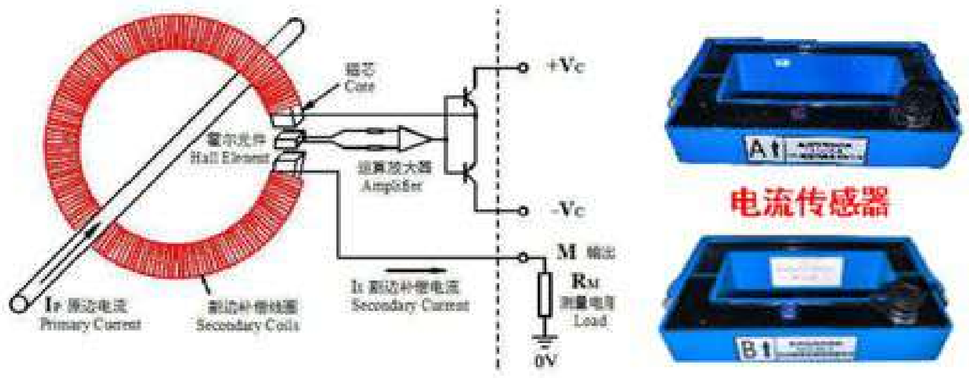
2.Contributions：

Since the project's research began, a batch of intellectual property rights and research achievements have been produced. 20 invention patents have been authorized, 5 papers have been published in SCI source journals, 6 papers have been indexed by EI, 5 papers have been published in core journals, 3 standards have been participated in the formulation, 8 software Copyrights have been registered, and 1 monograph has been compiled.

The achievements have been widely applied in multiple important energy engineering and technical fields across the country, such as the selection of new ultra-high voltage direct current grounding electrodes and surrounding substations, the assessment of transformers' ability to withstand DC bias, and the route planning and safety assessment of oil and gas pipelines. The value of promotion and application is extremely high. Demonstration applications have been carried out in countries such as Pakistan and Kazakhstan, directly generating economic benefits of 1.125 billion yuan and indirect economic benefits of over 50 million yuan.

3.The development prospects of the project

The problem of DC bias will shift from passive protection to active prediction and collaborative governance, becoming an indispensable part of power grid safety. With the global energy transition, its solutions will place greater emphasis on economy, standardization and international collaboration, providing support for the stable operation of high-proportion new energy power grids.



Current Sensor

Zinc oxide protection unit

The second generation of zinc oxide has added a monitoring unit with an exit alarm function

China's first DC magnetic bias suppression device has been put into operation at the 220kV Dongjiang Substation and the 220kV Haminan Substation .

Contact:Zhang Yichuan Company：Anhui Zhengguangdian Electric Power Technology co., Ltd.

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Email: 13395608518@zgd88.com Website：www.zgd88.com

CHINA ASSOCIATION OF INVENTIONS

Key Technologies, Device Development and Application for Improving the Power Supply Reliability of Distribution Networks

Patent No.: *ZL2024109871463, ZL2024109871463, ZL2024111028979, LU508721, PLU385CN24004, 243404PTZA.*

CAI No. 03 **C**

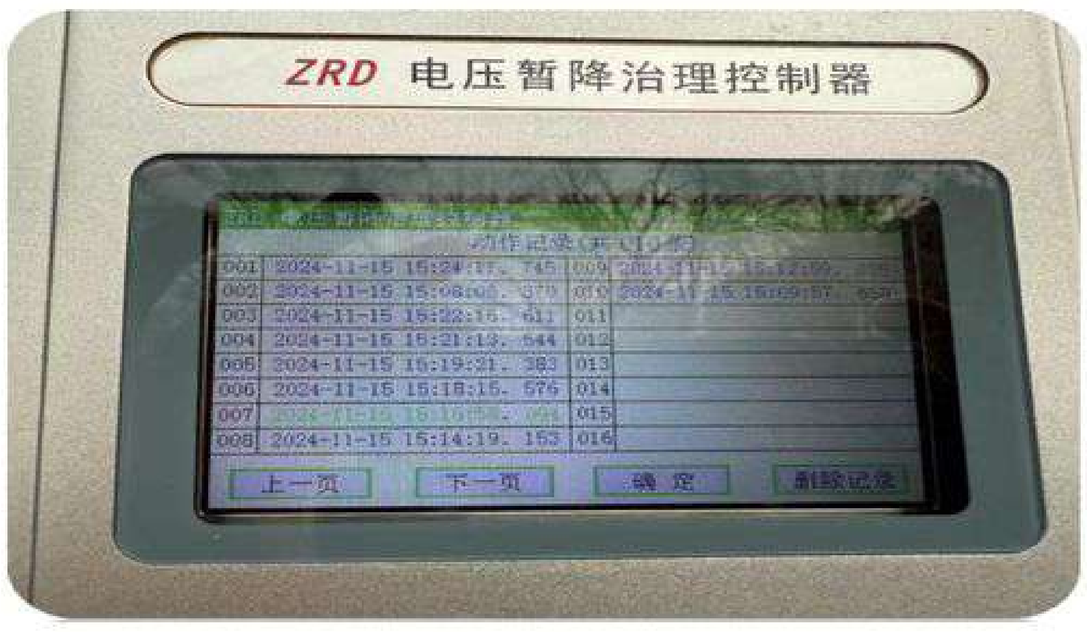
Authors: *Long He, Puzhi Zhao, Yongming Zhu, Yong Liu , Tao Suo.*

Company: *State Grid Xinjiang Electric Power Company Limited Changji Power Supply Company、Anhui Zhengguangdian Electric Power Technology co., LTD.*

Description :

With increasingly complex power system loads, voltage sags have become a critical issue affecting power quality and supply reliability. This project developed a rapid short-circuit identification method based on a weighted algorithm for instantaneous current/voltage variations, resolving the challenge of distinguishing between sensitive load energization and actual faults within 3 ms. A voltage sag mitigation device integrating an electromagnetic high-speed switch with parallel impedance was created, along with a monitoring system, enabling 20 ms self-healing after faults.

The outcomes include 3 international patents, 4 invention patents, 6 research papers, 1 technical standard, and 1 monograph. Applied in national pipelines, major power groups, petrochemicals, and steel industries, it generated approximately 3 billion CNY in sales over three years. The technology is internationally advanced, with leading capabilities in arc grounding fault phase selection and voltage sag mitigation, supporting UHV grid security and Belt and Road technology exports.



To verify the effectiveness of the distribution network voltage sag mitigation equipment under actual operating conditions, the "mitigation equipment" was installed and demonstrated at the first pole tower where the cable feeder from the 220kV Changji Substation (Line No. 2) transitions to an overhead line. The on-site construction, installation, and commissioning of the device were completed in November 2024.

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国家电网 STATE GRID

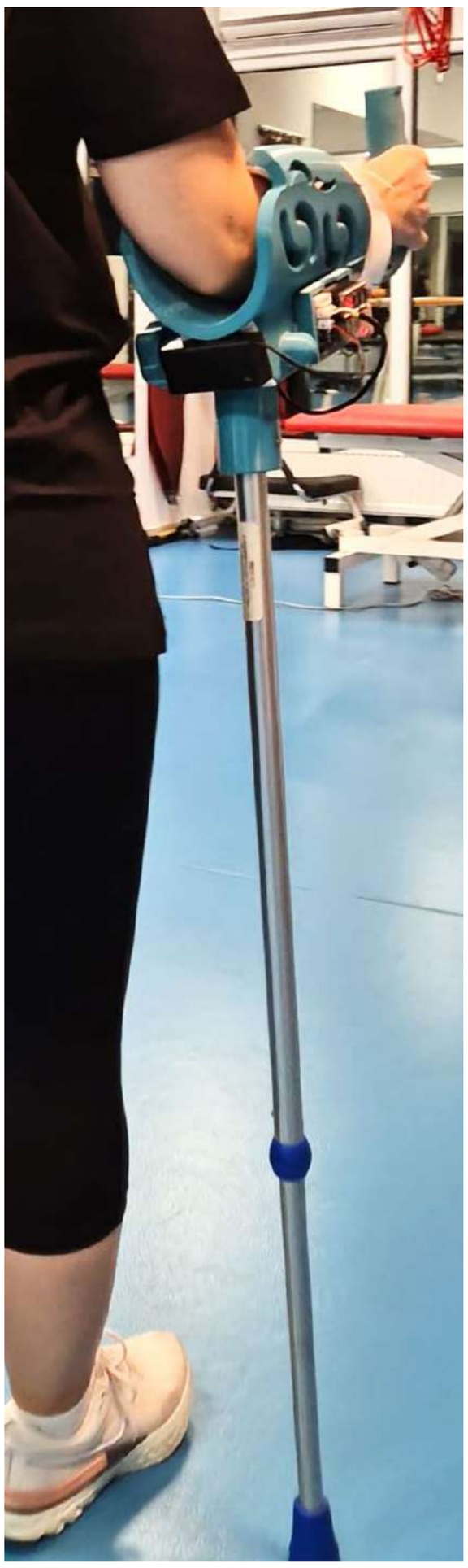
A 3D-Printed Forearm Crutch with Integrated Biosensing and Real-Time Rehabilitation Monitoring

Authors: Ph.D. Eng. Horea-Ștefan GOIA;
Assoc. Prof. Dr. Eng. Florin POPIȘTER Ph.D;
Prof. Dr. Eng. Corina BÎRLEANU Ph.D;
Prof. Dr. Eng. Mihai DRAGOMIR Ph.D;

C

Institution: Technical University of Cluj-Napoca

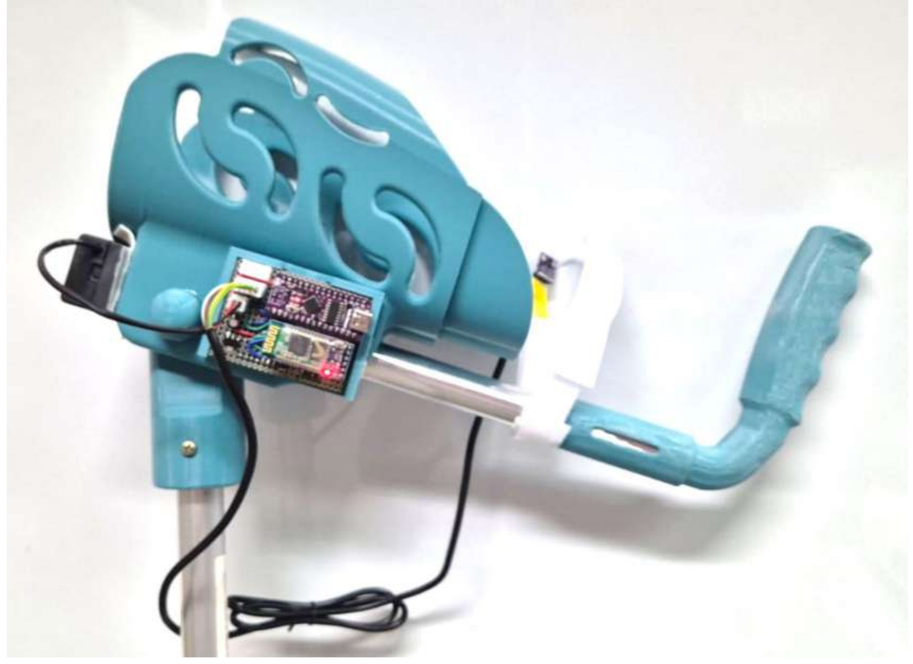
Conventional forearm crutches offer no feedback mechanism, often leading to incorrect weight-bearing, secondary injuries, and poor rehabilitation compliance between clinical visits. This project presents the design and development of smart rehabilitation device, a 3D-printed crutch displaying forearm support integrated with a multi-sensor system for real-time patient monitoring.

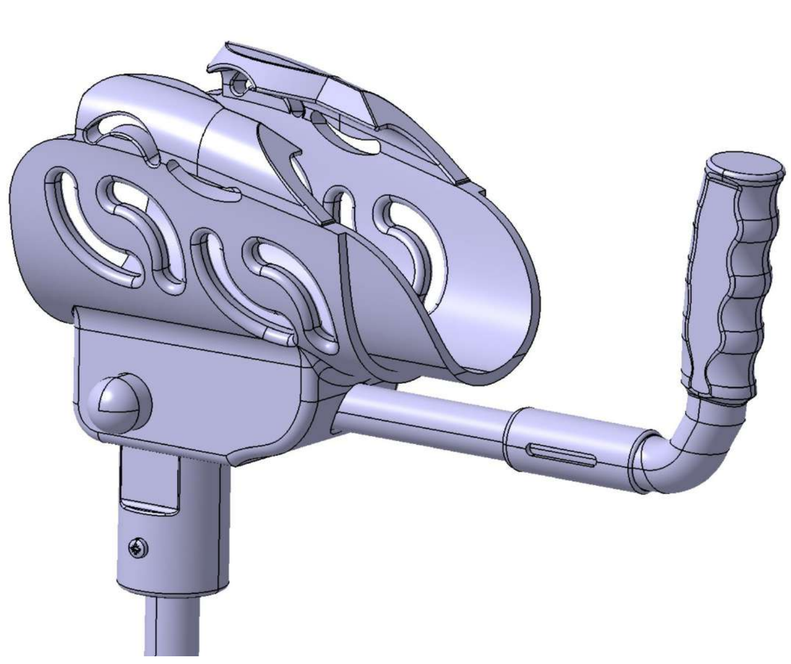


The device incorporates a MAX30100 pulse oximeter for continuous heart rate and blood oxygen saturation (SpO_2) monitoring, a GY-521 6-axis IMU (gyroscope + accelerometer) for crutch orientation and motion analysis, and a GY-NEO6MV2 GPS module for outdoor patient localization. All sensor data is processed by an Arduino Nano microcontroller and transmitted wirelessly via HC-05 Bluetooth to a dedicated Android application, enabling both the patient and physician to monitor progress and adjust weight-bearing parameters remotely.

The forearm support structure was designed in CATIA V5 and fabricated using FDM 3D printing from a recycled, biocompatible thermoplastic, enabling lightweight, personalized fit at low cost.

The system targets individuals with temporary or permanent lower-limb mobility impairments, providing objective rehabilitation data, reducing secondary injuries caused by crutch misuse, and contributing to shorter recovery times.





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Study and development of a gesture-based control unit for collaborative robots

Author: Ph.D Eng Paul CIUDIN
Assoc. Prof. Dr. Eng. Florin POPIȘTER Ph.D,
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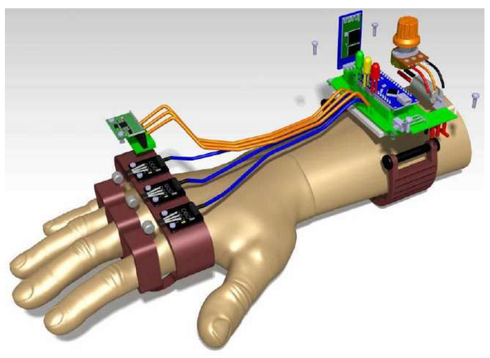
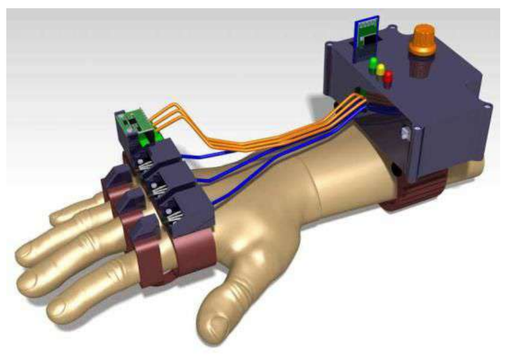
Assoc. Prof. Dr. Eng. Diana Cristina DRAGOMIR

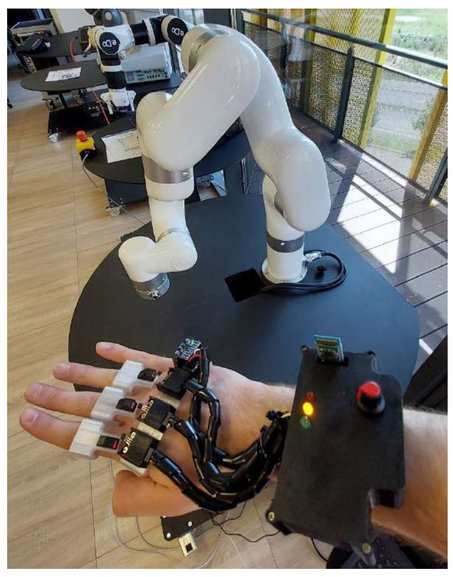
Institution: Technical University of Cluj-Napoca

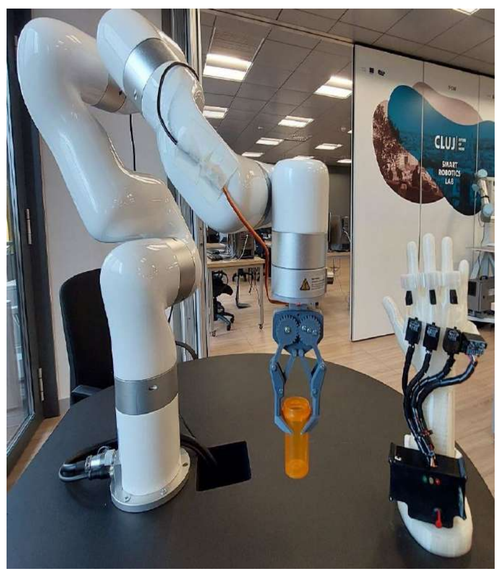
C

This study introduces an innovative method for advancing tele-robotic systems, focusing on the development and testing of a gesture-based control method for collaborative robots. The purpose of developing such a prototype stems from the need to improve the use of tele-robotic devices. The project aims to facilitate effortless interaction between humans and robots without the need for traditional control interfaces. The main objective is to design a compact and ergonomic gesture glove that intuitively captures hand movements, transforming them into linear or rotational movements for collaborative robots.

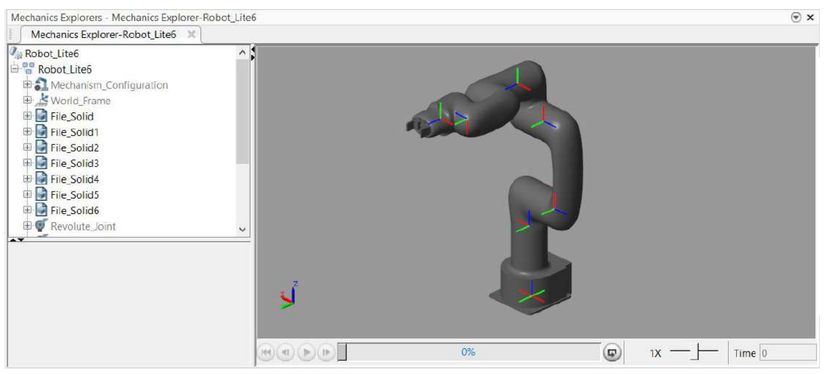


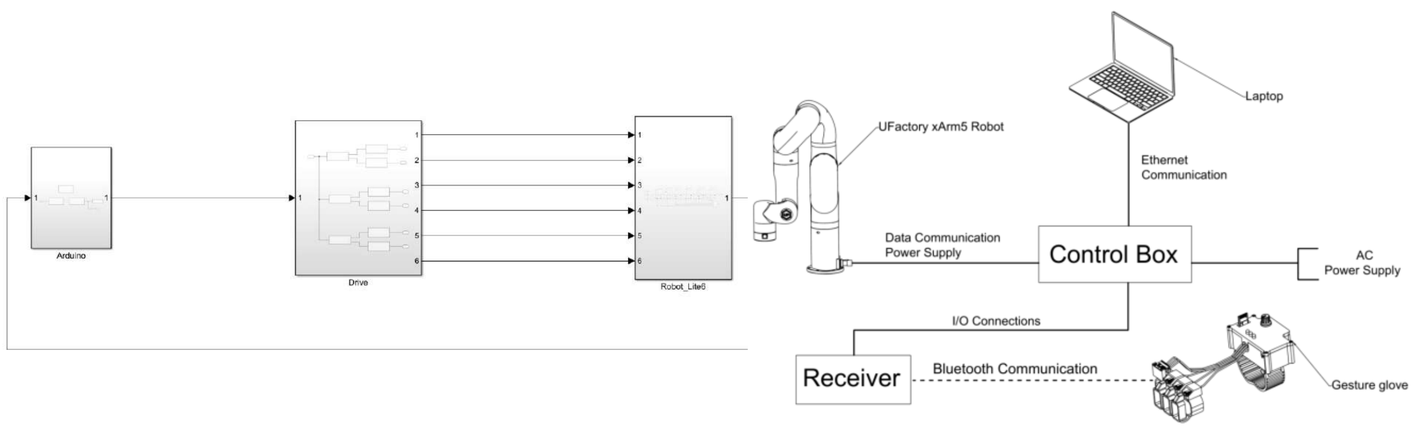




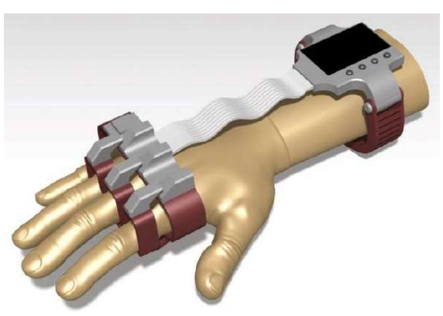


The methodology involves 3D printing technology for manufacturing the components of the gesture glove and the use of various CAD programs for designing the electrical enclosures and wiring diagrams. Arduino IDE software is used for programming the gesture glove, while the robot programming was done in Python. The results obtained from the tests provide insights into communication latency, addressing the challenges posed using low-precision sensors in the development of the glove.





The main limitations are visible through the impact of latency on accuracy in pick-and-place applications. The project explores the practical implications of the current version for remote manipulation of robotic arms. In particular, the study highlights the originality and value of the project by introducing unique elements such as Hall effect sensors for orientation selection and the integration of sign language for new commands. This scientific study contributes to the continuous evolution of tele-robotic control methods, presenting a distinct and innovative approach to gesture control with potential applications in various fields.



After analyzing the results of the repeatability, accuracy, and latency tests, improvements will be made to the presented control model. These improvements will involve implementing a 5G communication module, adding robot orientation functions by detecting the user's hand orientation, and integrating the entire circuit into the motherboard to significantly reduce the device's dimensions.

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Totally Awesome Robotic System (T.A.R.S.)

C

Authors: Maia Emilia Moldovan, Levente Madaras, Mircea Nistor

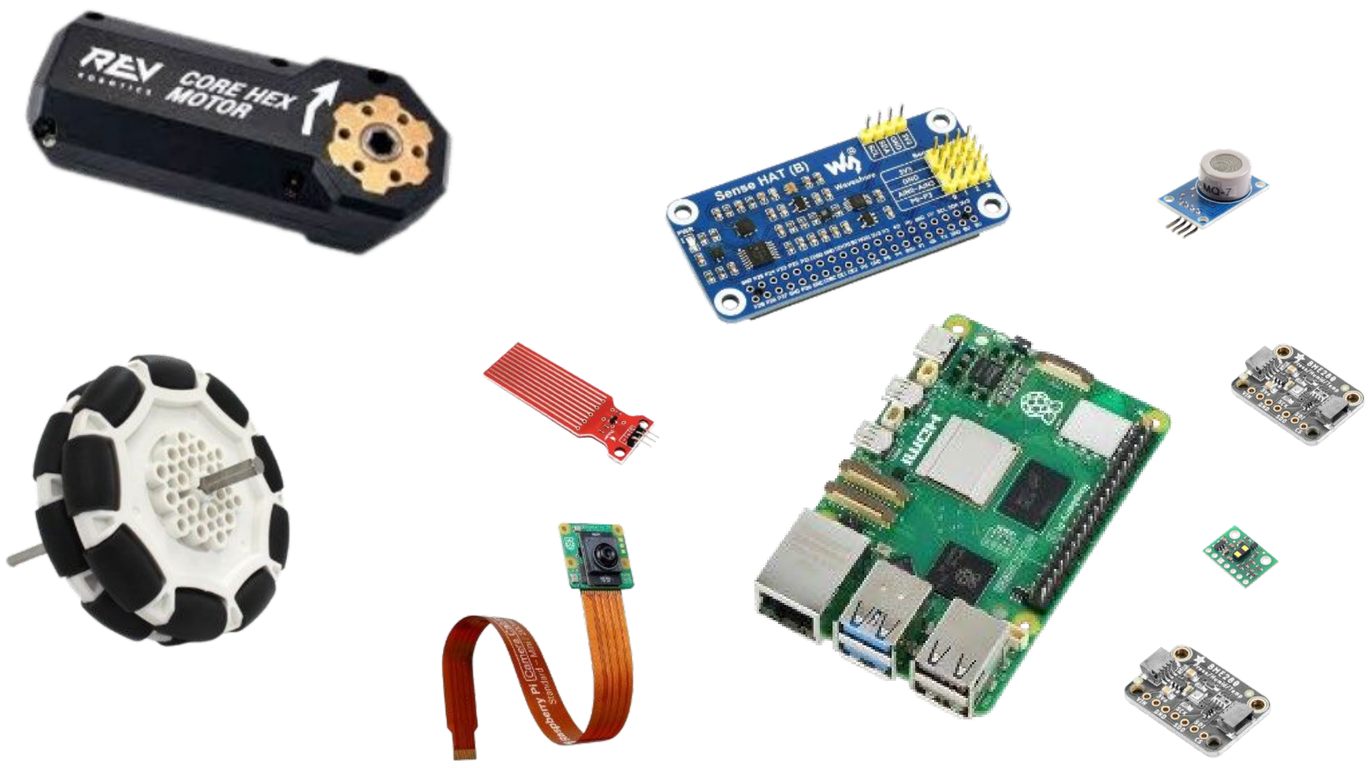
"Totally Awesome Robotic System" (T.A.R.S.) is an educational project based on artificial intelligence, created to support learning by offering interactive and personalized explanations without limits for every student .

The issues our project aims to address are common challenges found in the educational system —fresh in our minds as students ourselves . One of the main problems is the large amount of information and the difficulty of understanding it . The lack of time for individual explanations and traditional teaching methods makes it hard to adapt learning to each student's needs . In addition, technology is often used only in a limited way, mainly as visual support rather than an interactive learning tool .

The education system focuses mostly on theory, without highlighting the importance of practical experience, which is essential for deeply understanding information . As a result, many things learned in school seem, at first glance, to have no real purpose or everyday use .

This project would also support rural schools as well as students with challenges or disabilities . These issues have persisted over time without visible improvement, but we aim to help solve them and inspire young people in Romania to take learning seriously .

Our presentation:



Our Instagram:

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NITRATE OF 2,6-DIACETYLPYRIDINE-BIS(PICOLINOYLHYDRAZONE)-(AQUA)(NITRATO)CADMIUM(II)–MONOHYDRATE WITH PHOTOLUMINESCENCE PROPERTIES

C

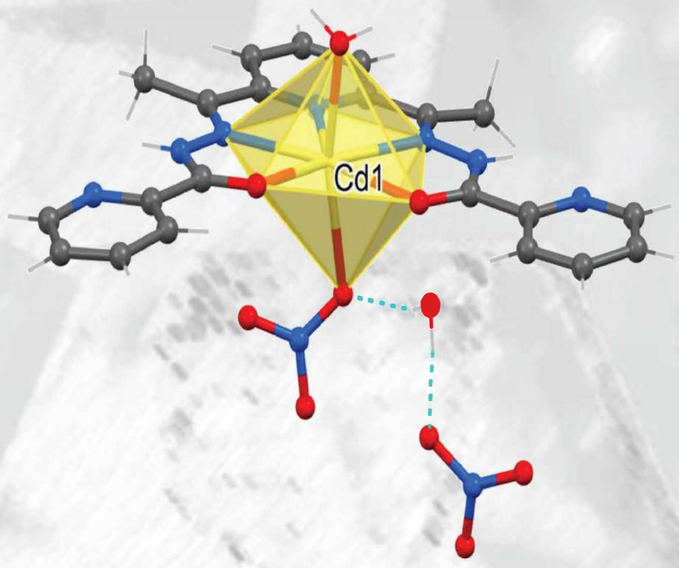
PATENT NUMBER: MD 4884

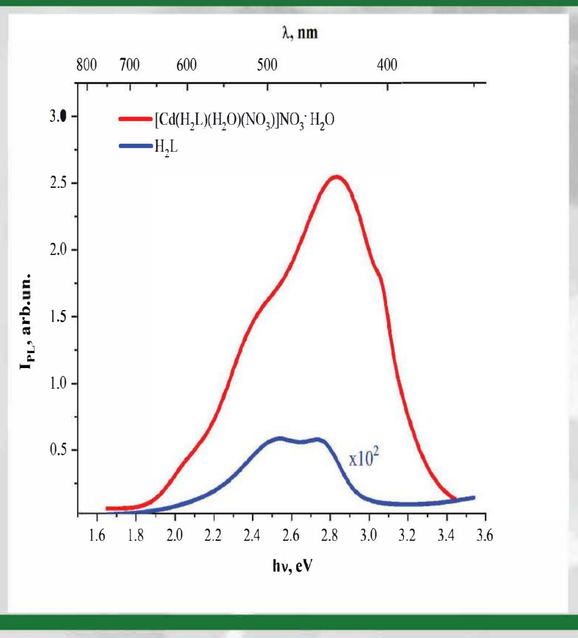
AUTHORS: DANILESCU Olga[1], BULHAC Ion[1], CROITOR Lilia[2], BOUROSH Pavlina[2], KULICOVA Olga[2]

APPLICATION FIELDS: Optical industry

AIM: Chemical synthesis and characterization of new coordination compound with photoluminescence (PL) properties

SOLUTION: Template synthesis containing $Cd(NO_3)_2 \cdot 4H_2O$ salt, 2,6-diacetylpyridine and picolinic acid hydrazide in EtOH solution, lead to mononuclear compound $[Cd(H_2L)(H_2O)_2(NO_3)]NO_3 \cdot H_2O$, where H_2L = 2,6-diacetylpyridine bis(picolinoylhydrazone).





400-500 nm

ADVANTAGES: The claimed coordination compound nitrate of 2,6-diacetylpyridine-bis(picolinoylhydrazone)-(aqua)(nitrato)cadmium(II)–monohydrate exhibits PL activity about 300 times more intense than the free ligand (H_2L), a fact established by evaluating the effect of the flourescent emission in the range 400-500 nm which can be observed even with the naked eye. $[Cd(H_2L)(H_2O)_2(NO_3)]NO_3 \cdot H_2O$ is proposed as a useful material for obtaining blue light sources.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: The authors are grateful for the research subprograms financed by MER 01.06.02 of the Institute of Chemistry of MSU, 01.12.01 and 01.12.02 of the Institute of Applied Physics of MSU.

CHEMSPARK – INTERACTIVE DIGITAL PERIODIC TABLE

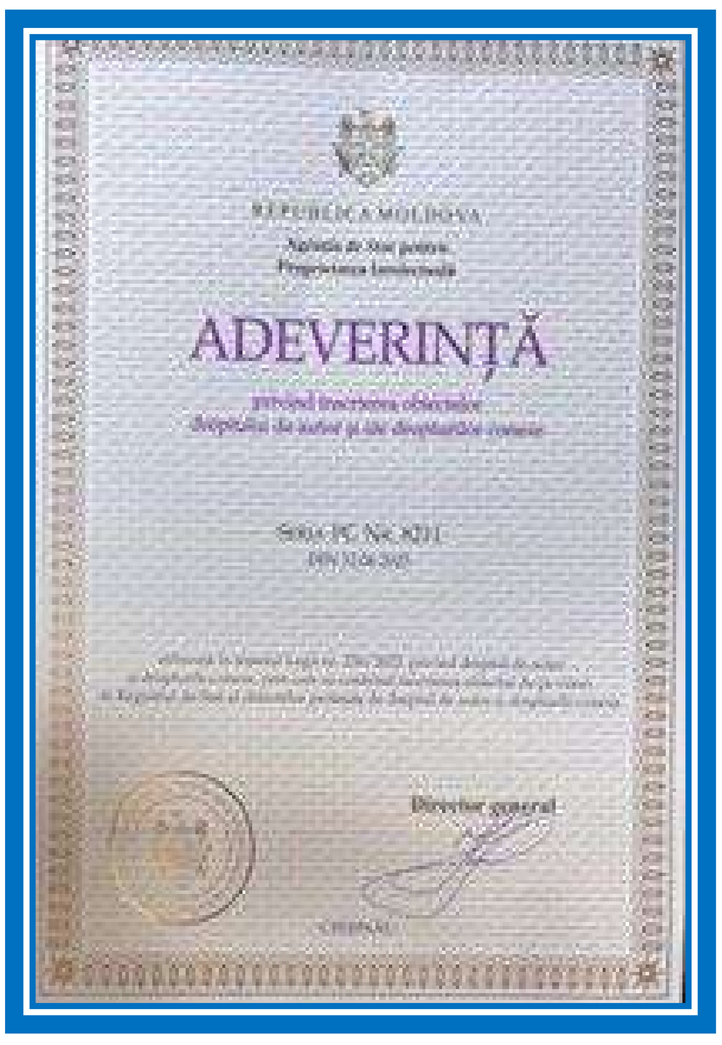
Patent: Patent no. 3015/28.05.2025
Authors: CIORNÎI EMILIANA-12th grade,
INDOITU IRINA-12th grade; GÎNCU EUGENIA
biology teacher, BLUDARU VIORICA chemistry
teacher, COROPCEANU EDUARD chemistry teacher

C

The Interactive Digital Periodic Table is an innovative educational engineering system designed to modernize the study of chemistry. It transforms the traditional static periodic table into a dynamic, technology-enhanced platform that combines hardware engineering with digital learning tools.

The system incorporates a microcontroller and addressable LED technology that illuminate selected elements, groups, and periods on the physical table, visually emphasizing their structure and periodic relationships. Through light-based interaction, students can clearly observe patterns and connections within the periodic system.

Complementing the physical model, the project includes a dedicated interactive website that functions as an extended educational platform. The website provides detailed information about each element, including atomic properties, electronic configuration, applications, and essential scientific data. In addition, it offers quizzes, educational resources, and engaging facts designed to reinforce understanding and encourage independent exploration. By integrating electronics, programming, and chemistry, the project creates a cohesive physical–digital learning environment. It supports both classroom demonstrations and individual study, offering a modern, intuitive approach that bridges theoretical knowledge with visual and interactive experience.



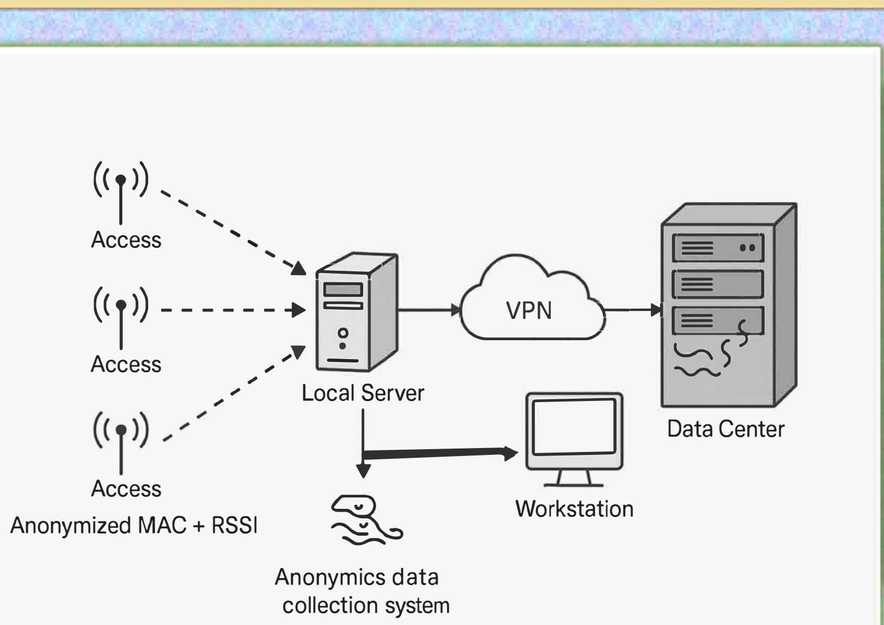
Contact: Coordinating teacher: Bludaru Viorica – 069962641 – vicarusul@gmail.com
Student coordinator: Ciornîi Emiliana – 067351469 ciorniifelicia@gmail.com

Proposed Architecture for an Anonymous Passenger Mobility Data Collection System

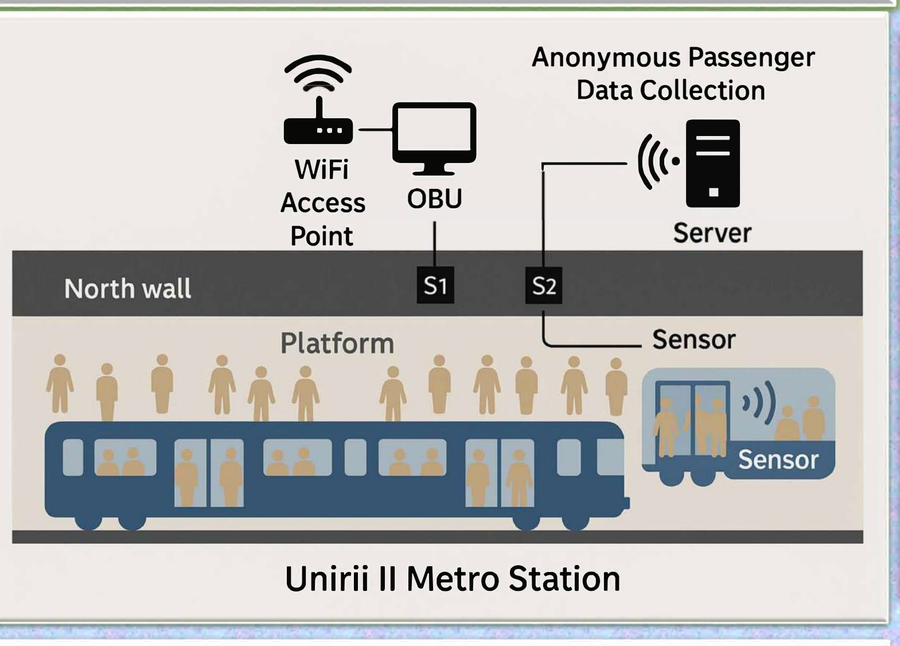
Chiva Ionuț Cosmin, Semenescu Augustin

C

The proposed solution consists of an anonymous data collection system for monitoring passenger mobility in public transport, based on the detection of Wi-Fi and Bluetooth devices carried by passengers. The network is composed of strategically placed Access Points (APs), approximately 35 meters apart, which operate as passive sensors and collect information such as anonymized MAC addresses, Received Signal Strength Indicator (RSSI) levels, and detection timestamps.The collected data are transmitted to a local server for storage and preliminary processing, and then through a VPN connection to a central data center, where they are analyzed using artificial intelligence algorithms (Delaunay–Voronoi triangulation and k-means clustering) to estimate passenger positions and flow patterns. The system is energy-efficient, does not require cellular networks, and can provide valuable insights into congestion levels, passenger routes, and the optimization of public transport operations.

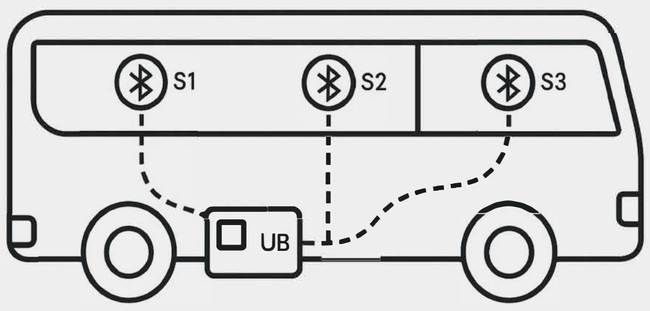


The diagram illustrates the data flow within the anonymous passenger data collection system. Wi-Fi/Bluetooth access points act as passive sensors, capturing anonymized MAC addresses and RSSI values. The information is sent to a local server for initial processing, then securely transmitted via VPN to a remote data center for AI-based analysis. A workstation allows local monitoring of system performance.



Unirii II Metro Station

A system that anonymously collects passenger data at the “Unirii II” metro station. Sensors and WiFi access points detect the presence of people on the platform and inside the train, and the information is sent to a server for analysis. The collected data is anonymous, meaning it does not directly identify individuals but only records their number and movement. The purpose is to monitor passenger flow and improve transportation services.



Proposed system for position and mobility information collection

A proposed system for collecting position and mobility information in a bus.
The system is installed in a bus and collects data about passengers’ position and movement. Three Bluetooth sensors (S1, S2, S3) send data to a central unit (UB), which stores and analyzes the information. The purpose of the system is to monitor passenger mobility and distribution in order to improve public transportation.

Expected Outcomes

Real-time estimation of passenger flow and congestion levels.
Improved operational decisions for public transport authorities.
Scalable, energy-efficient, and privacy-preserving architecture.

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Nanohybrid ternary formulation for relative humidity chemoresistive sensing devices

Romanian Patent Application A00312, RO, OSIM, 08.06.2022

Assignees: National Institute for Research and Development in Microtechnologies - IMT Bucharest
Valahia University of Targoviste
Inventors: Bogdan-Cătălin Șerban, Octavian Buiu, Marius Bumbac, Cristina Mihaela Nicolescu

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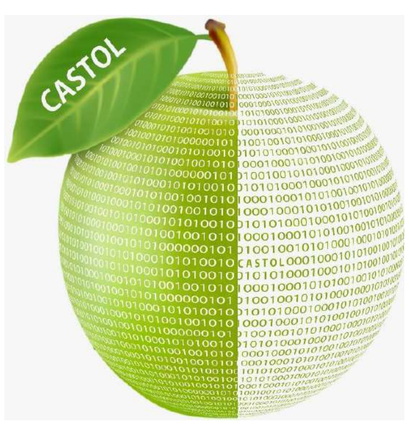
Field of invention:

A complex gaseous mixture results in storage premises of fresh fruits and vegetables due to respiration and transpiration processes, and depending of the plant type, climacteric / non-climacteric. The phytochemical characteristics and organoleptic properties of stored fresh products may change depending on the atmosphere in the storage facilities containing humidity, CO_2, O_2, ethylene and other volatile organic compounds. The humidity of the air in the storage spaces or containers is a defining parameter for keeping the plant products in good condition, as it strongly correlates with respiration and transpiration rates.

Narrowly monitoring and control of the relative humidity (RH) in spaces and/or containers for storage of fruits and vegetables may ensure prolonging the products quality shelf-life and market value, and implicitly reducing the food waste generation. Thus, the two metabolic processes of fresh products, respiration and transpiration, may be carefully limited while not-stopped.

RH sensitive layers manufacturing and testing:

- the ternary nanohybrid can be deposited by the drop casting method on linear or interdigitated electrodes made of Kapton or poly-ethylene-terephtalat (PET); the assembly is then thermally treated at 90 °C under vacuum conditions;
- the electrodes were connected by the successive deposition of Cr (10 nm) and Au (100 nm);
- the relative humidity monitoring capability was investigated by applying a constant current between the two electrodes and measuring the voltage at different values of the relative humidity levels of the testing environment

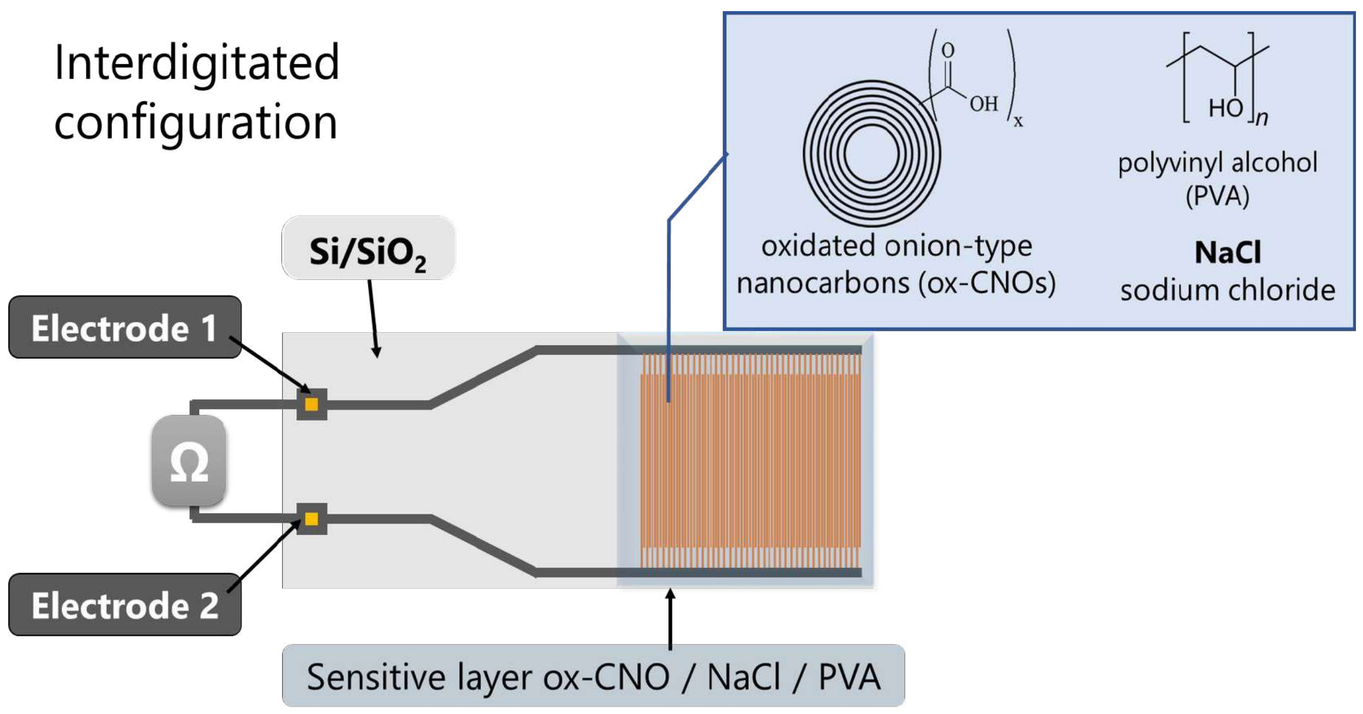


Original approach:

The invention refers to new ternary nanohybrid formulation suitable for use as sensing layers in chemoresistive devices for monitoring relative humidity.

- The ternary nanohybrid formulations contain oxidated onion-type nanocarbons (ox-CNOs), sodium chloride (NaCl) and polyvinyl alcohol (PVA) which may form conductive layers
- Detection principle relies on variation of this conductive layer resistance with the level of relative humidity in the monitored environment
- Synthesis of the carbonaceous materials onion-type consists in thermal treatment of the nanodiamond at 1650 °C in helium environment, followed by oxidation in water-plasma @ 5 torr and room temperature
- The nanocomposite ox-CNO / NaCl / PVA is obtained by mixing the components in deionised water, and ultrasonication at 80 °C

RH chemoresistive device with ox-CNO / NaCl / PVA sensing layer



Advantages:

- ternary nanocomposites formulation of ox-CNO/ NaCl / PVA offer notable advantages in RH resistive detection;
- ox-CNOs offer high specific surface / volume ratio, affinity for water molecules, and notable resistance variation of sensitive layers at contact with water molecules throught the RH range;
- polyvinyl alcohol is a hydrophilic polymer exhibiting low hysteresis;
- the presence of sodium cations Na^+ (hard acids according to Hard Soft, Acids and Bases theory) gives the ternary nanohybrid an increased sensitivity, by increasing the number of active sites available for an interaction with water molecules;
- detection at room temperature.

Result of the Project PN-III-P2-2.1.-PED-2019-5248, 2020 – 2022, Controlled Atmosphere for STOrage facilities of fruits and vegetables: a Low-cost multidisciplinary solution (CASTOL)

Ammonia Resistive Sensor

Romanian Patent Application A00313, RO, OSIM, 08.06.2022

Assignees: National Institute for Research and Development in Microtechnologies - IMT Bucharest
Valahia University of Targoviste
Inventors: Bogdan-Cătălin Șerban, Octavian Buiu, Marius Bumbac, Cristina Mihaela Nicolescu

C

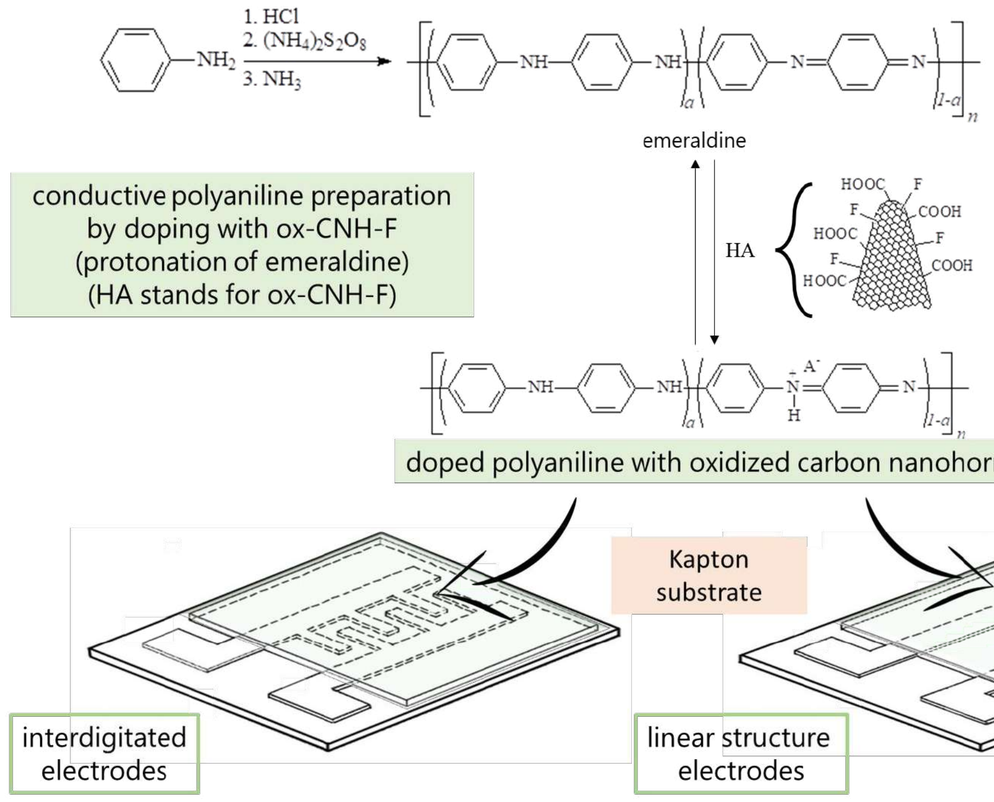
Field of invention:

Ammonia concentration monitoring is important in the agri-food industry, in particular for the premises where fresh fruits and vegetables are stored for long time frame, or for those where composting processes of food waste occur. The information on the ammonia concentration in the atmosphere of respective facilities is important both to secure the human health (NH_3 is a harmful gas even at low concentrations, *i.e.* 35 ppm), and to ensure the market value while protecting the environment. Significant benefits in food waste reduction may be achieved by considering a multidisciplinary approach Internet of Things – Phytochemistry.

Original approach:

This invention refers to new resistive sensors for monitoring ammonia concentration, with the sensitive layers consisting of binary nanocomposites containing oxyfluorinated carbon nanohorns (ox-CNH-F) and doped polyaniline. Both components are p-type semiconductors, and thus the detection principle resides in variation of the layers resistance when in contact with environments with different ammonia concentration values.

Ammonia sensor manufacturing

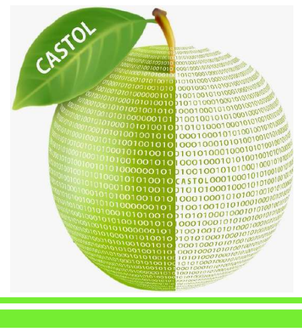


Sensor Design:

- the sensing device consists of a dielectric substrate (*i.e.* Kapton), linear / interdigitated metal electrodes (*i.e.* Al, Cr, Au, Pt) and a sensitive layer made of a thin film made of a binary nanocomposite ox-CNH-F / doped polyaniline;
- two-steps preparation process of a new p-type conductive polyaniline;
- presence of carboxyl-type oxygenated functions on the nanocarbon material is essential in the emeraldine doping process; this is achieved by treatment of nanocarbonic materials in argon-oxygen plasma;
- deposition method of the electrodes on the dielectric substrate may be direct printing, sputtering or evaporation
- investigations of NH_3 sensing characteristics of the ox-CNHs-F/polyaniline sensing layer was performed by applying a constant current between the two electrodes of the sensor, and measuring the voltage while exposing it to environments with different values of ammonia levels.

Advantages:

- the use of binary nanocomposites of ox-CNHs-F/ polyaniline has significant advantages in the resistive detection of NH_3
- functionalization of nanocarbon nanohorns in F_2-N_2 and Ar-O_2 plasma in the conditions of this invention ensures an optimal C:F:O atomic ratio;
- fluorine atoms increase the number of carriers in the carbon nanohorns due to the inductive electron-attracting effect; as the conduction is achieved through holes (p-type carriers), the device's sensitivity to ammonia molecules increases; also, presence of fluorine atoms reduces the hysteresis through their hydrophobic effect.
- chemical and thermal stability and superior mechanical properties;
- due to the π-π interactions between polyaniline and the nanohorn material, the de-doping process is less likely.



Result of the Project PN-III-P2-2.1.-PED-2019-5248, 2020 – 2022, Controlled Atmosphere for STOrage facilities of fruits and vegetables: a Low-cost multidisciplinary solution (CASTOL)

Ozone Resistive Sensor

Romanian Patent Application A00416, RO, OSIM, 19.07.2021

Assignees: National Institute for Research and Development in Microtechnologies - IMT Bucharest
Valahia University of Targoviste
Inventors: Bogdan-Cătălin Șerban, Octavian Buiu, Cristina Mihaela Nicolescu, Cristiana Rădulescu

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Field of invention:

Ozone (O_3) is an oxidizing, reactive gas with a specific smell, widely used in disinfecting the atmosphere of premises dedicated to the agri-food industry (*i.e.* fruits and vegetables storage facilities). Its beneficial action as UV-filter in the Earth stratosphere is well known. However, in the ground proximity O_3 is a component of the photochemical smog, and is considered one of the main six pollutants harmful to public health and environment. Severe negative influence to humans' respiratory function and eyes may be caused by exposure to environments with ozone (*i.e.* concentrations of 0.1 ppm - 1 ppm) even for reduced time periods (2h - 6h). Thus, it is very important to monitor the O_3 concentration in the atmosphere of closed spaces, as well as in premises where ozone is used for technological processes.

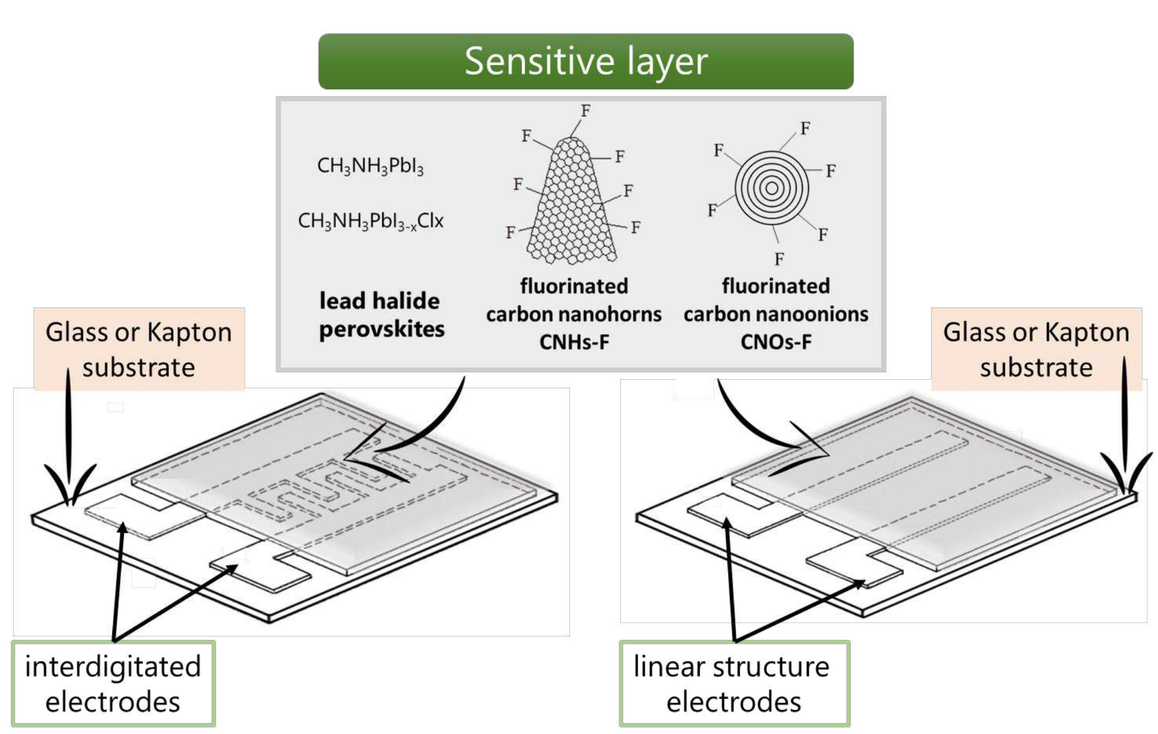
Ozone sensor design and manufacturing

- resistive ozone concentration monitoring sensor that is characterized by the fact that it consists of a dielectric substrate (*e.g.* glass), metal electrodes (*e.g.* Au, Pt) and a thin film of sensitive layer containing a nanocomposite halogenated perovskite and fluorinated nanocarbon materials;
- electrodes may be of the linear type or interdigitated, and are deposited on the dielectric substrate by either direct printing, sputtering or evaporation;
- the ozone-sensitive layer of the halogenated perovskite type / fluorinated nanocarbon materials, is obtained by the successive deposition (*drop casting*) of the fluorinated nanocarbon material, then by the *spin coating* of the $CH_3NH_3PbI_3$ perovskite precursor on the glass substrate with linear electrodes.

Original approach:

The invention describes an ozone resistive sensor using new nanocomposite sensitive layers containing halogenated perovskites ($CH_3NH_3PbI_3$ / $CH_3NH_3PbI_{3-x}Cl_x$ or a mixture of these two) and fluorinated nanocarbon materials (carbon nanohorns CNHs-F or onion-like carbon nanomaterials CNOs-F). Functionalization of the nanocarbon materials is achieved by F_2-N_2 plasma treatment.

O_3 is a molecule with electron-attracting properties, and thus its ad/absorption process is associated with an electron-transfer process from the nanocarbon structure, as both CNHs-F and CNOs-F are p-type semiconductors. By reducing the number of electrons, the holes rises, leading to a proportional decrease of the electrical resistance. Also, once the ozone molecules are ad/absorbed, the unpaired Pb^{2+} cations are passivated, the corresponding decrease of the resistance is proportional to the gas concentration to which the sensitive layer is exposed.



Advantages:

The sensor design by using the sensitive layer with halogenated perovskite nanocomposite / fluorinated nanocarbon materials shows important advantages:

- both nanocarbon materials CNHs-F and CNOs-F offer a high specific surface / volume ratio, and variation of sensitive layer resistance upon contact with ozone molecules;
- halogenated perovskite shows an increased affinity for ozone molecules, and variation of sensitive layer resistance upon contact with O_3;
- due to their increased electronegativity, the fluorine atoms increase the polarity of the surface of the nanocarbon material, creating temporary dipoles that facilitate the interaction with ozone molecules;
- functionalization of nanocarbon materials in fluorine-nitrogen plasma (at various values of power and exposure time) ensure an optimal C:F ratio, an appropriate sensitivity, and a reduced hysteresis;
- reversibility and quick response of the sensor to variations in the ozone concentration value;
- chemical and thermal stability, superior mechanical properties, detection over a wide temperature range.

Result of the Project PN-III-P2-2.1.-PED-2019-5248, 2020 – 2022, Controlled Atmosphere for STOrage facilities of fruits and vegetables: a Low-cost multidisciplinary solution (CASTOL)

MULTI PLATFORM SYSTEM FOR CONTROLLER FREE SPATIAL OBJECT GENERATION USING COMPUTER VISION BASED HAND TRACKING TECHNIQUES

C

Ștefan Neculai, Ana-Maria Roșu, Florin Nedeff, Mirela Panainte-Lehăduș, Andrioaia Dragoș-Alexandru, Diana Mirilă

University "Vasile Alecsandri" of Bacău / Romania

DESCRIPTION

This project presents a **Cross-Platform Augmented and Virtual Reality (XR) system** that enables the generation and manipulation of three-dimensional objects through natural, controller-free interaction, using image-processing algorithms for hand tracking. The proposed architecture integrates a real-time gesture-recognition subsystem implemented in Python with a 3D rendering and interaction engine developed in Unity. Data transfer is supported by a communication layer based on the WebSocket protocol, optimized for minimal latency, ensuring responsive and scalable spatial interaction across various hardware configurations: desktop, mobile AR, and immersive VR environments. By modularly separating perception from rendering logic, the system provides high interoperability and offers an extensible framework for further research in the field of natural user interfaces (NUI).

SYSTEM ARCHITECTURE:

The system is structured into three functional layers:

1. Perception Layer

This layer performs real-time detection of the anatomical landmarks of the hand and gesture interpretation using advanced Computer Vision techniques. It processes input from standard RGB cameras, extracting the spatial feature vectors required for mapping user interactions.

2. Interaction and Communication Layer

This layer translates the interpreted gestures into semantic commands (instantiation, affine transformations, deletion) and transmits them through asynchronous data streams via WebSocket. This component is critical for maintaining low latency when synchronizing the perception and visualization modules.

3. Rendering and Spatial Interaction Layer

Developed in Unity, this environment receives the command stream and updates the state of the 3D scene accordingly. Its platform-agnostic design allows the same interaction logic to be reused across various devices without requiring changes to the core architecture.

Attributes and Innovation:

- Non-Invasive (Controller-Free) Interaction
- Real-Time Spatial Construction
- Versatility and Scalability

Research and Development Directions:

The system serves as an experimental platform for future explorations in Spatial Computing:

- Deep-Learning-Based Recognition Optimization
- Synchronous Spatial Collaboration
- Physics-Based Interaction
- Generative AI Integration

The project demonstrates the viability of a modular architecture for controller-free spatial interaction, creating a bridge between computer vision and immersive graphics. Its flexibility enables the system to function as a reference framework for future natural user interface development in Mixed Reality environments.

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C - Computer sciences, Electronics and Electrical engineering

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C

TITLE

APPARATUS AND METHOD FOR LINEARIZATION OF CONTROL CODE-OSCILLATION FREQUENCY CHARACTERISTIC FOR MULTI-BAND DIGITALLY CONTROLLED OSCILLATORS AND APPARATUS CUSTOMIZATION FOR A FREQUENCY-LOCKED LOOP

INVENTOR/S - CONTACT

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PATENT/PROJECT

Patent OSIM no.: RO134011-B1/ 28.03.2025

SHORT PRESENTATION

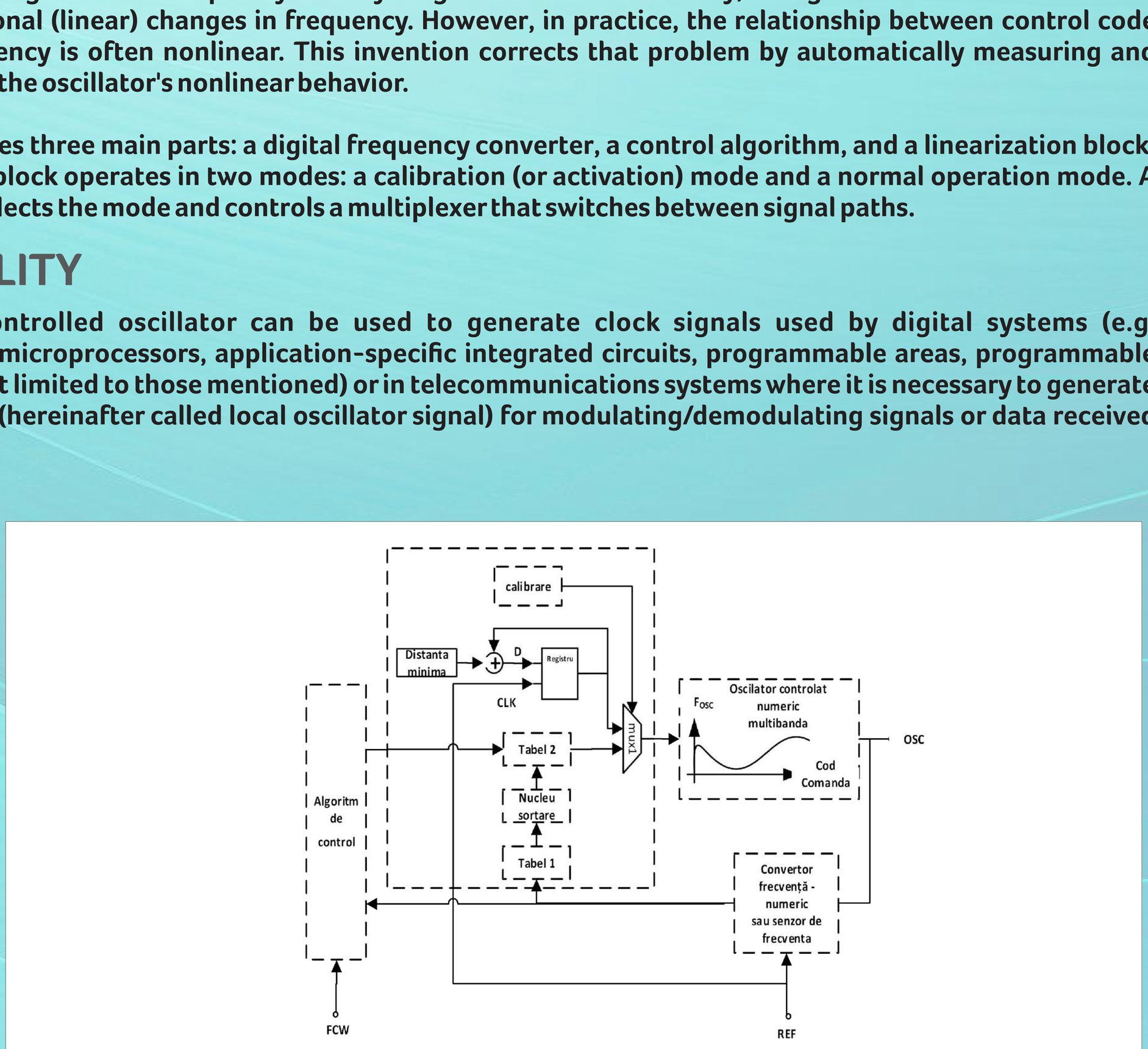
This invention describes a system and method for improving the accuracy of digitally controlled oscillators (DCOs). A DCO generates a signal whose frequency is set by a digital control code. Ideally, changes in the control code would result in proportional (linear) changes in frequency. However, in practice, the relationship between control code and output frequency is often nonlinear. This invention corrects that problem by automatically measuring and compensating for the oscillator's nonlinear behavior.

The system includes three main parts: a digital frequency converter, a control algorithm, and a linearization block. The linearization block operates in two modes: a calibration (or activation) mode and a normal operation mode. A calibration unit selects the mode and controls a multiplexer that switches between signal paths.

APPLICABILITY

A numerically controlled oscillator can be used to generate clock signals used by digital systems (e.g. microcontrollers, microprocessors, application-specific integrated circuits, programmable areas, programmable logic areas, but not limited to those mentioned) or in telecommunications systems where it is necessary to generate a local oscillation (hereinafter called local oscillator signal) for modulating/demodulating signals or data received or transmitted.

IMAGES



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TITLE

TOF NORMAL ESTIMATION FOR PULSE BASED TOF CAMERA USING CNN

C

INVENTOR/S - CONTACT

Szilard Molnar, Levente Tamas
Levente.Tamas@aut.utcluj.ro

PATENT/PROJECT

Patent OSIM no.: RO137263 - B1 / 28.11.2025

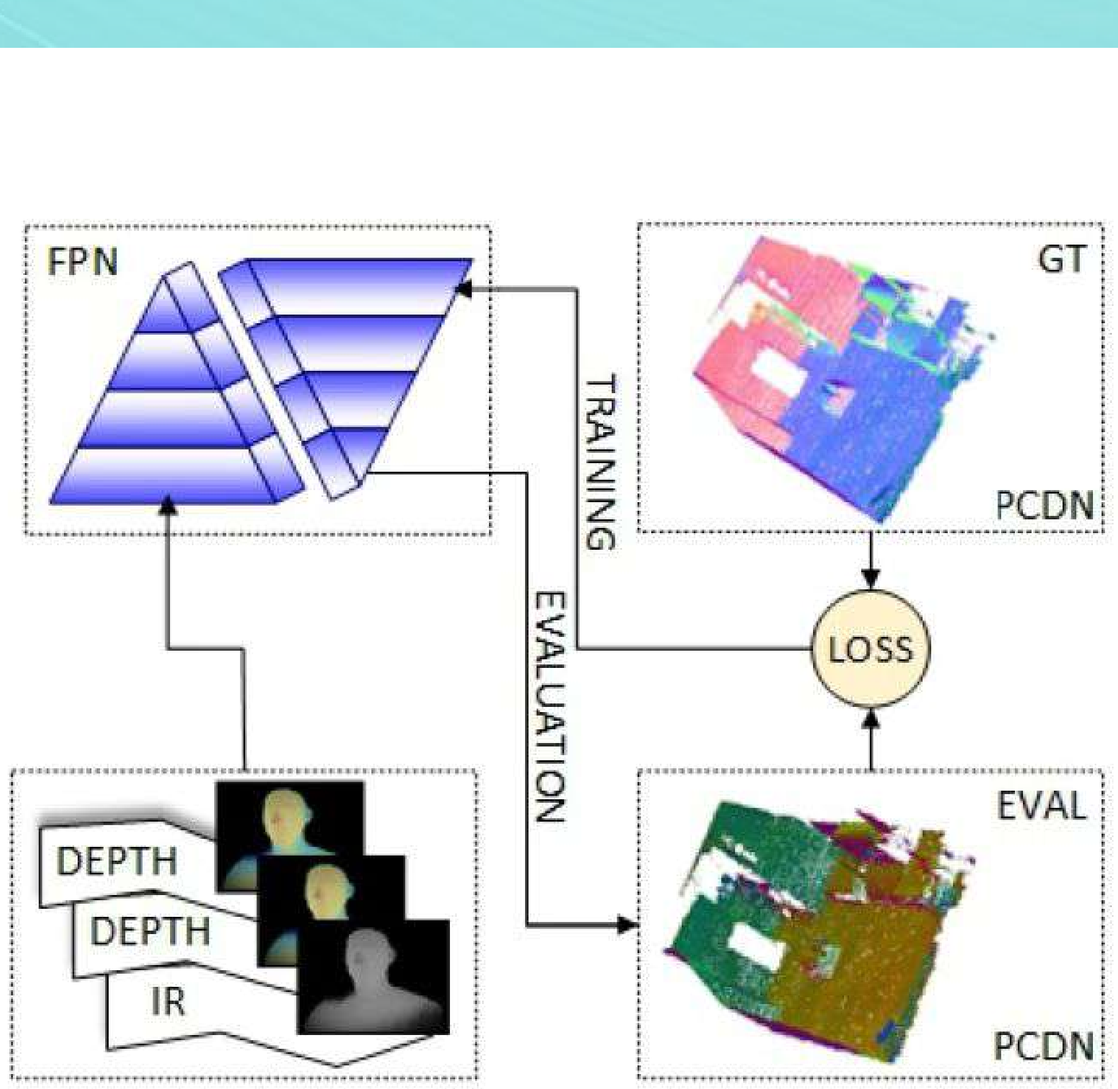
SHORT PRESENTATION

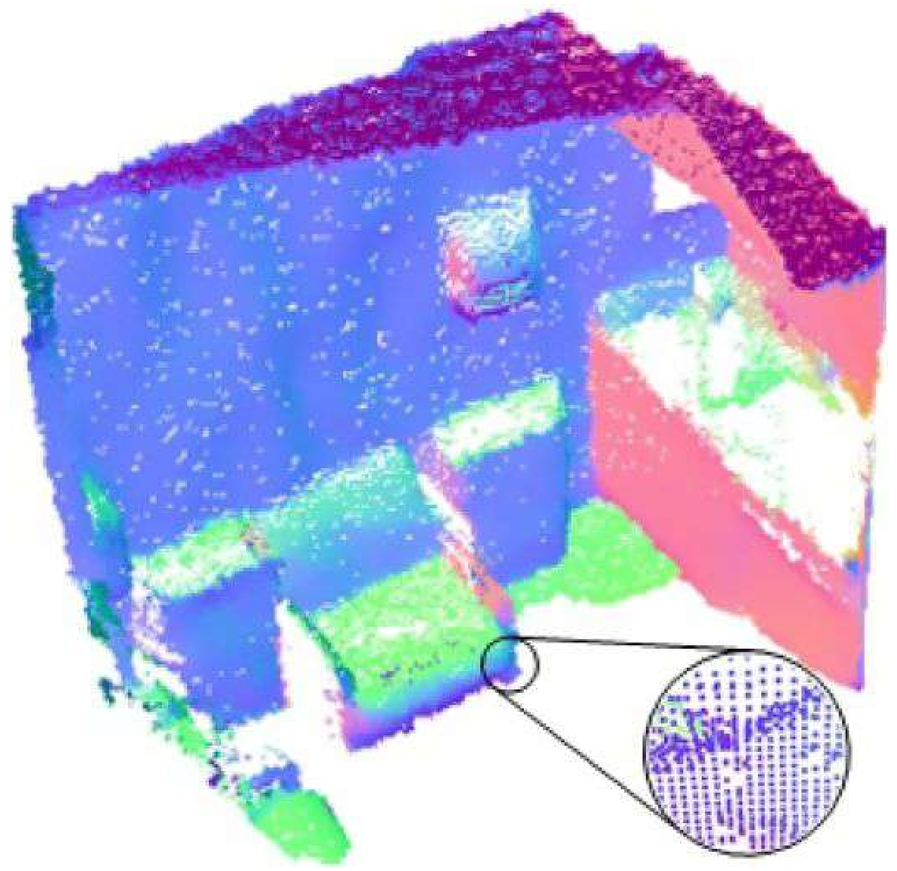
A system and method for automatically computing spatial surface normals in 3D data from the pulse based Time-of-Flight(ToF) cameras is provided. Moreover, the system comprises a component which is using convolutional neural network (CNN) for computing the normals of a 3D pointcloud sensed and returned from the ToF camera depth images. The CNN is based on the 3 channel composition of information which is trained on a large real and synthetic dataset, for which an automatic 3D point processing chain is used to determine the normals. During the evaluation mode, the CNN is able to compute the normals of the pointcloud from the ToF camera, ensuring a fast and robust normal estimation for the pointclouds.

APPLICABILITY

The invention is applicable in interventional oncology and medical robotics, especially in interstitial brachytherapy procedures that require precise and repeatable placement of multiple needles for positioning radioactive sources inside tumour tissue. It can be integrated in manually assisted setups or robotic systems and is suitable for laboratory validation and future image-guided cancer treatment platforms.

IMAGES





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TITLE

ELECTROTHERMAL EVAPORATOR WITH FLAT FILAMENT

INVENTOR/S - CONTACT

Dorin Petreus, Cadar Sergiu,
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C

PATENT/PROJECT

Patent application OSIM no.: A/00136/15.04.2025

SHORT PRESENTATION

The invention relates to an electrothermal evaporator with a flat molybdenum filament (1) intended for evaporating micro liquid samples and introducing them into the plasma of an analyzer based on optical emission spectrometry for the simultaneous determination of the constituent elements. The flat molybdenum filament evaporator is characterized by the fact that the entire drying and evaporation process of the micro sample is carried out without contaminating the plasma with oxygen through the use of an iris-type closing mechanism (14) and a new type of flat molybdenum filament (1).

APPLICABILITY

Analytical instrumentation, electrothermal evaporation processes

IMAGES

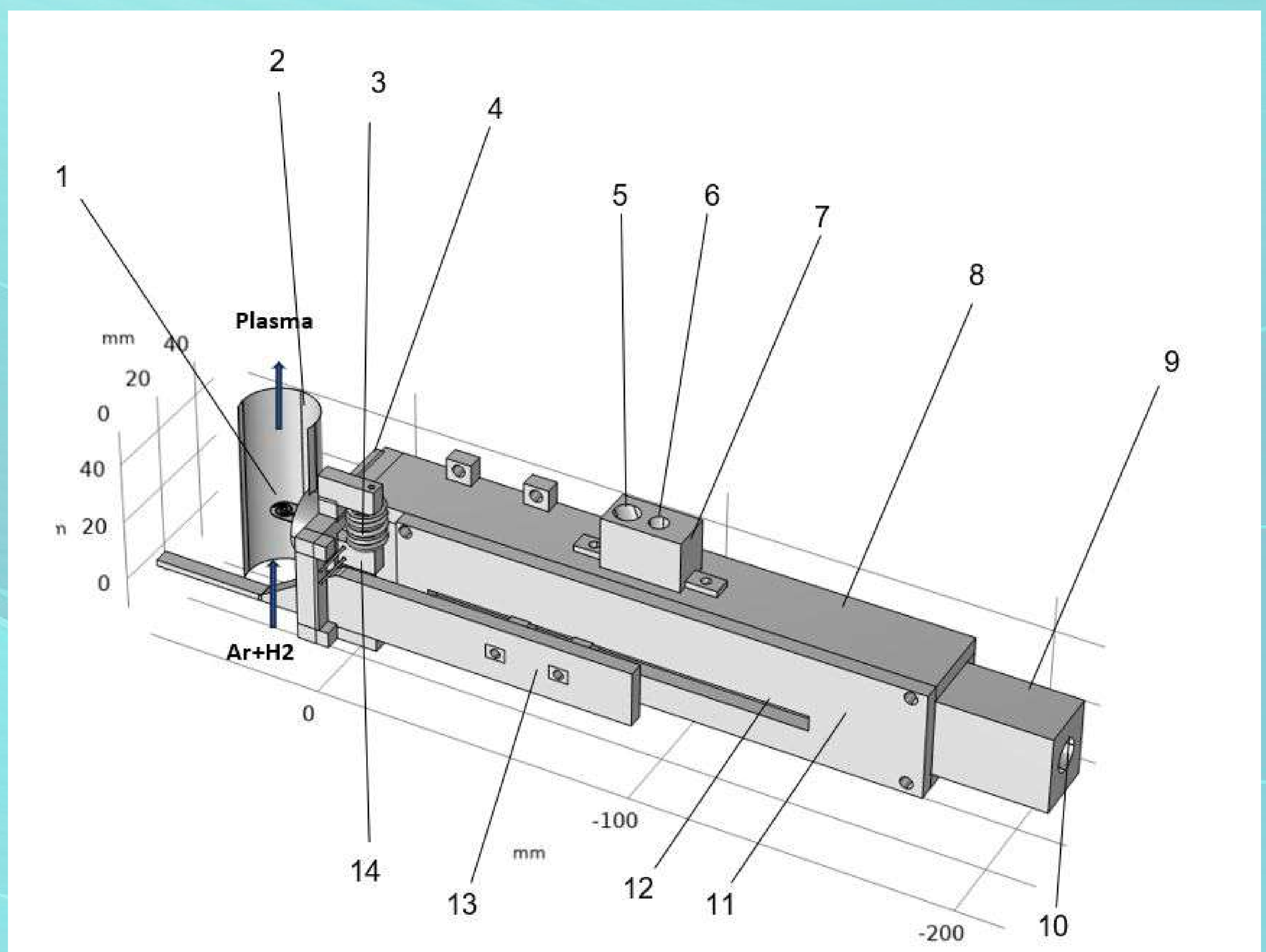

Fig. 1

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C

TITLE

INSTRUMENT FOR DIGITALIZING THE HUMAN EXPOSURE ASSESSMENT PROCESS TO ELECTRIC AND MAGNETIC FIELDS

INVENTOR/S - CONTACT

Giurgiuman Nicoleta-Adina, Păcurar Claudia, Constantinescu Claudia-Alana, Gliga Marian-Răzvan, Andreica Sergiu-Iulian, Bojiță Adrian-Ioan
Adina.Giurgiuman@ethm.utcluj.ro

PATENT/PROJECT

Patent application OSIM no.: A/00156/05.05.2025

SHORT PRESENTATION

The invention relates to an automated instrument designed for digitalizing the process of assessing human exposure to electric and magnetic fields generated by the conductors of overhead power distribution and transmission lines. To achieve this objective, the technical solution adopted by the present invention consists of four main components, as shown in Figure 1: the EMF software application developed for digitalizing the process, accessed via a mobile phone or a laptop (1); a commercial device for measuring electric and magnetic fields (2); a robotic platform that includes the electronic components required for its automation (4); and a wooden tripod (3). The EMF application includes three modules presented in its graphical interface, as shown in Figure 2, namely: a module for commanding and controlling the robotic platform (5) (Figure 3); a module for recording, storing, and graphically displaying the measured values (6) (Figure 4); and a module for selecting the exposure limits to electric and magnetic fields according to current regulations (7) (Figure 5). Figure 6 presents Detail A, according to Figure 1, illustrating the components of the electronic system intended for the automated control of the robotic platform (electronic systems (8) and (9) are powered by battery (14). The Raspberry Pi microprocessor-based electronic system (10) is powered by battery (15). The housing (11), made of PLA plastic, contains all electronic components (8–15)). Figure 7 presents Detail B, according to Figure 1, regarding the assembly composed of the wheel (18), the DC motor (16) and the PLA plastic support (17) for this motor.

APPLICABILITY

The automated instrument that has been designed is used in the process of assessing human exposure to electric and magnetic fields generated by the conductors of overhead power distribution and transmission lines. In regard to the assessment of human exposure to electric and magnetic fields generated by the conductors of overhead power transmission and distribution lines, two regulations must be complied with: the one concerning occupational exposure (Government Decision No. 520/2016 from 20th of July 2016 on the minimum health and safety requirements regarding workers' exposure to risks arising from electromagnetic fields) and the one concerning public exposure (Order No. 1193 from 29th of September 2006 approving the Norms on limiting the general population's exposure to electromagnetic fields from 0 Hz to 300 GHz).

IMAGES

fig.1

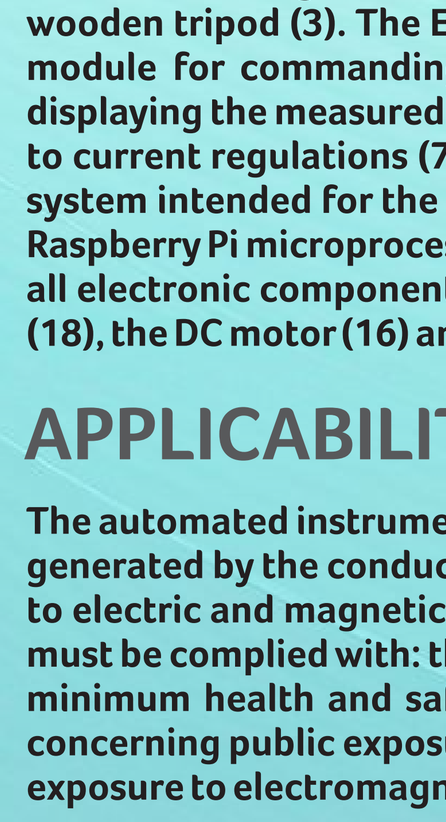


fig.2

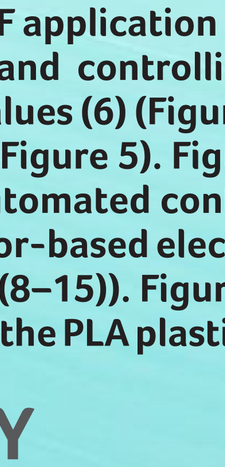


fig.3

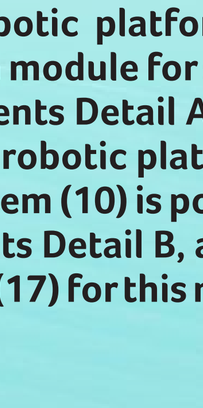
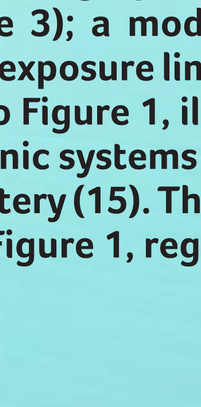


fig.5



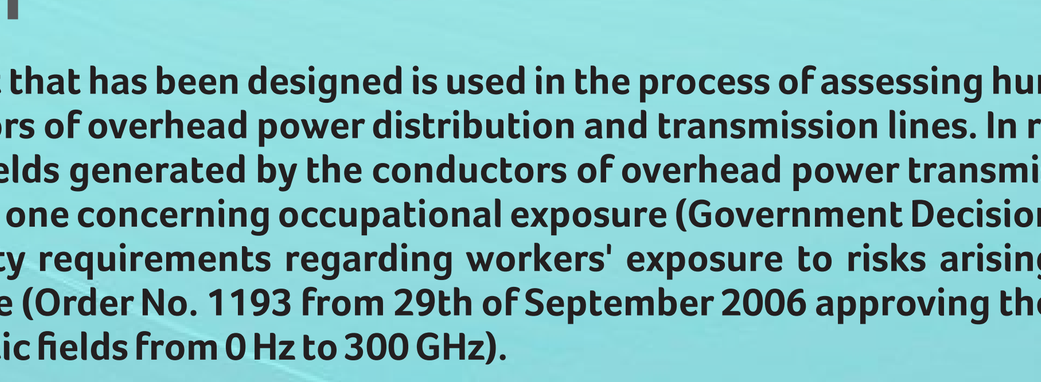
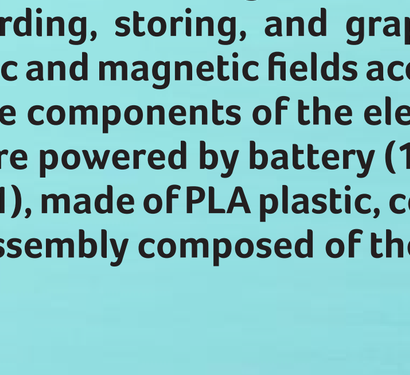


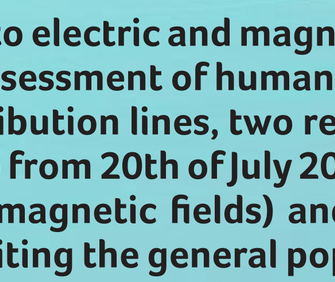
fig.4

fig.6



Detail A

fig.7



Detail B

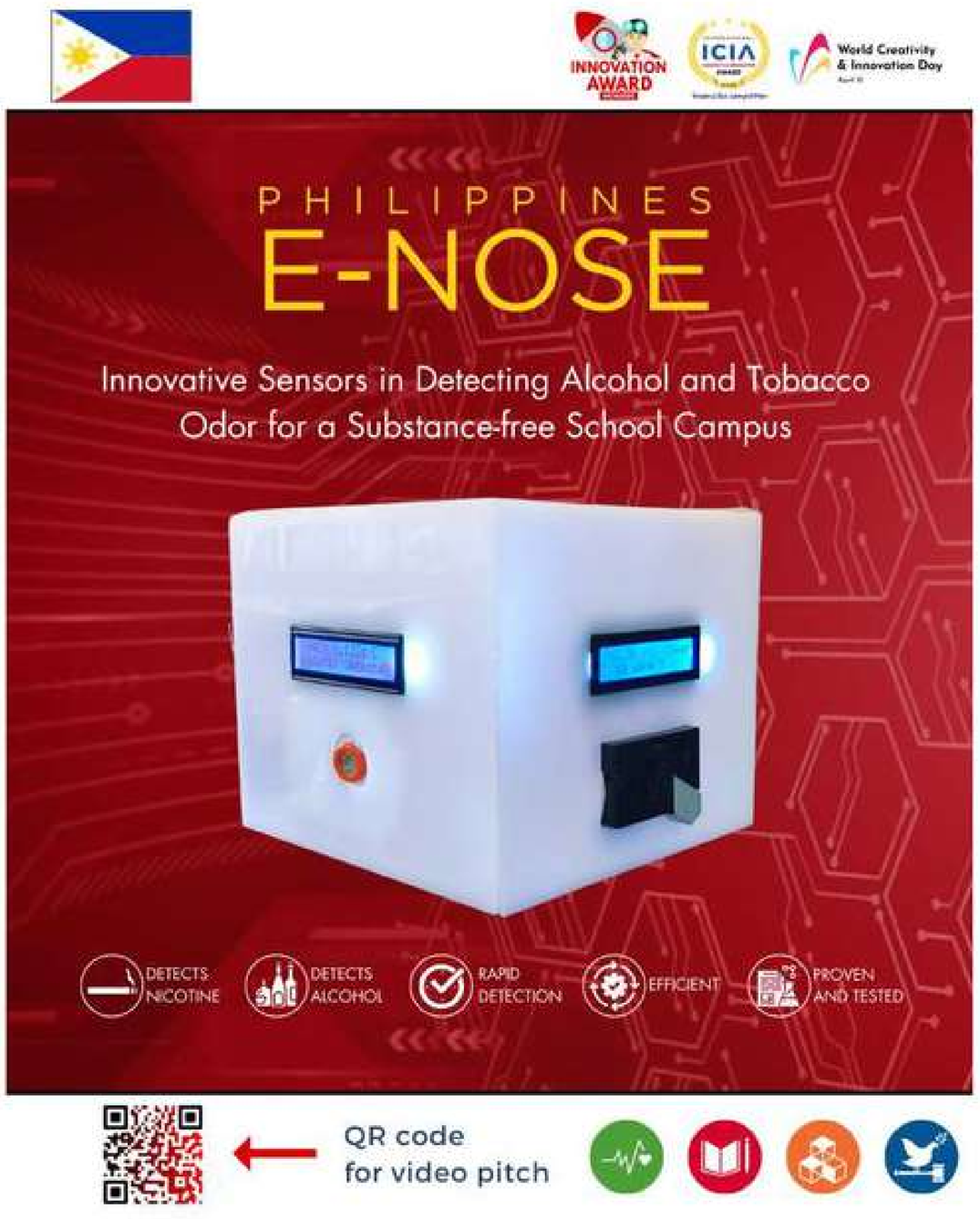
E-Nose: Innovative Sensors in Detecting Alcohol and Tobacco Odor for a Substance-free School Campus

C

Authors: Ralph, Kerd B. Abapo, Johanna Noriz D. Jumalon,
Philip Dion T. Berroya, Gavriel Nyno B. Cambonga
Mentors: Ivan C. Belnas, James Oliver B. Deang

Description:

E-Nose aims to improve public services in Education, Health and Nutrition, and Social Welfare by promoting safer, substance-free school environments. According to the 2021 Young Adult Fertility and Sexuality Study (YAFS5), 12% of Filipino youth smoke and 29% consume alcohol, behaviors that negatively affect academic performance, discipline, and campus safety. Current monitoring methods are largely reactive, relying on observation and manual intervention. E-Nose introduces a proactive solution through substance detection sensors (MQ-3 and DSM501A), QR-based identity logging, and GSM-enabled real-time SMS alerts to administrators. Operating under a single microcontroller with enclosed sensors for improved accuracy, the device is portable, efficient, and cost-effective. By integrating detection, identification, and reporting in one system, E-Nose supports safer educational services and aligns with SDGs 3, 4, 9, and 16. Beyond schools, it also has potential applications in workplaces, government offices, and other smoke- and alcohol-free public spaces.



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BunuriPersonale.ro online ecosystem optimized for efficient connection between sellers and buyers

C

Author/s: Mihoc Mădălina

The accelerated digitization of commerce has led to a significant increase in peer-to-peer trading platforms. However, most existing solutions have limitations such as complex interfaces, high exposure to fraud attempts, difficulties in filtering relevant ads, and the lack of a digital environment focused on trust and transparency.

In this context, the BunuriPersonale.ro platform was developed as an optimized digital solution to simplify the buying and selling process and create a secure and efficient online ecosystem.

The main goal of the project is to develop an intuitive digital platform that: reduces the time needed to publish and manage ads; optimizes the product search process; facilitates quick connections between real sellers and buyers; contributes to increasing the level of trust in online transactions between individuals. BunuriPersonale.ro is built on a scalable web architecture that allows:

- Efficient management of user accounts - Quick account creation in a secure environment; Simplified management of active ads; Monitoring of interactions and ad performance.

- Optimized ad publishing system - Structured form for entering relevant data; Organization into multiple categories (electronics, cars, car parts, home, fashion, hobbies, etc.); Standardization of information for increased clarity and comparability of offers.

- Efficient search engine - Quick filtering based on category and relevant criteria; Logical structuring of databases for quick product identification; Reduction of time spent finding suitable offers.

- Trust-oriented digital environment - Secure personal space for each user; Direct interaction between parties; Simplification of communication and reduction of unnecessary intermediaries.

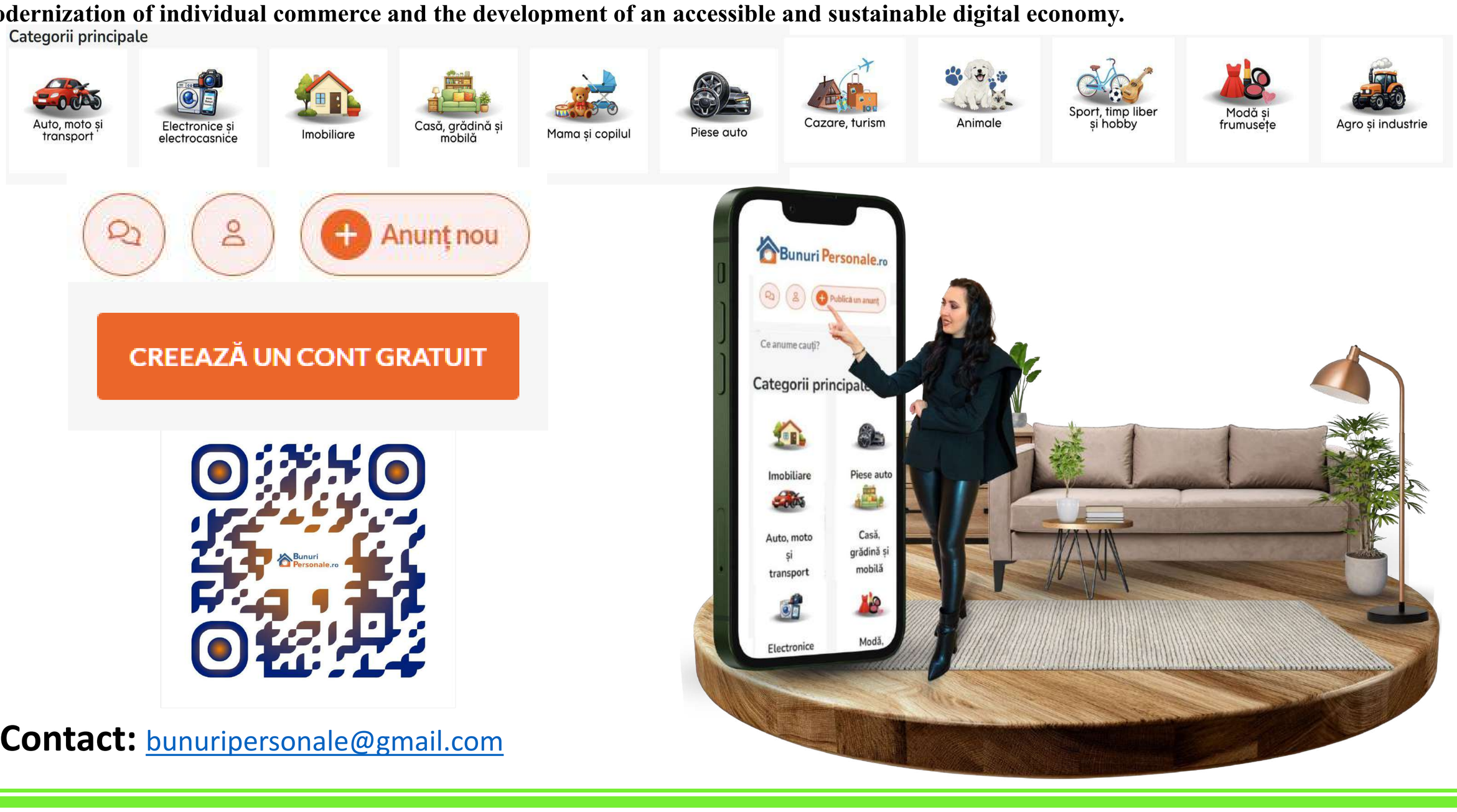
The innovative nature of the project consists of:

Integrating a simplified and optimized publishing and search system, focused on the user experience; Reducing technical barriers for users without digital experience; Optimizing the transaction flow by minimizing the necessary steps; Creating an accessible, free, and efficient platform for the collaborative economy.

Unlike the crowded and complex platforms currently on the market, BunuriPersonale.ro emphasizes clarity, logical structure, and operational speed.

The project contributes to: stimulating the circular economy through the reuse of personal goods; reducing waste and promoting responsible consumption; accessible digitization for users from diverse backgrounds; creating a fair and efficient trading environment.

BunuriPersonale.ro is a scalable and efficient digital solution for trading personal goods, offering an optimal balance between simplicity, functionality, and security. Through its user-centered approach and optimization of digital processes, the platform contributes to the modernization of individual commerce and the development of an accessible and sustainable digital economy.



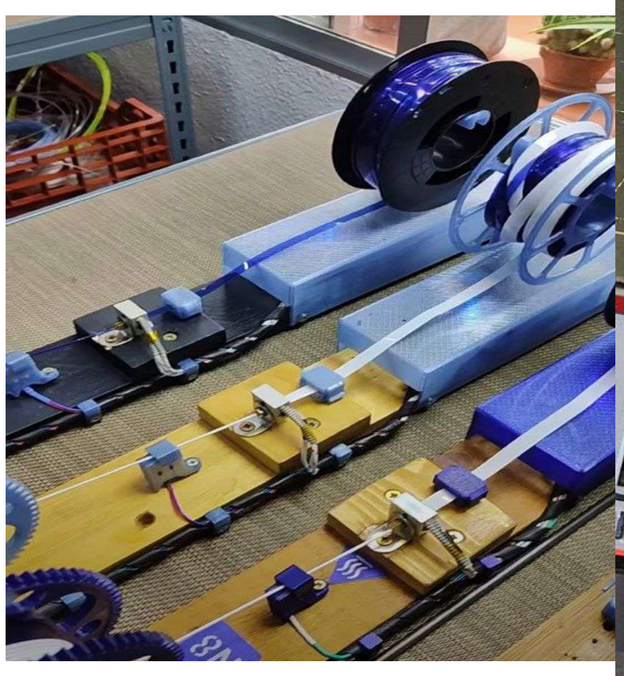
Contact: bunuripersonale@gmail.com

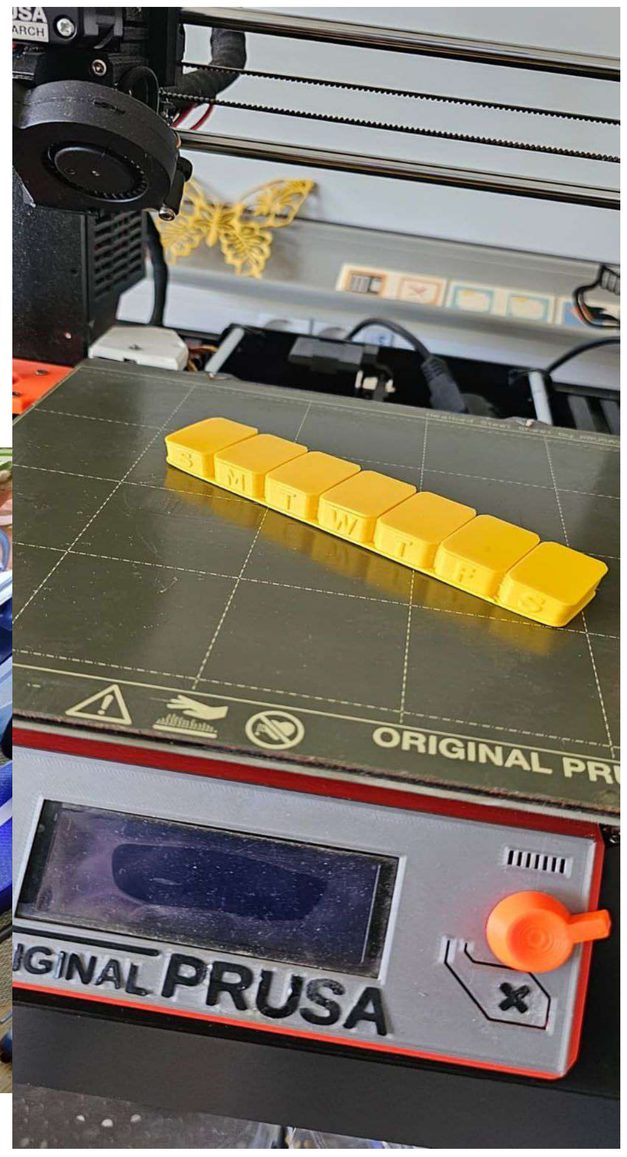
PILL ORGANIZER WITH WARNING SENSOR 3D PRINTED FROM RECYCLED PLASTIC

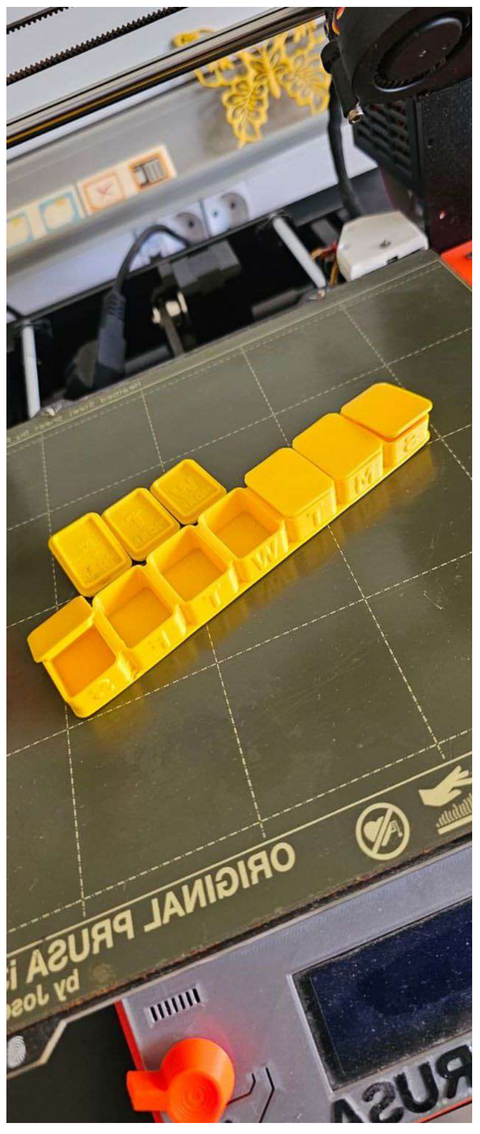
Authors: Andrei PÎRVU, Nicoleta VARTOLOMEI, Simina TĂNASĂ

C

The overall objective of the project is to obtain a pill organizer for elderly people with a 3D printed warning sensor from recycled plastic, tracking the degree of involvement in environmental protection by recycling plastic materials in order to produce filament for 3D printing. Even though today they have their phones at their disposal and can set an alarm, there are some elderly people who have not adapted to mobile phones, and it would be much easier for them to remember to take their pills at the right time. The pill organizer for the elderly people can be printed on both sides without supports and is equipped with a small screen, a small speaker and a base plate with a buzzer, on which the time can be set to ring, reminding them to take their pills.







Conclusions

Plastic bottles have found a new use: raw material for 3D printers. Pill organizer for elderly people with a 3D printed warning sensor from recycled plastic, tracking the degree of involvement in environmental protection by recycling plastic materials.

Acknowledgements

This study was performed with the support material by ***Technological High School of Targu Ocna***

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Virtual Reality network for VET providers (VR-VET)

C

Project number: 101132959

Description:

The VR-VET project aims to enhance the training of Welding Inspectors, specifically focusing on Non-Destructive Testing with penetrating liquids, using Virtual Reality technology.

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. **Project Number: ERASMUS-EDU-2023-PI-FORWARD-LOT2 (Project ID 01132959).**

Contact: aperianu@isim.ro

Deep-tech driven inclusive and socially-aware circular material joining & welding for a safe future (WELDIFY)

Project number: No. 101184218

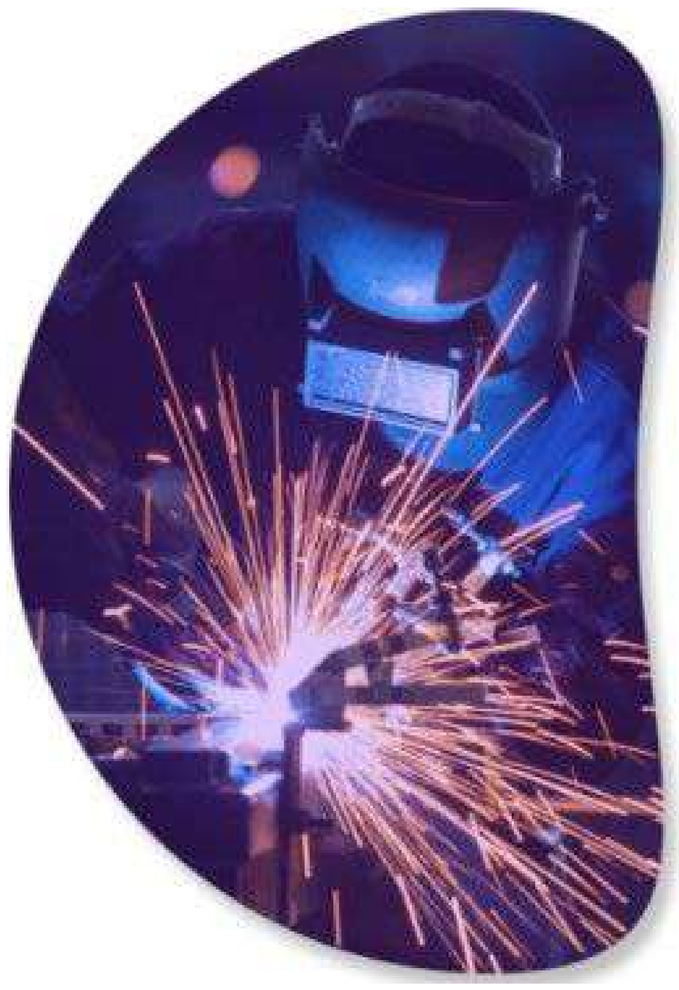
C

Description

The Weldify Project aims to train professionals in advanced Circular Material Welding. Using robotics and cutting-edge technology, we aim to ensure high-quality welding of recycled metals for stronger infrastructure, less waste, and manufacturing excellence in Europe. Our training will take an inclusive, multidisciplinary, and cross-sectoral approach.

objectives

- Develop an innovative cross-disciplinary and cross-sectoral CMW toolkit (ECTS and ECVET compliant) uptaken by 5000 learners (VET/university/industry employees). The courses will be also uploaded on the EIT Deep Tech Talent Initiative Platform and will also be delivered to 500 learners with disabilities.
- Develop a cutting-edge human-machine interaction toolkit for trainers in welding processes by integrating robotics to enhance safety and security (higher education, vocational education, corporate) that would be uptaken by 250+ VET/SME/higher education trainers.
- Develop a Europass-enabled micro-credential certification framework for the envisioned CMW toolkit would enable at least 2000 learners (students, VET learners, workforce) to receive certification
- Establish a comprehensive cross-disciplinary platform for advanced learner analytics, market skills prediction and real-time learning content update (to reflect real time market needs).
- Establish a robust quality assurance and certification framework for CMW, aligning with ISO standards.
- Conduct work based learning apprenticeships with 100 learners.



Consortium participating organizations

Scan me

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. **Project Number: ERASMUS-EDU-2023-PI-FORWARD-LOT2 (Project ID 01132959).**

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MINEON

Patent/project number: SPS2026-01
Author/s: Rangel Amber Untalan, Louise Dominique Borabon
Jacob Drew Cortez, Gabriel Lupe Garcia, Eulice Layne Anis
Dave Lucas Rivera
Mentors: Mr. Raymundo Carlo Hernandez
Mr. Francis Napucao
Dr. Dary Dacanay

C

Our project is a prototype robot for mapping and retrieving artifacts. MINING, INNOVATION, NAVIGATION, ENGINEERING, OPTIMIZATION, NEXT GENERATION. An advanced, multi-purpose mining robot designed to promote safety, efficiency, and environmental care. This model combines exploration and protection in one powerful robot.

Our robot uses sensors to check what is under the ground. The robot shows different colors to tell what is finds. After digging, our robot helps fill the holes in the ground to make the land safe again. It also helps restore plants and animals' habitat so the area becomes healthy and green.

Contact: Dr. Dary Dacanay, Director for Academics – St. Patrick School of Quezon City, Philippines
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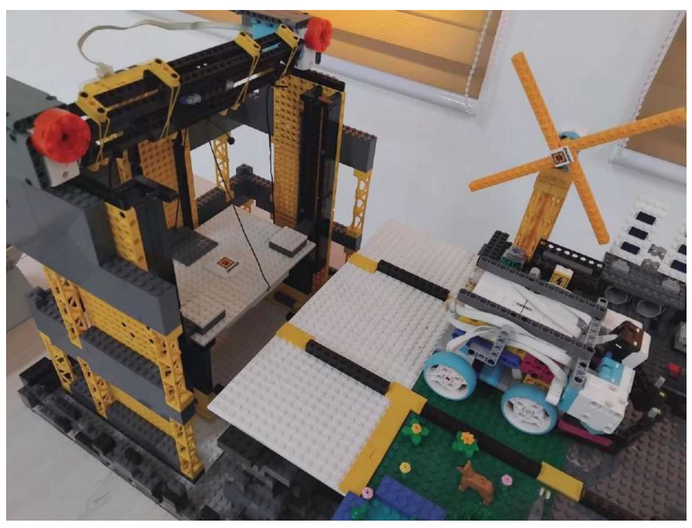
SULO

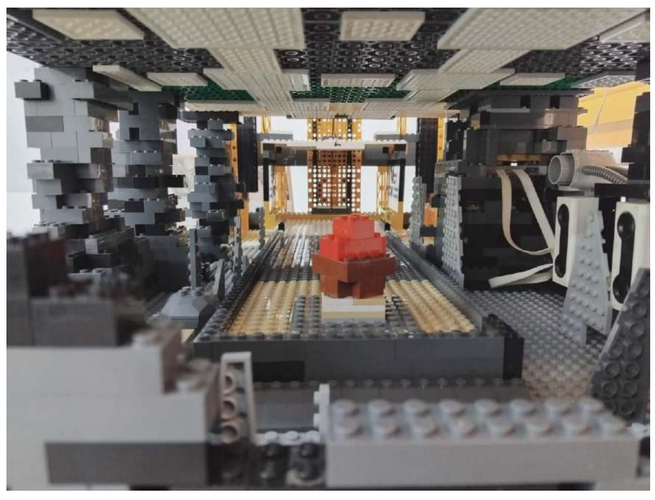
Patent/project number: SPS2026-02
Author/s: Ethan Dominic Ortiz, Jio Gabriel Reyes, Luis Arkin Quiñones, Amalia Summer Matala, Joaquim Sebastian La Torre, Sebastian Oliver Cua
Mentors: Mr. Raymundo Carlo Hernandez
Ms. Mishel Salon
Dr. Dary Dacanay

C

Our project is a prototype robot for mapping and retrieving artifacts. SUBTERRAINIAN UNCOVERER LEGACY OPERATOR. Derived from the Filipino word “Sulo” which means torch. It is a smart robot designed to find and retrieve artifacts without ever touching them. Concept: A non-invasive robotic explorer that replaces "digging" with "sensing.“
Our main concepts are: Ultra-Compact Design and Small Hub

Architecture: Using the 2-port SPIKE Essential Hub, S.U.L.O. features a significantly smaller footprint, allowing it to navigate gaps as narrow as 15–20cm. Lightweight Chassis: The reduced weight ensures that the robot exerts almost zero pressure on the cave floor, protecting delicate stratigraphic layers and ancient pottery shards from cracking. Simplified Locomotion: Powered by Small Angular Motors, providing high precision for slow, deliberate movements—essential for "no-disturb" archaeology. Specialized Intelligence: The "Eye" of S.U.L.O.: The SPIKE Essential Color Sensor acts as the primary investigative tool. It is programmed to scan for the deep earthy reds of the artifact, signaling a "discovery" when the color signature matches. Integrated Light Grid: The 3x3 Light Matrix on the Hub serves as the modern "Sulo" (torch), providing a localized, low-heat light source to illuminate artifacts for the camera without changing the cave’s ambient temperature. Long range Connectivity: Real-time data transmission from the "Dark Zone" back to the archaeologist’s tablet on the surface.





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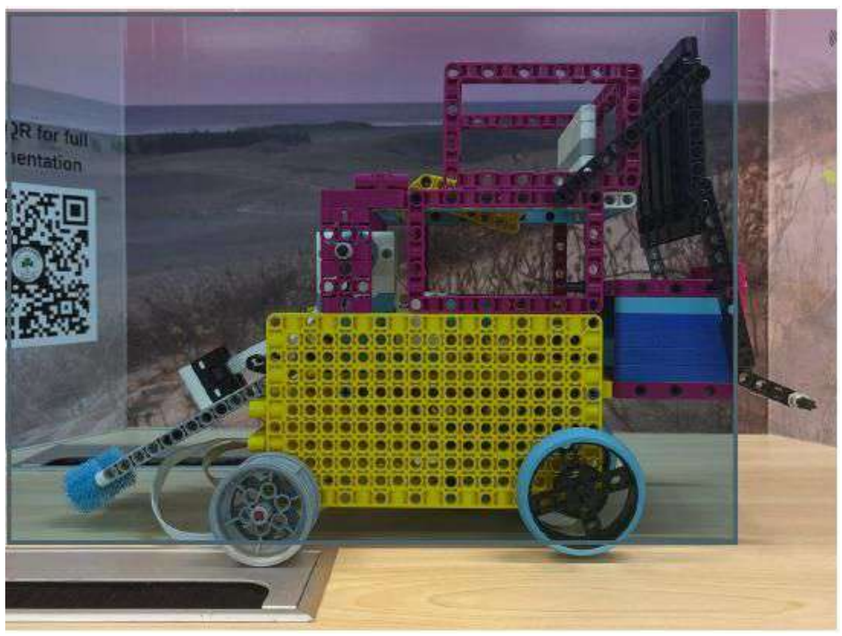
DUNE

Patent/project number: SPS2026 - 03
Author/s: Riyane Samantha Maligson, Zoey Nathalie Rivera, Andrei Miguel Ramos
Mentor: Mr. Raymundo Carlo Hernandez
Dr. Dary Dacanay

C

Our project is a prototype robot for mapping and retrieving artifacts. DISCOVER, UNCOVER, NAVIGATE, and EXPLORE. It is a robot that picks up artifacts and clean to identify what type of artifact this is. We chose this problem because we have noticed from our research that some of the common reasons are that some Archeologists take a long time digging and finding for artifacts and it is also very time consuming and tiring for them.

Our robot will detect and dig up the artifact instead of humans having to dig for several hours. And it will make sure that the artifacts will be protected. It can be efficient for Archeologists, so they won't need to worry about digging for such a long period of time and it can be faster instead of humans doing it.



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DESCENT

Patent/project number: SPS2026 - 04
Author/s: Matt Raemar Sario, Larah Jewel Jacinto, Marquin Xian Lara, John Emmanuel Raymundo
Mentors: Mr. Andrei Tejero, Ms. Mishel Salon, Mr. Raymundo Carlo Hernandez
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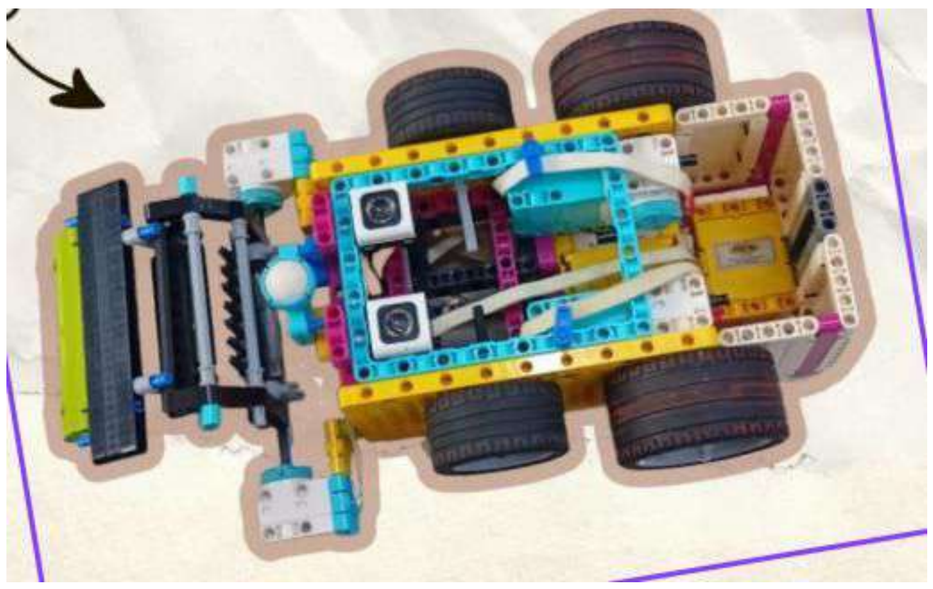
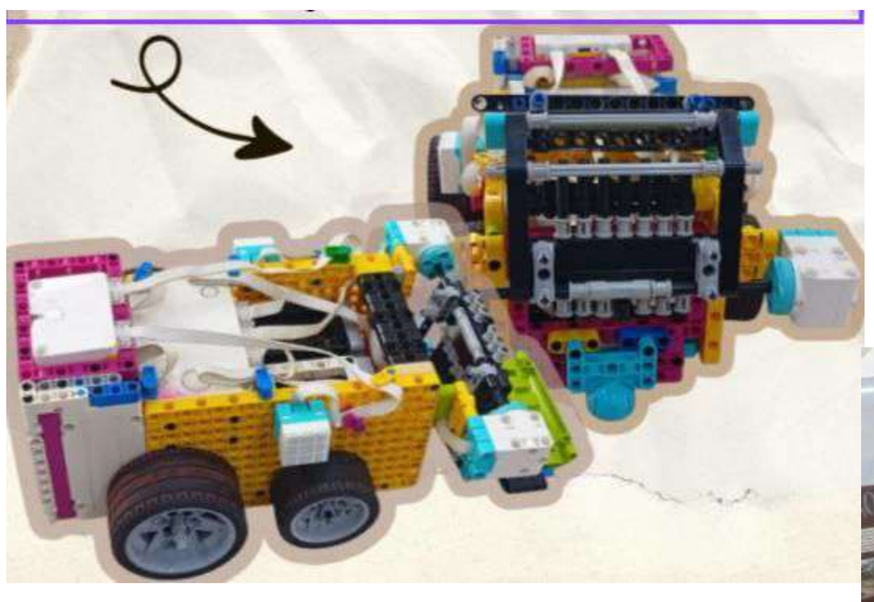
C

Our project is a prototype robot for mapping and retrieving artifacts. The main focus of this project was to minimize environmental damage by maximizing the potential of non-invasive archaeological technology. We constructed the robot model made in the studio and created the basic structure of diorama.

D.E.S.C.E.N.T.'s LiDAR drone would be deployed into the cave to scan the area. After the data of the cave has been sent back to D.E.S.C.E.N.T., It's GPR scanning would activate. Once D.E.S.C.E.N.T. scans a fossil, it switches to extraction mode to scoop the fossil. Filters inside the robot would leave the fossil in its storage box, while dirt and rocks return back into the soil.





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CSUB - Marine Benefit Center

Patent/project number: SPS2026-05

Author/s: Acedillo, John David Reginald S.C.

Escasa, Janelle Clarise L. Cordero, Earl John M.

Mentors: Mr. Jhon Joven Quillao

Mr. Raymundo Carlo Hernandez

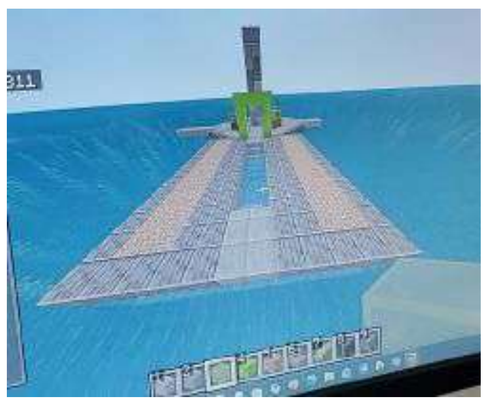
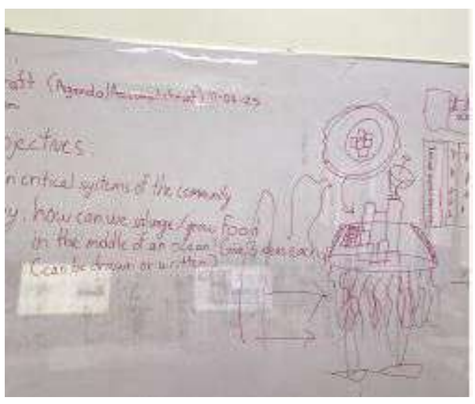
Dr. Dary Dacanay

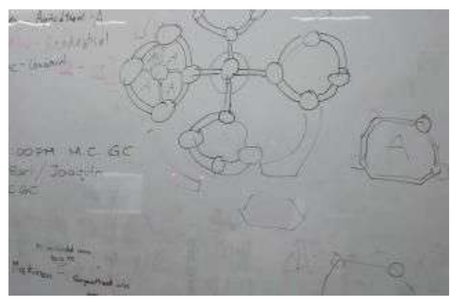
C

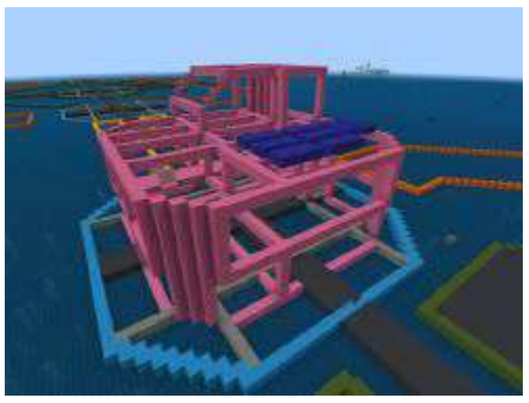
The Need For Ocean Cleanup Ocean cleanup is essential due to plastics eventually breaking down into microplastics, these microplastics pose a severe threat to marine life and humans due to their effects being largely unknown. Plastic Upcycling Sailboats with big nets large enough to not capture fi sh, they will catch any plastics or debris that happen to pass by the sailboat. We will also deploy underwater drones to seek out anthropogenic materials that are detrimental to marine life, ghost gear, plastic bags, and some forms of microplastics.

The plastic collected from this will be upcycled to create a prosthesis for marine life, and the leftover will be used to create the needed equipment for the inhabitants of the settlement, such as diving gear, tools, and building materials. Surplus goods manufactured will be sold in the global market in order to help fund the cleanup program and plastic upcycling. The story of Winter the Dolphin was very inspiring for us. She was rescued from a crab trap line through the help of the Harbor Branch Institute and lost her tail due to necrosis during her time in the Clearwater Marine Aquarium, before being taken as patient in the Hanger Clinic.

Kevin Carroll, vice president of the hanger clinic decided to take her as a patient for life and attempted to develop prosthetics for her. In time they were able to develop a prosthetic she was comfortable using, and she was eventually able to learn how to use it after going through a variety of daily therapies and was eventually able to go through a full recovery.





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CORAL NEXUS

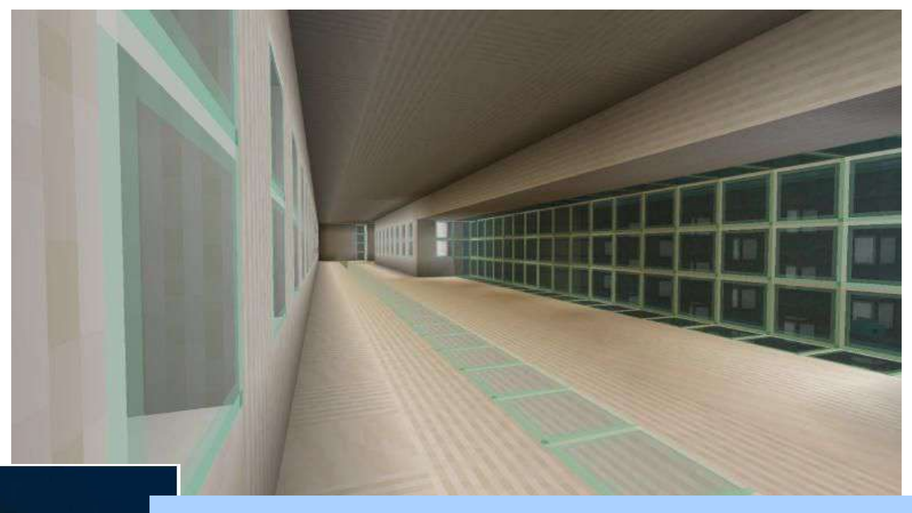
Patent/project number: SPS2026-06
Author/s: Joaquin Nicholas Pereja
Mentors: Mr. Jhon Joven Quillao
Mr. Raymundo Carlo Hernandez
Dr. Dary Dacanay

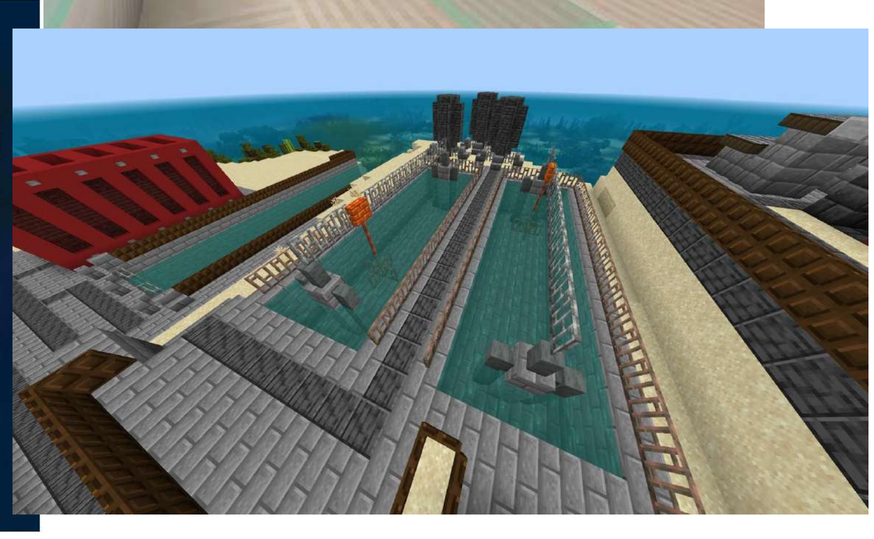
C

This project will be called Coral Nexus. An innovational research base that ensures a safe and quality research base for scientists studying about how to save and maintain sea life. The base has many things that makes it safe for anyone visiting, Such as a fire escape plan, evacuation boats and procedures, and most importantly the outstanding shipping container research hubs. This is a new system made for maximum safety during floods and storms. The shipping containers will be color coded and fitted with scientific research equipment near the sea to make research accessible at any time. And the think that makes this even better is our crane. The crane Is mainly used to lift up our containers to a higher place when we are warned about a typhoon or a tsunami.

Lifting the containers prevents any damage being caused to the equipment. And when the flood subsides we will be able to safely put them back to their original spots with the crane. The lighthouse was here way before the Coral Nexus so we will be using it to our advantage to redirect big boats away from our island to prevent any damage being done to the corals surrounding it. It can also be used to signal that the island is there for any scientists attending work. Speaking of boats, we will now be introducing our trash clean up boats. These clean up boats can scrape the surface of the water to collect plastics that can be brought back to the island to be recycled or researched.

Now that we have discussed everything outside lets talk about the insides. In case the weather is rough or extremely hot and dangerous for work we have established an underground research base with a big ventilated aquarium with various corals and fish to ensure scientists can still research while being in a safe and sustainable environment. The images I will be attaching is the current state of the underground research base and the plans for the island.





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HEALTHY OCEAN FILTER

Patent/Project Number: SPS2026-07

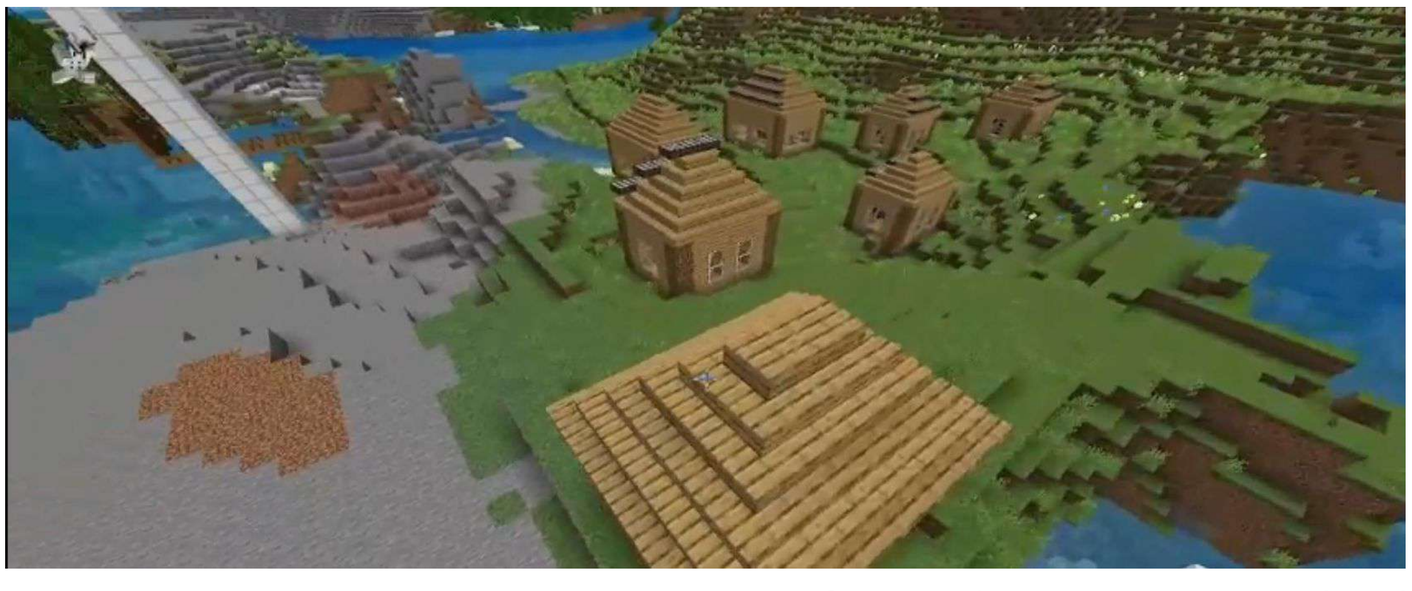
Author/s: Light Ezekiel La Torre, Brianna Majie Dizon, Iago Montrell Davila

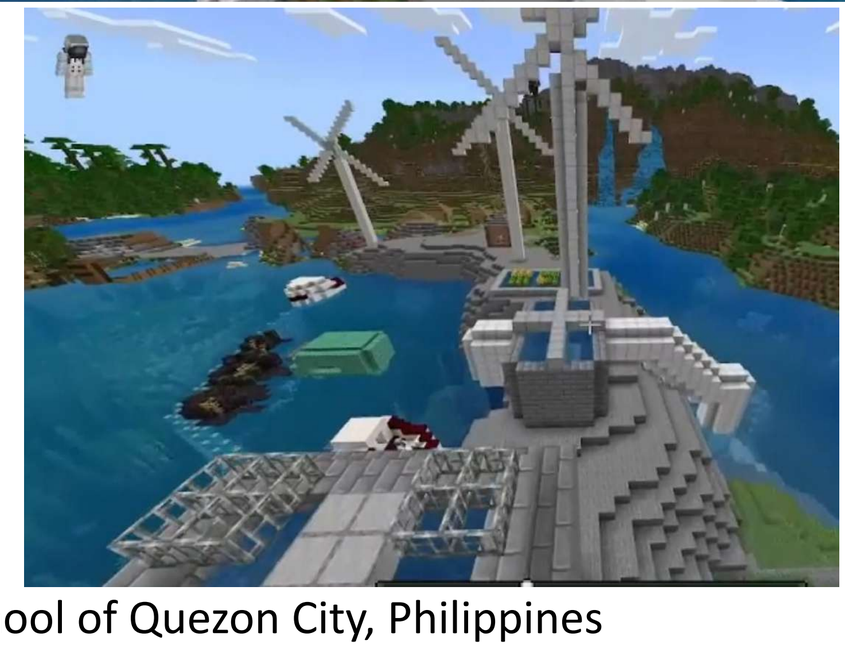
Mentors: Mr. Christian Ivan Galera, Mr. Daniel Apilado Dr. Dary Dacanay

C

Healthy Ocean Project is a simulated project using Minecraft Education. It is a community-centered coastal initiative that combines low-impact engineering, renewable energy, and hands-on marine research to restore and protect local marine ecosystems. The project envisions a village of floating and shore-based facilities that filter ocean debris, generate clean energy, support coral recovery, and engage local residents as stewards and researchers. The design is inspired by proven large-scale cleanup concepts such as System 002 and adapted for sustainable, community-scale implementation in the Philippines. The key components of this projects are: Water Filtration System — A shore-mounted intake lifts surface water through a pipe, passes it through a coarse and fine filter to remove floating trash and microplastics, then returns cleaned water to the sea through an outlet pipe. Filters are modular for easy cleaning and replacement.Trash Capture Fleet — Two support boats tow large floating nets that funnel concentrated debris to a collection boat. Collected waste is sorted on board for recycling, composting, or safe disposal.Renewable Energy Network — Wind turbines and rooftop solar panels supply power to the village, filtration pumps, and the underwater research dome, minimizing fossil fuel use.Underwater Research Dome — A pressurized, accessible dome supports coral restoration, species monitoring, and experiments.

A team of mini researchers (trained students and community volunteers) conduct regular surveys, coral nurseries, and rehabilitation trials.Transport and Logistics — Boats move people, equipment, and research samples between the dome and the island. A small dock and storage hub onshore handle supplies and processed waste.Healthy Coral Zones — Designated restoration areas use native coral fragments, substrate stabilization, and protective measures to create resilient habitats for fish and other marine





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INFRARED RULER

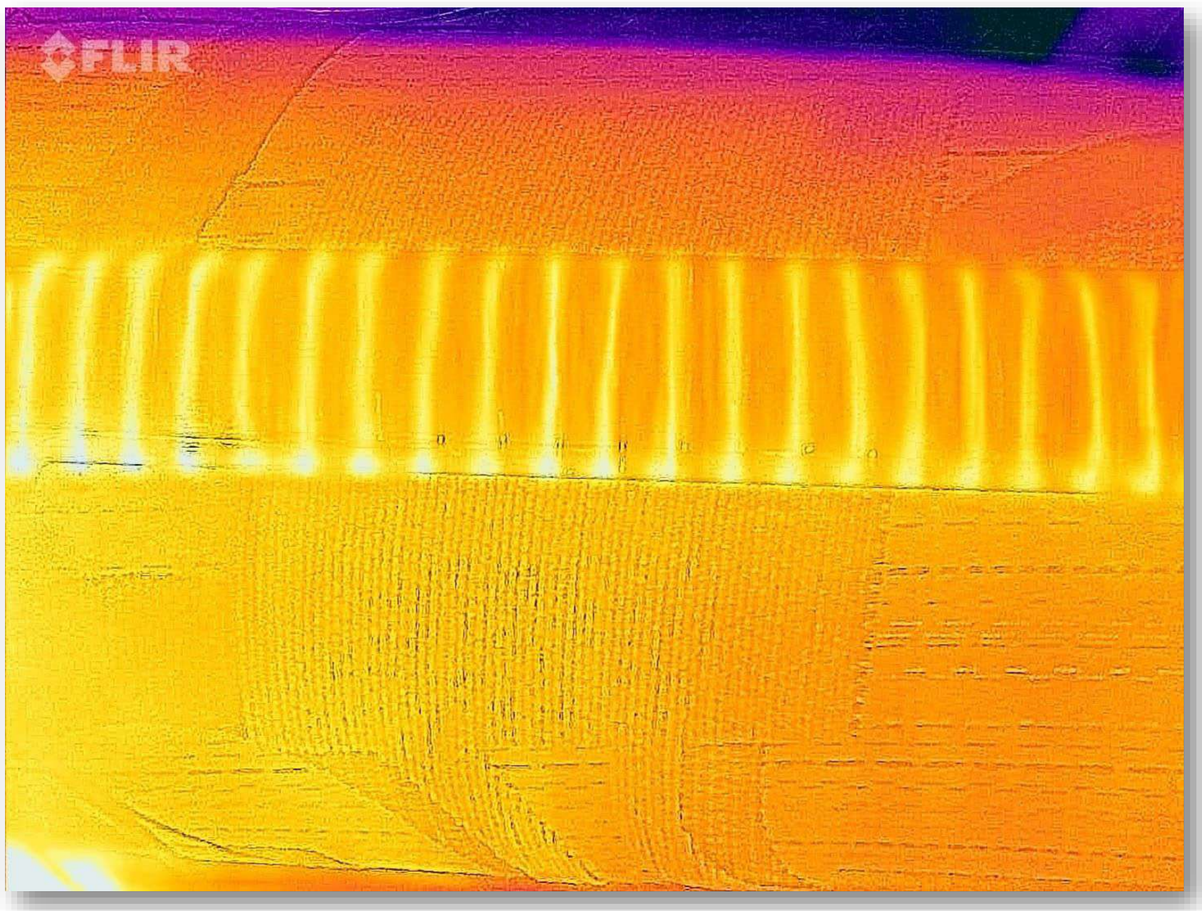
Patent/project number: A/00388/2024

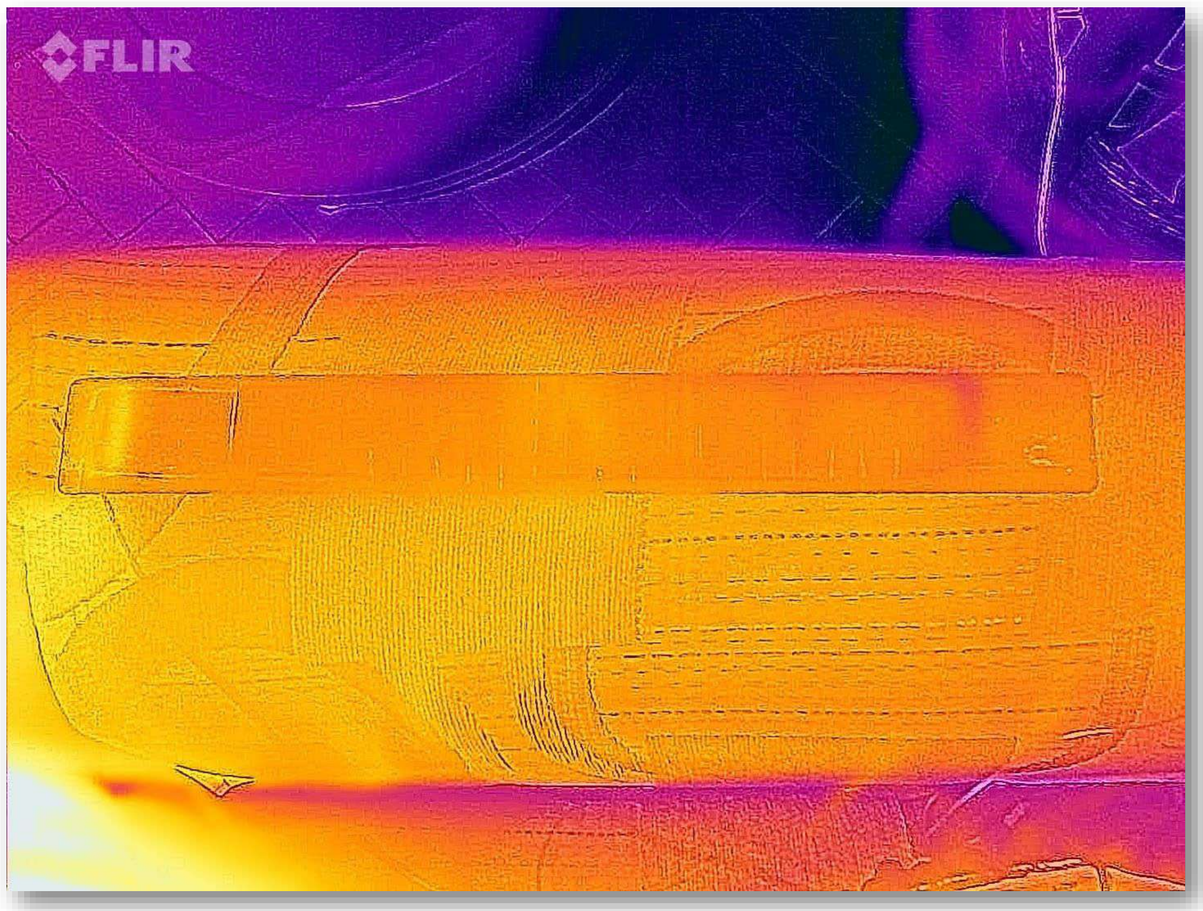
Author/s: Șaptebani Neta Ionelia, Mocan Liviu Marian, Dragan Florin, Ivascu Larisa, Pislaru Marius

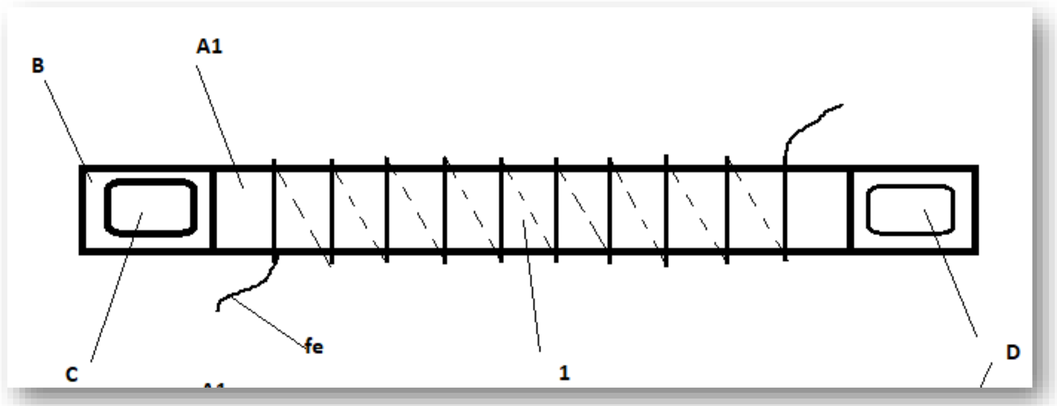
C

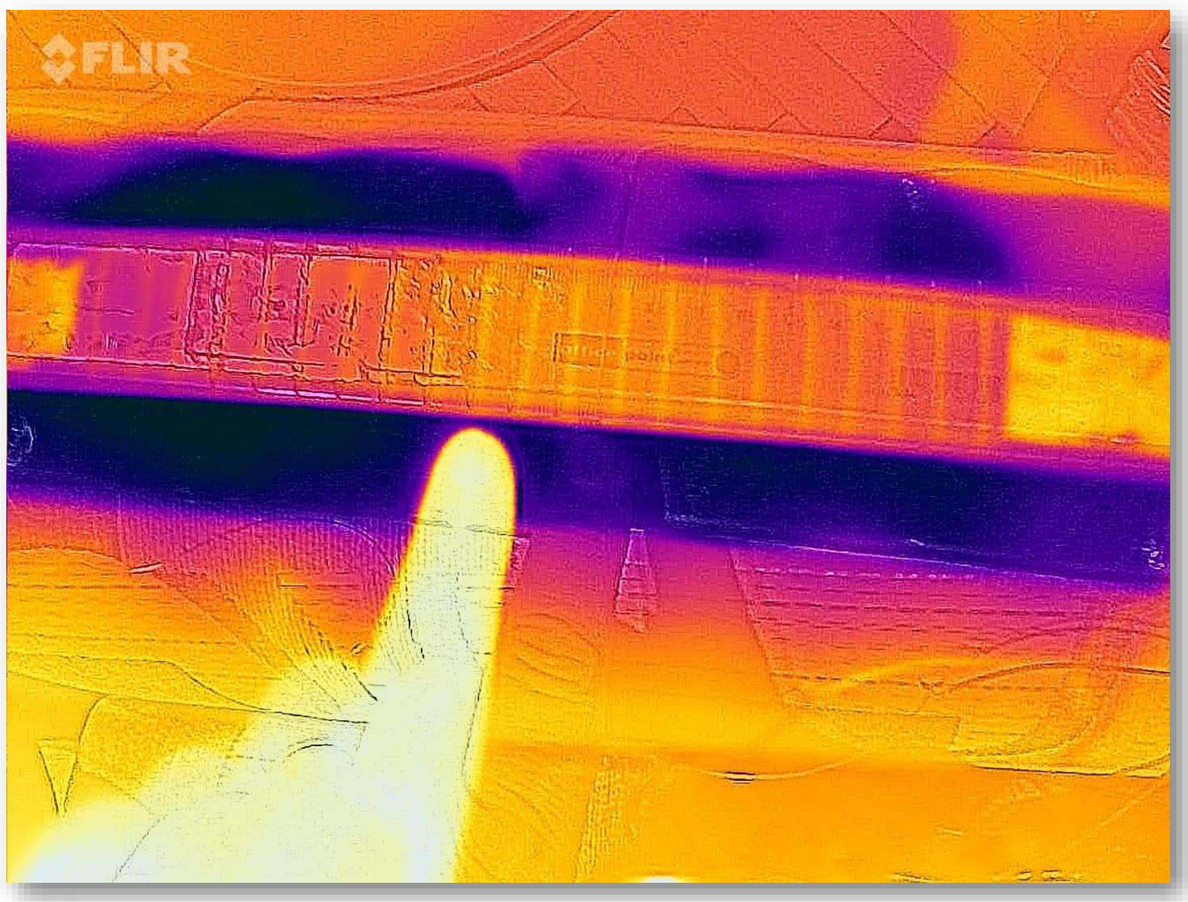
The invention relates to an infrared ruler used for measuring linear dimensions. This is achieved by wrapping an electrically heated conductor wire around an assembly of insulating plates, with a centrally located metal plate cooled by forced ventilation or cooling elements. Alternatively, the wire can be arranged on an insulating structure with compartments through which a cooling fluid circulates, either in a single compartment or in systems with opposing or multiple flows, ensuring the uniformization of the thermal field.

The ruler is useful in research and design, allowing measurements of thermal zones in heating-cooling systems, optimizing air flows, designing and thermally optimizing electrical and electronic circuits, as well as other equipment that requires temperature management.









Contact: Neta Spatebani,
Larisa Ivascu (larisa.ivascu@upt.ro)

Software Optimization for Embedded AI Systems Using Binary Neural Networks for Traffic Sign Detection

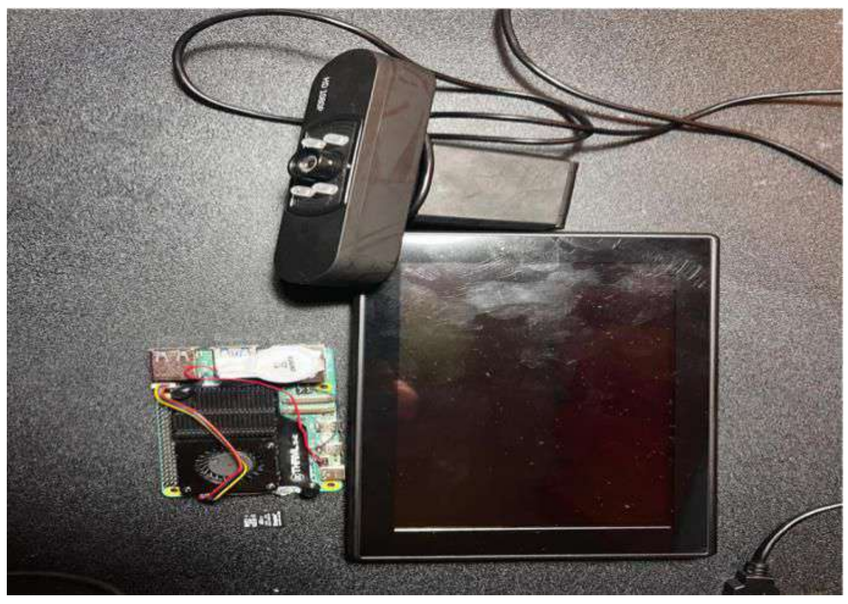
Patent/project number: research project
Authors: Andrei Iliescu, Mihail-Alexandru Stanescu
Mentor: Șl. dr. ing. Adrian Iosif.

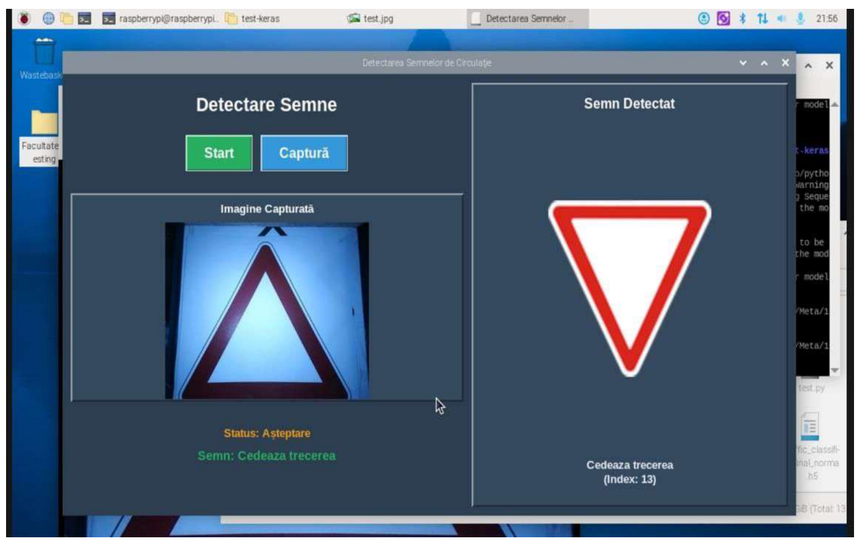
C

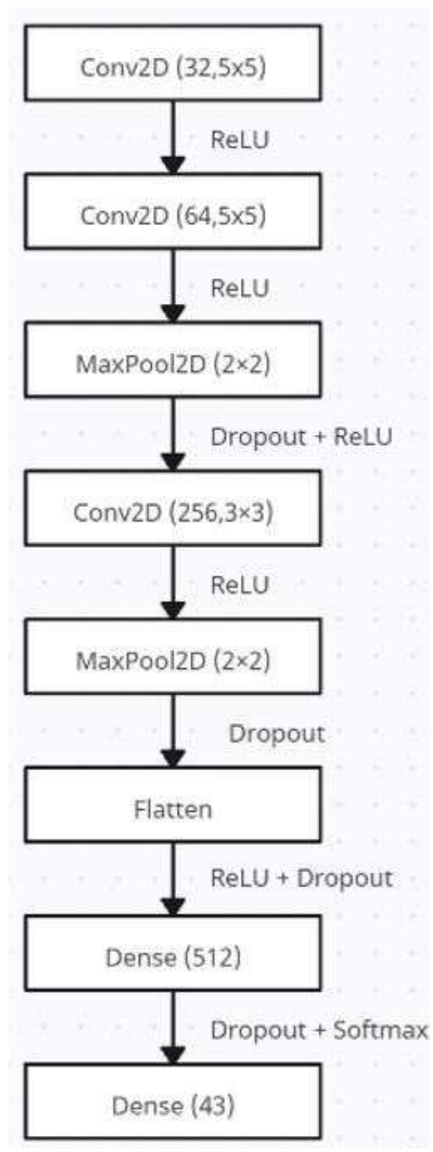
Description:
The project develops an intermediate step toward building a hardware AI accelerator, demonstrating the practical use of a binary neural network for real-time traffic sign detection — a relevant use case in the context of autonomous vehicles.

Problem Addressed:
Conventional CPU/GPU hardware struggles to efficiently support modern AI models due to high processing and memory demands. Neural networks typically rely on 32- or 64-bit floating-point arithmetic, which is expensive to implement on dedicated hardware (FPGAs or ASICs) due to complex circuits and high latency.

Proposed Solution:
The team proposes quantizing the neural network model — converting it from FP32 to INT8 format via Post-Training Quantization (PTQ). This reduces model size and speeds up inference significantly (up to 10× faster, with up to 10× lower energy consumption), while losing only minimal accuracy (2–4%).

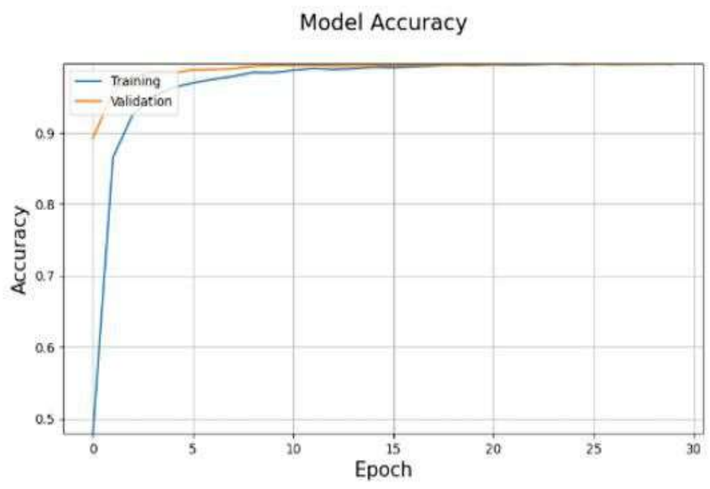


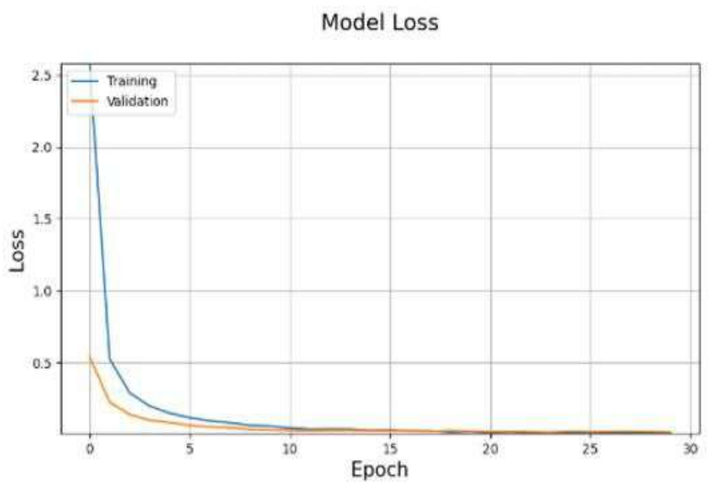




Software Application:
The application runs on a **Raspberry Pi 5** with a connected webcam, performing real-time traffic sign detection. The neural network was trained offline on an **RTX 3060 GPU** using the **GTSRB (German Traffic Sign Recognition Benchmark)** dataset, then deployed to the embedded device.

Conclusions:
Hardware AI accelerators are a viable and efficient solution for critical applications like traffic sign recognition. Quantized models running on microcontrollers can significantly reduce energy costs and processing requirements — key factors for IoT and edge computing systems.





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ALIANT BUSINESS SOLUTIONS & NAVITECH

Driving performance through digital innovation

Alina DUMITRU, Andrada GALBENUSA

C

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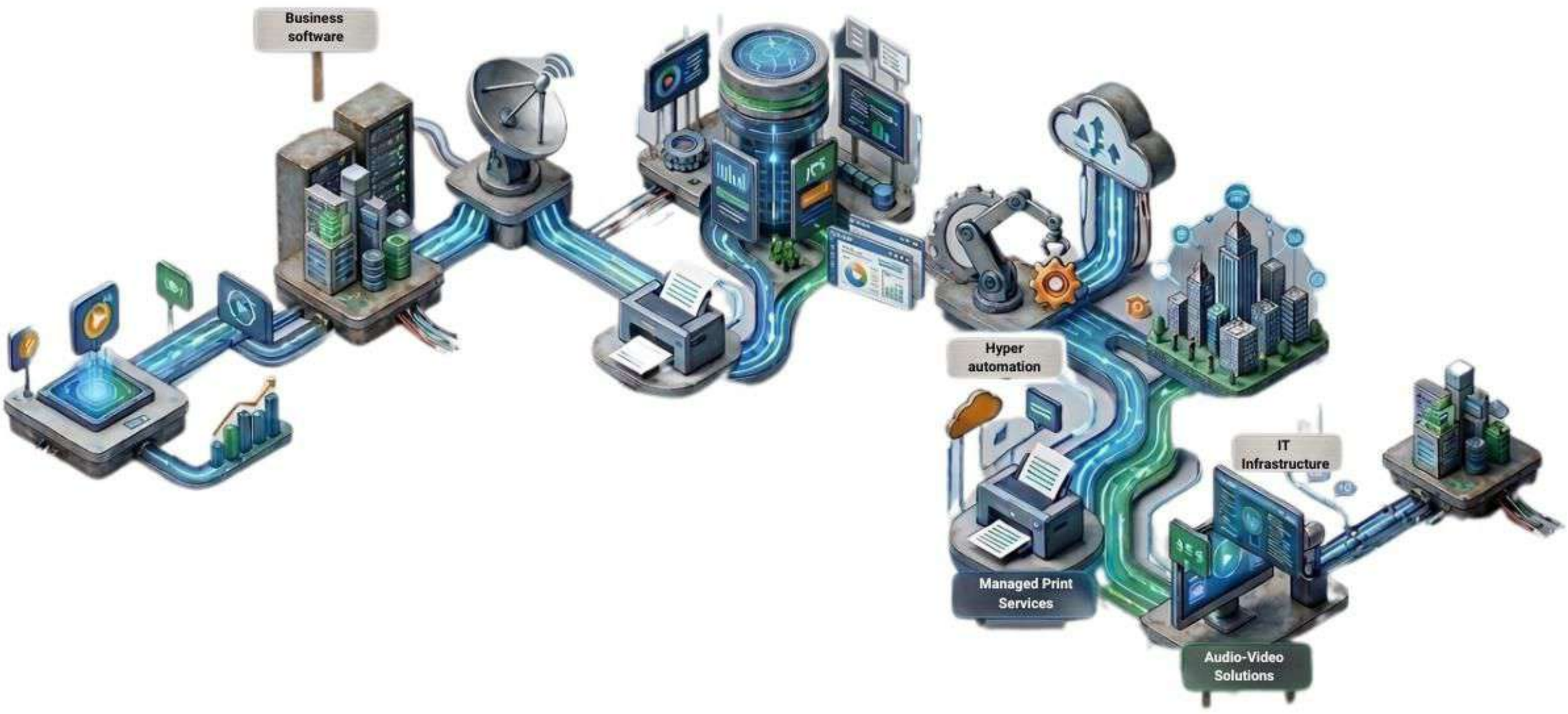
Founded in 1992, Aliant has evolved from a leading document production provider into a trusted partner for digital business transformation. We integrate technologies and services tailored to your business needs, helping you boost performance and achieve real results. Embracing change is in our DNA, we constantly reinvent ourselves to create value for clients and partners. Driven by a passion for disruptive technologies, innovative business models, and forward-thinking ideas, we deliver solutions that make a tangible difference in everyday business and life.

About Navitech IT Concept

Navitech IT Concept is an IT solutions integrator that helps companies and institutions build modern, secure technology infrastructures. We design and implement comprehensive IT solutions, including data centers, networking, security, and storage, tailored to the specific needs of each organization. Leveraging technical expertise and strong partnerships, we transform technology into a genuine driver of performance and growth.



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Application for Supporting the Design of Vertical Axis Wind Turbines

PhD. Stud. Emilia DOBRIN, prof. Nuno Calcada Loureiro, prof. José Carlos Martins

C

This study presents a software application designed to assist in the design and optimization of vertical axis wind turbines (VAWTs), offering advantages such as lower complexity, reduced maintenance, and suitability for small-scale applications. The tool allows users to dimension VAWTs based on power output, rotor size, and wind speed, featuring 2D and 3D visualization tools for performance simulation. To validate its effectiveness, physical prototypes were tested under various wind conditions using non-destructive and destructive evaluations. Results confirmed the application's accuracy in predicting turbine performance and optimizing design parameters. This software provides a valuable tool for engineers and researchers, supporting the broader adoption of renewable energy solutions. Future enhancements will integrate advanced computational models and real-time wind data analysis for improved accuracy.

Three blades Darrieus VWT prototype			
Data (m/s)		The power coefficient of VWT	
V1	10,7		
V2	4,1		
Cp	0,5900	Procent	59%

H type Giromill VWT prototype			
Data (m/s)		The power coefficient of VWT	
V1	10,7		
V2	2,7		
Cp	0,5863	Procent	58,63 %

Two cons Savonius VWT VWT prototype			
Data (m/s)		The power coefficient of VWT	
V1	10,7		
V2	1,5		
Cp	0,5589	Procent	55,89%

Contact: emilia.dobrin@student.upt.ro

METHOD AND SYSTEM FOR ANONYMOUS COLLECTION OF POSITION AND MOBILITY INFORMATION EMPLOYING BLUETOOTH AND ARTIFICIAL INTELLIGENCE

MINEA Marius, DUMITRESCU Cătălin Marian, CHIVA Cosmin Ionuț, MINEA Viviana Laetitia, SEMENESCU Augustin

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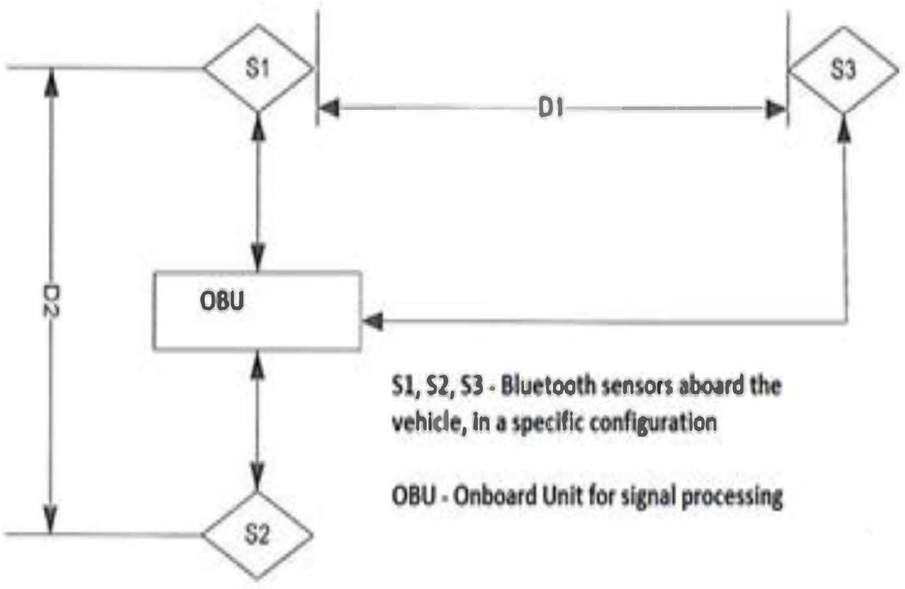
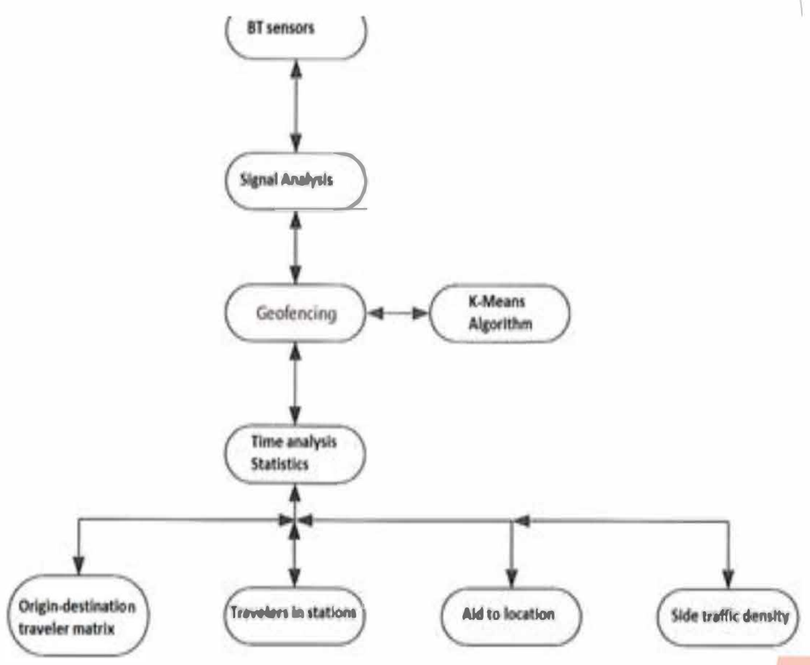
PRESENTATION



The invention relates to a method and system for anonymously collection of information regarding position, mobility of travelers in a public transport system and collateral traffic density. It employs a dedicated configuration of Bluetooth sensors installed in a public transport vehicle, an onboard unit for signal processing and a specific software employing artificial intelligence module for time and space classification of detected bluetooth nodes.

ADVANTAGES

- Provides an aid for public transport management: dynamic allocation of vehicles, location of vehicles, re-routing, estimating the number of transported travelers and detection of collateral traffic density;
- It is modular and can be adapted to the public transport vehicle structure, it has low energy consumption and zero emissions;
- Does not need any infrastructure device or network; adaptable for the future Internet of things;
- All modules are low energy and can be supplied from the vehicle's power supply



PROBLEM SOLVED

❖ The solution delivers economy in infrastructure complexity; does not interfere with any of the existing equipment and is safe and secure,

❖It is adaptable in accordance to the public transport company requirements;

❖Ensures proper visualisation of the recorded information and improves in accuracy in time.

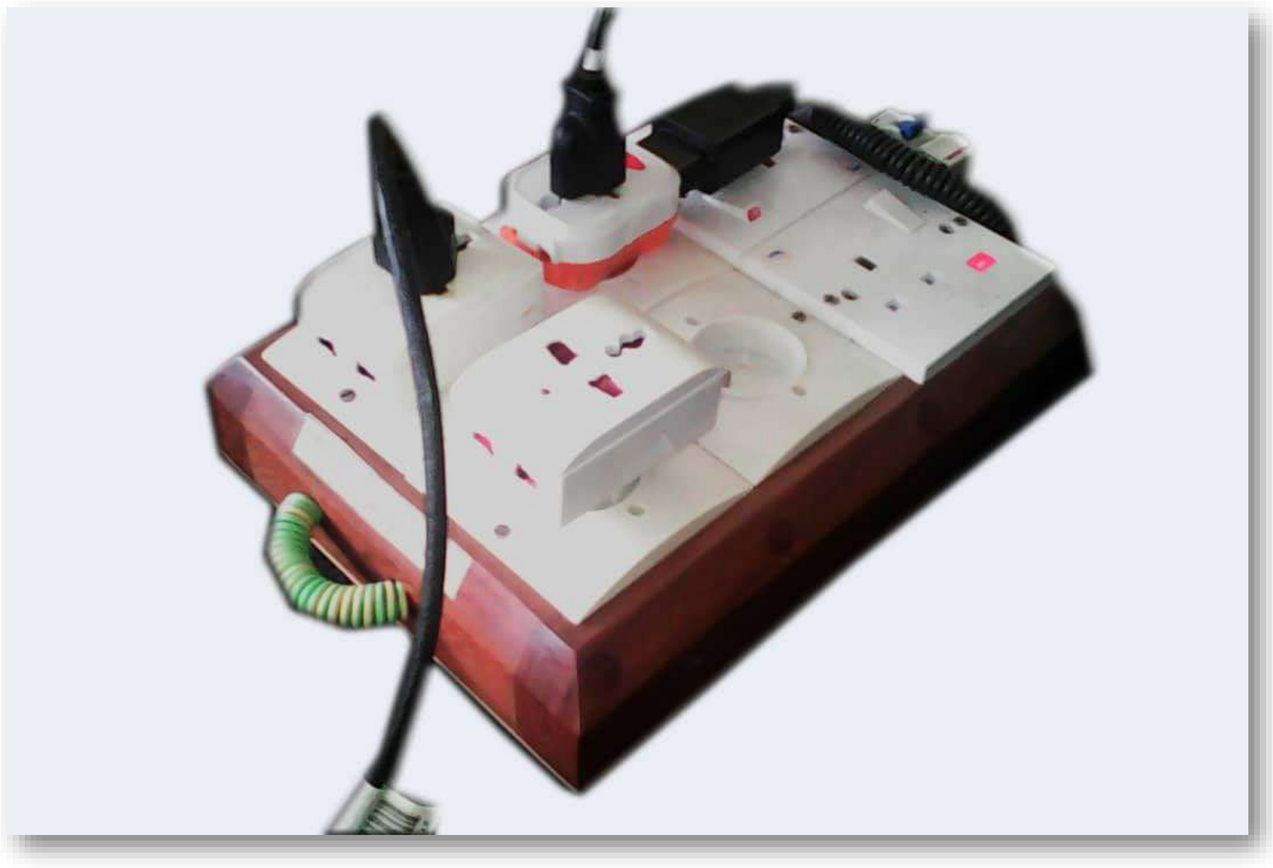
MULTIFUNCTIONAL SURGE PROTECTOR

Patent/project number: 1201800385(18953)

C

Author/s: WAM ELVIS MBVIUGEH

This invention relates to multifunctional surge protector, innovated and designed to play multifunction; to supply a stable current and even voltage on general electronics and machines. To protect electronics from unforeseen conditions like excessive heat, overload, lightning and thunder, excessive current and voltage. This apparatus is also used as a maintenance tool in the electronic and electrical industries.



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wamelvis@gmail.com

Autonomous robot for collecting, sorting and relocating objects

"Traian Lalescu" Theoretical High School

Category: C

Authors: *Nistor Mircea (coordinator), Achim Luca Petru, Pașolea Lucian, Borbely Richard, Galfi Rareș Cristian, Vladu Bianca Teodora, Budiul Alexandru Vasile, Alexa Maria Gabriela, Socoteanu Paul Daniel, Nitzu Gloria Eleni*

Who are we?

We are the RobotX Hunedoara team from the "Traian Lalescu" Theoretical High School in Hunedoara, and this is our ninth year of activity. We are united by our common goal: to solve some of the world's problems using science and technology.

Introducing our project

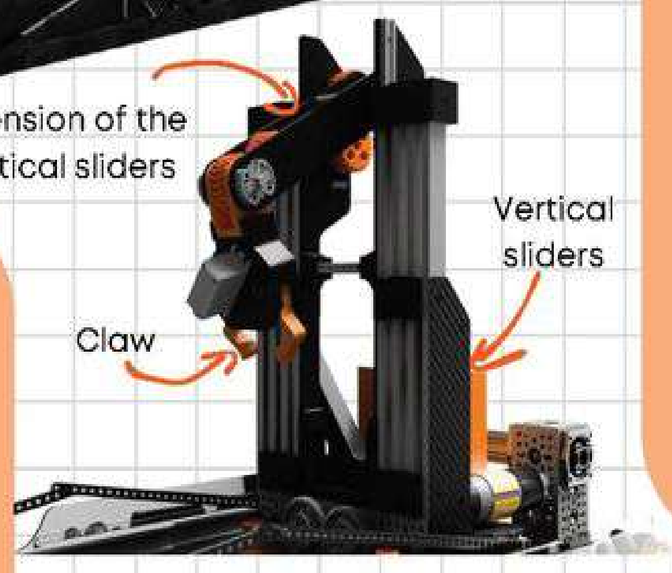
Our robot collects, sorts, and relocates objects of various colors in both autonomous and teleoperated modes.
It is designed to be reliable, fast, and easy to control, with a compact size and reduced weight. Its modular systems allow for easy replacement and repair, ensuring efficient maintenance. Additionally, the robot operates with minimal chassis movement, optimizing performance and energy efficiency.

Chassis:

The chassis is modular, allowing for easy attachment of various systems. It features a Miter Gear transmission and an integrated odometry system. The electronics are compactly integrated to maximize space efficiency. The chassis measures 440 mm in length and 410 mm in width.

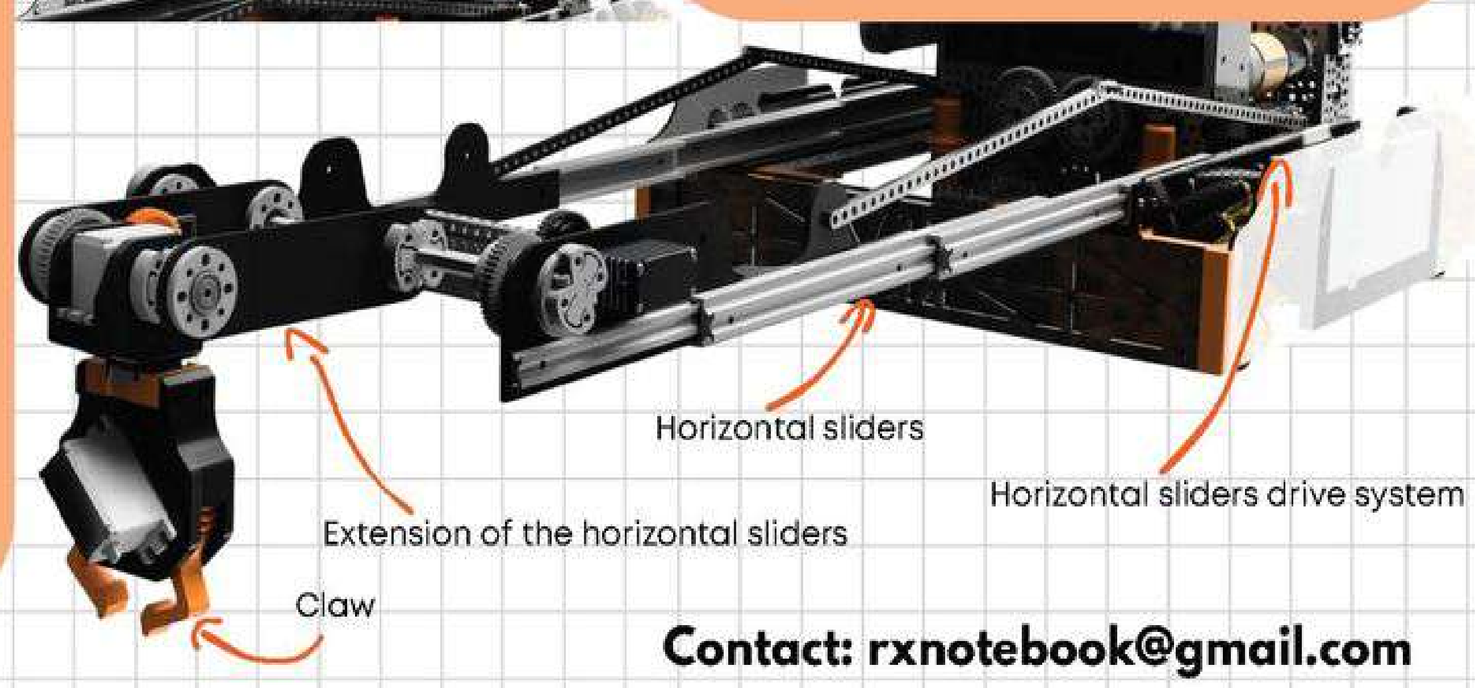
Delivery system

The vertical sliders enable precise placement of objects at elevated levels (up to 135 cm), thanks to the extension of the sliders which is equipped with a claw at the top. Additionally, they operate at high speed due to the 1150 RPM motors that drive them, ensuring both efficiency and smooth performance during operation.



Collecting system

The collecting system enables efficient retrieval of different color objects from various spaces. It has a reduced mass and dimensions for enhanced agility. With five degrees of freedom, it allows collection from any position. Additionally, it facilitates the smooth transfer of the collected objects to the delivery sistem.



Contact: rxnotebook@gmail.com

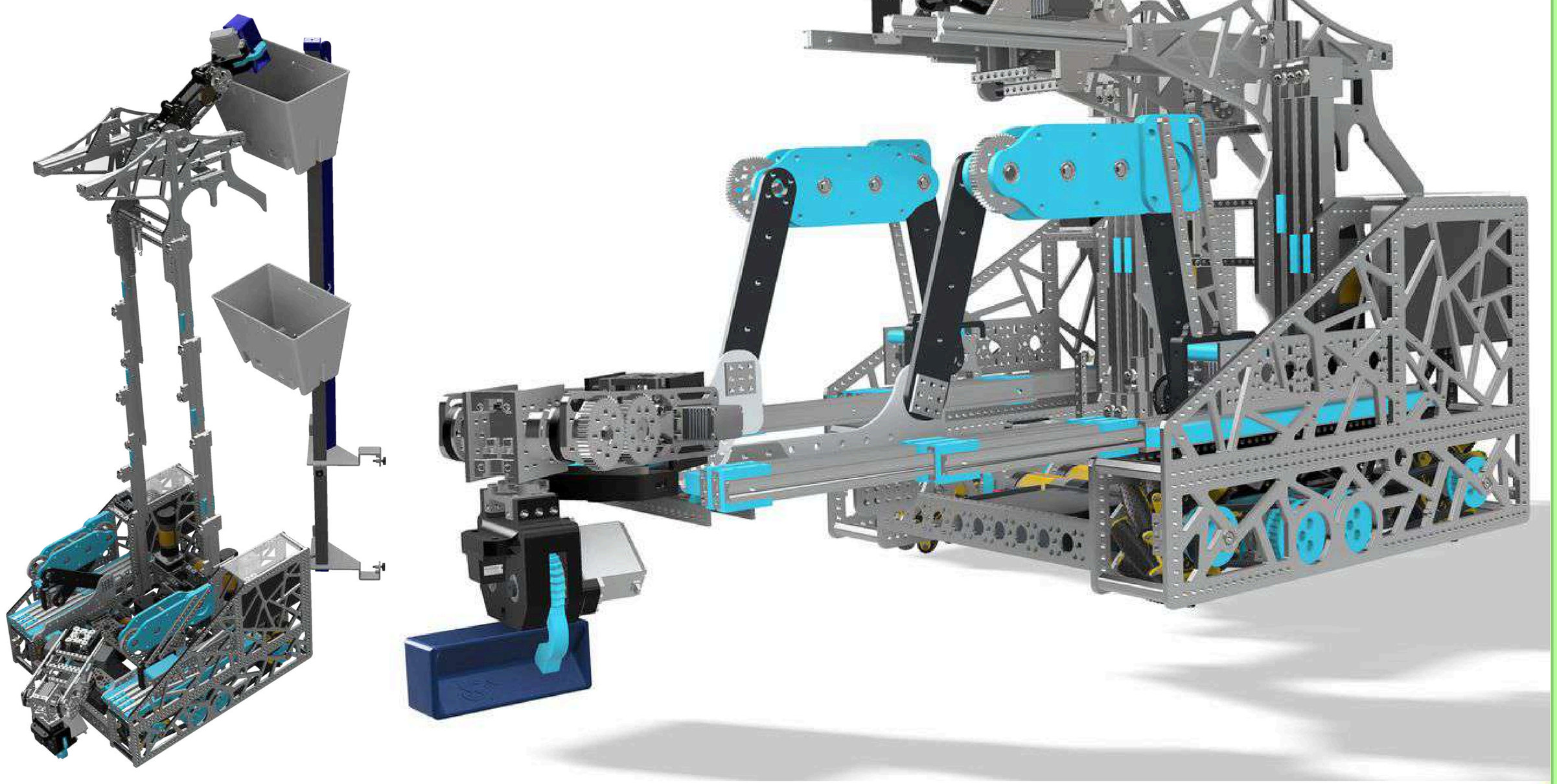
Competition robot for FIRST Tech Challenge

Patent/project number:

Author/s: Adrian Carol Budiul (coordinator), Stratulat Bogdan Ioan, Zală Andreea Maria, Miklos David Krisztian, Varvaroi Andrei, Mitican Andrei, Cerișeri Robert Octavian, Șunda Tudor Marian, Truță Andrei Rareș, Manole Iulia Nicoleta, Titianu Ștefan, Zanef Alexandra

C

The outtake system features an arm with two servos and a joint, enabling sample retrieval from the intake, placement in the Basket and Chamber, and specimen collection. A 3D-printed claw ensures a secure grip. The system is mounted on a linear support, allowing for remote specimen placement, saving time, and reducing chassis movement. The vertical linear system underwent several iterations to achieve optimal weight and speed, with custom parts for strength and reliability. For Level 2 Ascend, a hooking system on Misumi slides, powered by four motors, was implemented. Aluminum hooks guide the bar to the robot's center of gravity. The intake was designed for efficient sample collection, improving performance with each iteration. The pivot allows precision during both autonomous and teleoperated modes. A differential system provides extra freedom for the front arm, moving in any direction with just two servos, offering enough force and speed. The balanced center of gravity and compact design allow easy system changes without chassis modification, simplifying maintenance. The linear extension system extends up to 50 cm for remote sample collection, reducing collection time. The minimalist design ensures space for additional systems and easy upkeep, avoiding unreliable counter springing systems.



Contact: Adrian Carol Budiul, tel: +40728913967, email: adrianb1313@yahoo.com

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Ministry of Education and Research

UNIVERSITATEA LUCIAN BLAGA DIN SIBIU

The wake-up bed

Scientific Research Project

Authors: Student Lotreanu Cristian Andrei
Student Mocofanu Ionut Madalin
Student Nanulescu Andrei Dumitru

Coordinator: Professor Aurel Mihail ȚÎȚU,

DESCRIPTION:

The alarm clock bed is an innovative project for people who have trouble waking up and sleep without hearing repeated alarms. This can have negative effects both from a health point of view but also greatly influences other points of view: you are late for college, for work, you don't get to drop your children off at school on time and so on. This bed is made to get rid of such unpleasant situations.

ADVANTAGES:

-Waking up in the morning is efficient and at an exact time;

-Increase in energy levels in the morning;

-Connectivity with other Smart devices;

-Alarm setting can be done both from the digitized screen of the bed and from the application on the phone;

-The certainty that you can't go back to sleep after 2-3 hours;

-Maintenance of the folding mechanism is cheap;

-Avoids the shock of the classic alarm.

The operating mechanism

This mechanism is very simple, consisting of a gear wheel attached to the shaft of an electric motor (220V), which is fixed and a half gear wheel attached to the base plate of the bed (that plate on which the mattress is placed). The small wheel on the motor shaft meshes with the half gear wheel on the base plate so that the bed can tilt up to 75 degrees. The electric motor has two directions of rotation so that it can also return to the normal position of 0 degrees. It is a simple automated mechanism that does not cost much.

RESULTS AND DISCUSSIONS:

The wake-up bed is an innovative solution for all people who have problems waking up and because of this it affects them in their daily life. Even though the bed has a more "aggressive" wake-up system, it also has results from the first use. It changes people's lives, makes them more energetic and productive all day long. Think about it, in a very short time a person forms an extremely productive routine and sleep will be more pleasant.

CONTACT:

Prof. Eng.& Ec. **Aurel Mihail TITU**, Sc.D. & Ph.D., Dr. Habil., Dr.h.c.
Academy of Romanian Scientists Corresponding Member;
PATLIB Expert at European Patent Office;
Director of Regional Centre OSIM-EPO for Intellectual Property Protection (PatLib Sibiu);
President of Romanian Association for Alternative Technologies Sibiu (A.R.T.A. Sibiu);
Vice-President of Romanian Association for Nonconventional Technologies Romania;
Editor-in-Chief Nonconventional Technologies Review;
Executive Editor Journal of Knowledge Dynamics – Academy of Romanian Scientist;
Associate Editor Management of Sustainable Development Journal – "Lucian Blaga" University of Sibiu;
Associate Editor The International Journal of Mechatronics and Applied Mechanics;
"Lucian Blaga" University of Sibiu,
Faculty of Engineering, Industrial Engineering and Management Department,
4 Emil Cioran Street, 101-100 Room, code 550025, Sibiu, ROMANIA
Mobile Phone: +40 744 390 290
E-mail: mihail.titu@ulbsibiu.ro

DARK ENERGY ROBOT

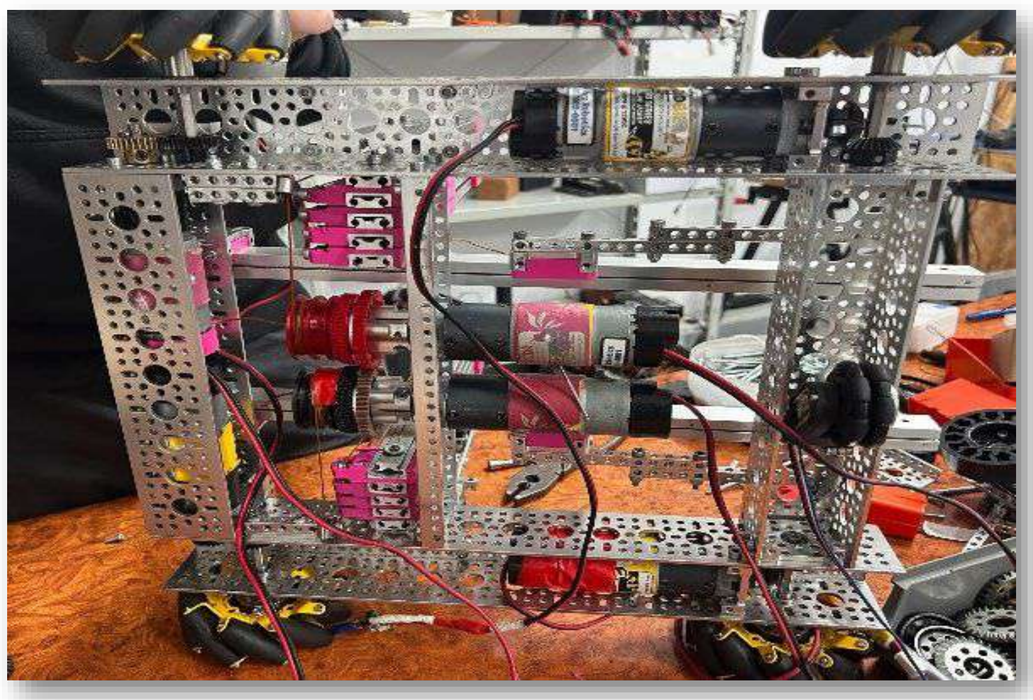
Authors: Visirin Alexandru, Irimie Breban, Crețu Matei, Cosma Iulia, Șindea Adrian, Stancovici Sara, Bălășoiu Alexandru, Balea Ioan, Hurdubeu Ioana, Covaci Elena, Glava Alexandra, Băluș Dari, Rotari Mădălina, Gașpar Dragoș, Gorneanu David, Crăciun Sofia, Coza Dragoș, Șchiopu Alexandra, Bozdog Alexandra, Iosif Roxana, Someșan Rareș; Mentor: Sorin Stănculescu

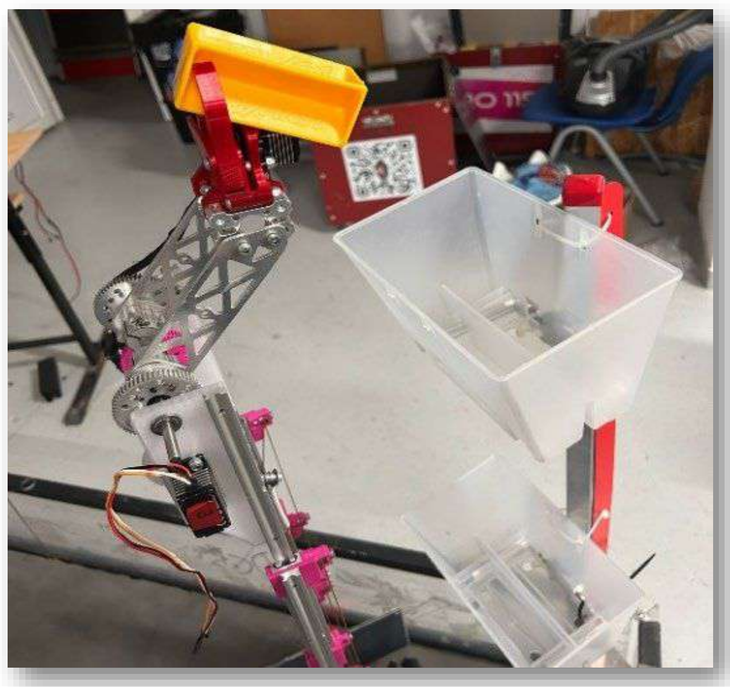
C

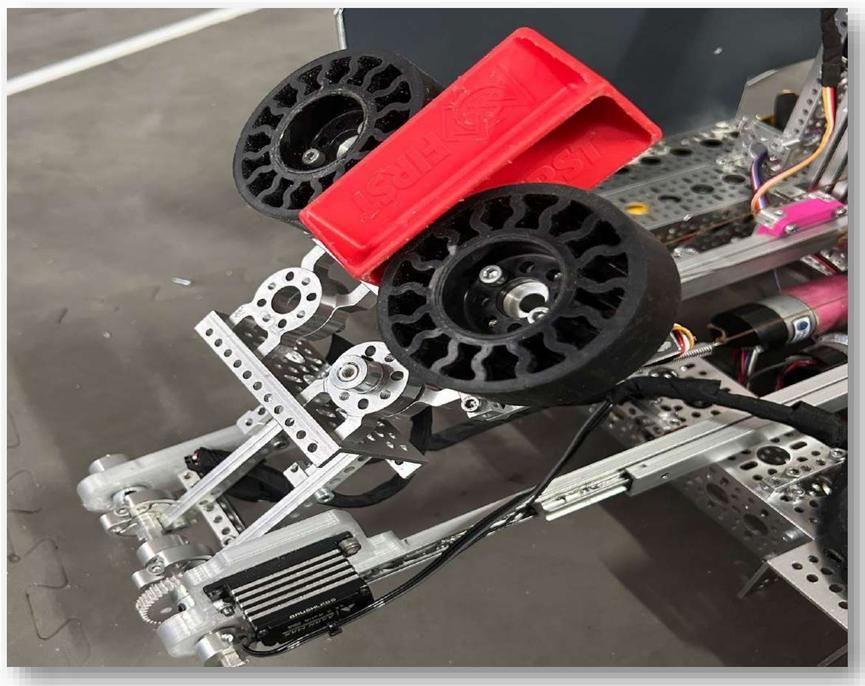
Our robot consists of: • Chassis • Intake system • Outtake system • Transfer

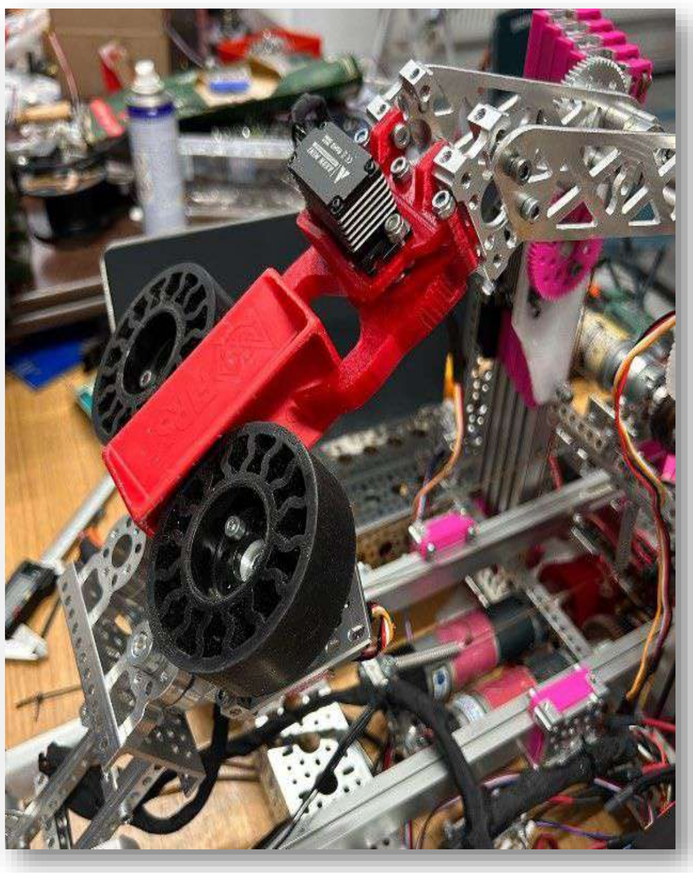
The chassis consists of 4 435 RPM motors, the front ones driving the wheels with pyramidal reductions, and the rear ones using normal gears. The wheels used are mecanum wheels that allow movement in any direction.

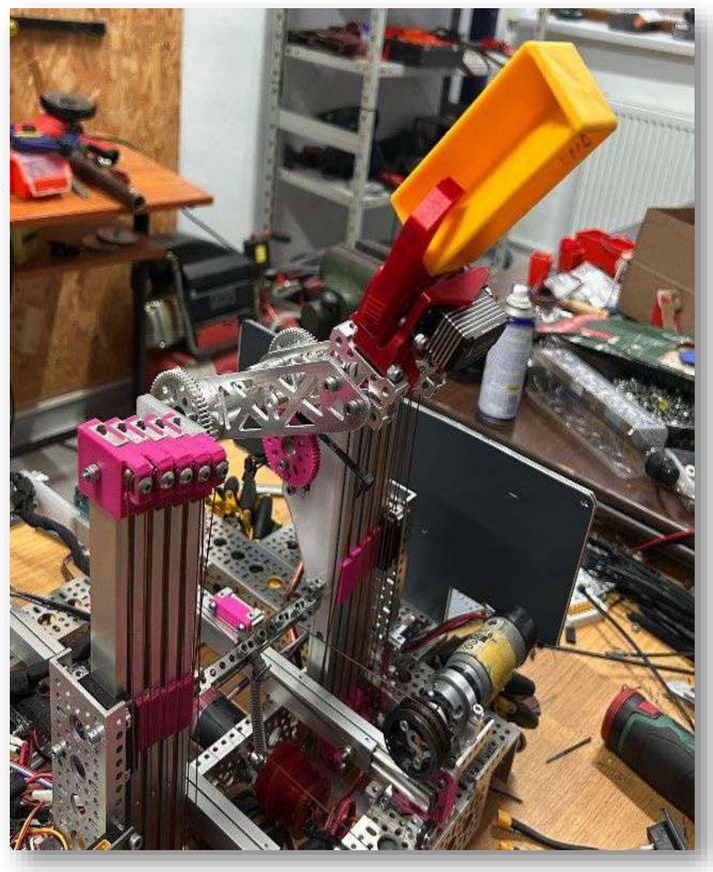
The intake system consists of two misumi-type sliders that extend forward using a thread that is driven by a 1150 RPM motor. Between these sliders is the intake, which is attached using two 3D printed parts. The intake consists of two rubber wheels that rotate using two mini axles, in order to be able to take the sample, the axles are attached to each other with a spring, in order to take the right samples, a color sensor is used behind the wheels, which stops the axles when it detects the correct color.











SCAN ME

The outtake system consists of two sets of misumi type slides driven by two 435 RPM motors connected by gears for consistent lift. Between these slides is the outtake which is a 3D printed tongs driven by a mini axon. Sample transfer is achieved by moving the intake arms to the back, and the wheels pull the sample out until the distance sensor on the tongs sees it, at which point the tongs close and prepare to score.

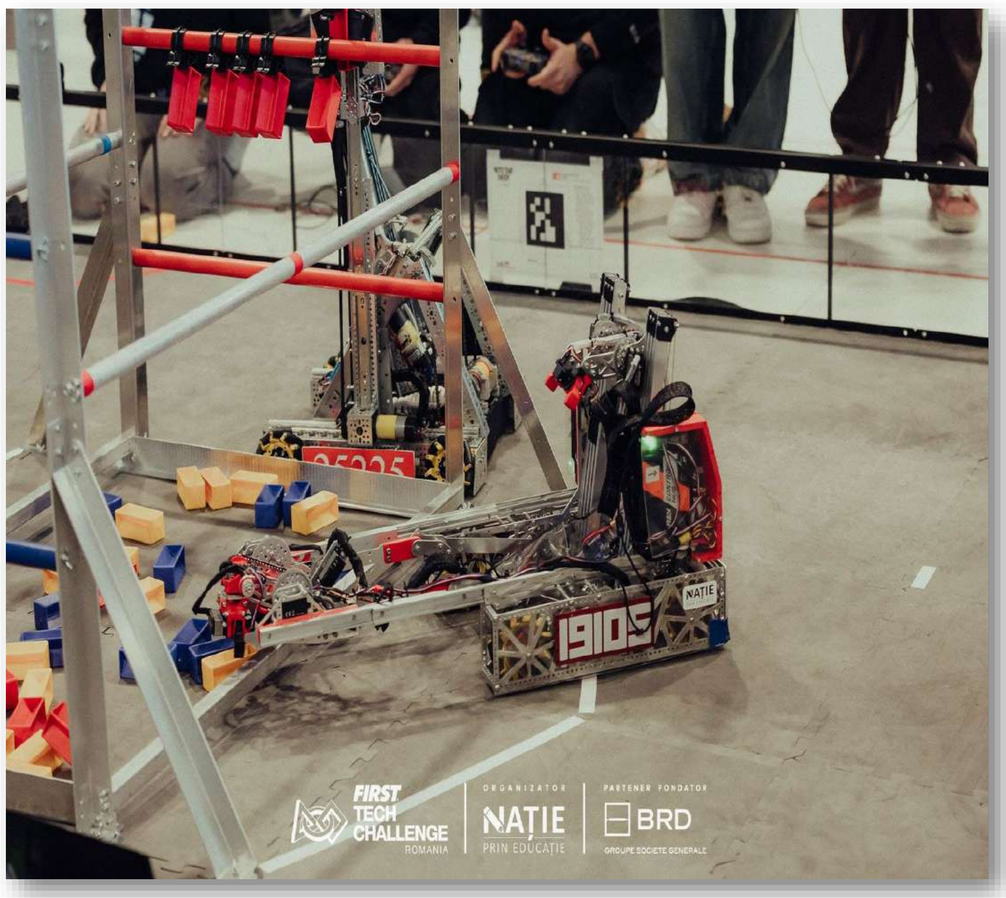
Contact: *roboticacnd@gmail.com*
https://www.youtube.com/@cndrobotics1794

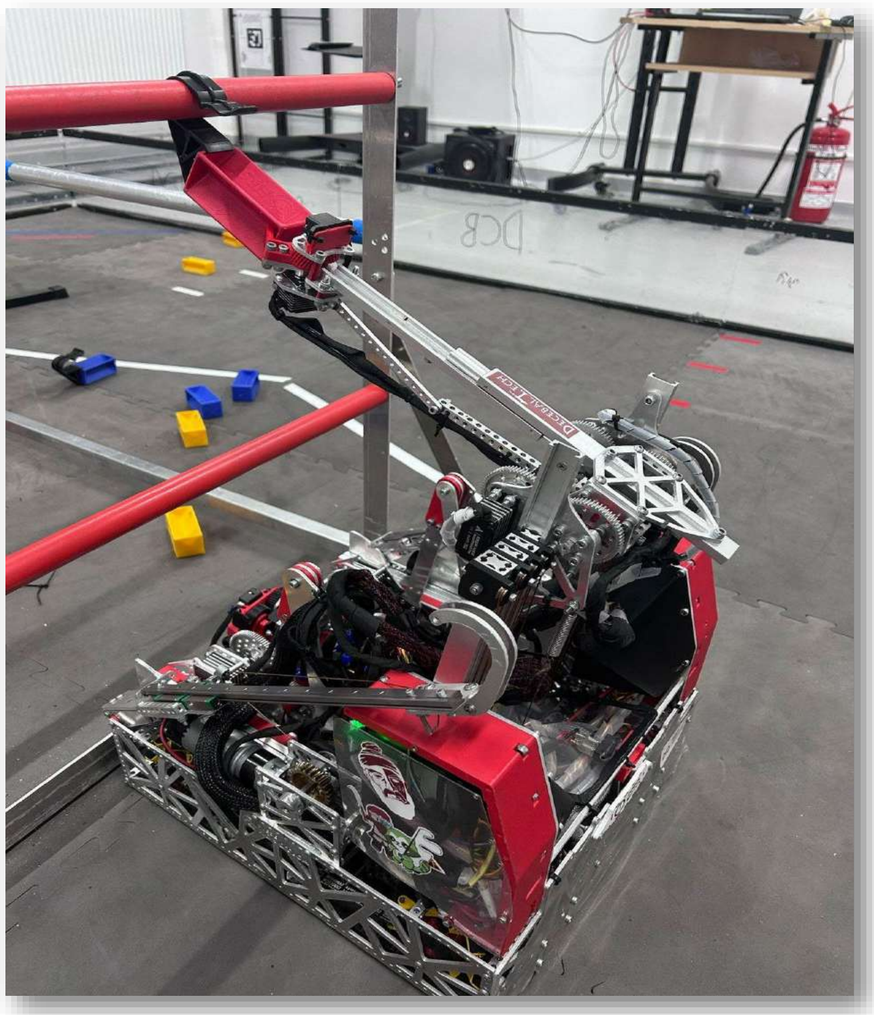
COMPETITION ROBOT INTO THE DEEP

Authors: Armie Andrei, Tomuș Vlad, Chirilă Tudor, Popovici Bogdan, Runcan Cristian, Hariton Vlad, El Haj Sleiman, Călinescu Adrian, Nagy Luca, Petruse Rareș, Popa Sebastian, Adascălului Sebastian, Cătană Irina, Colcea Carina, Ilca Ana, Sicoe Georgiana, Belea Alexandra, Morar Irina;
Mentor: Sorin Stănculescu

C

The competition in which our team participates, entitled "First Tech Challenge" - FTC, has reached its ninth season. The theme of this competitive season, "Into the Deep", involves collecting game elements in the shape of rectangular plastic parallelepipeds, either from the playing field or from inside a submersible – a structure made of metal bars. Scoring is done by entering the elements in a basket or by hanging them on one of the bars of the submersible. The competition robot was designed and built by our team to perform the missions of the theme of the 9th season of the FTC Romania competition.





SCAN ME

The robot includes a chassis with four 435 RPM motors that control mecanum wheels for multidirectional movement. An intake system with a gripping claw and extension with horizontal slides for collecting "sample" or "specimens" game elements controlled by servomotors. The gripping claw has several degrees of freedom and with a recognition system can identify the position of the game pieces. Scoring is done by a tong mounted on an arm, also having the possibility of extending, the entire scoring assembly (outtake) being raised to the level of the baskets or the bar with the help of slides driven by 1150 RPM motors located on a common axis.

Contact: *roboticacnd@gmail.com* *ttps://www.youtube.com/@cndrobotics1794*

Arduino for autonomous car

C

Research project
Author/s: Eugen BIRTOK , Raluca ROB

This paper presents the construction of an autonomous car and its programming in order to accomplish various abilities. The car is constructed on a chassis with four dc motors. The car controller is an Arduino Uno development board which is programmed in order the car is able to manage itself, avoiding the encountered obstacles. The distance to the obstacles can be modified by the user. An ultrasonic distance sensor is used for acquire the distance measurement. Like any autonomous car, the manual command options when required are mandatory. Therefore, an application on mobile phone is programmed. This application permits the motors controls on forward, backward, left and right turn,parking, using bluetooth transmission.

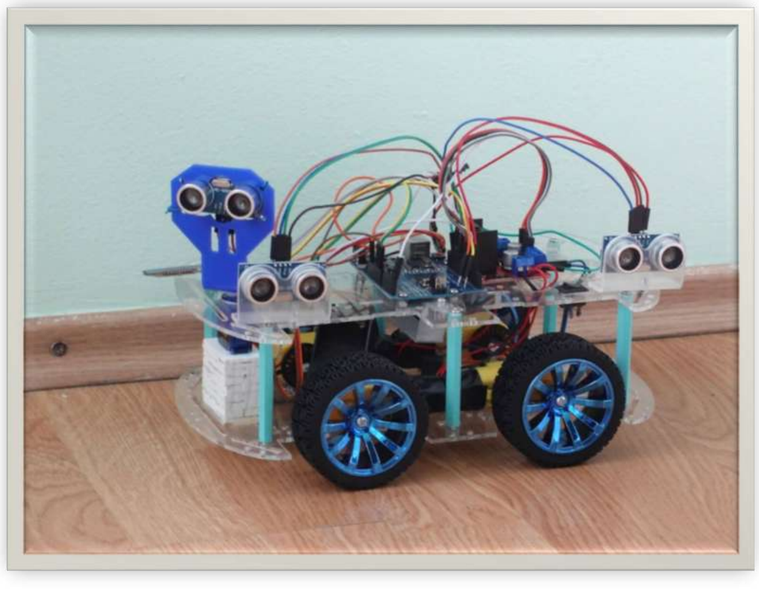
In the construction of this car were necesary the following parts:
Arduino Uno development board
Driver for L298N integrated circuit motors connects to Arduino digital pins.
HC-05 bluetooth module
Ultrasonic sensor HC-SR04 (to avoid obstacles and parking)
SG90 servomotor (for sensor movement at a certain angle)
DC 12V Battery Pack 3000mAh Rechargeable Lithium Battery Pack
65 mm Rubber Wheel RC Model Tires

Description of the Arduino program
A function has been programmed for each order. Thus, the *Forward () function* sends appropriate logic levels to the input pins in the driver, so that the wheels allow forward movement. To enable communication with the bluetooth module . The novelty consists in the implementation of two functions of modifying the engine speed. For parking I make a function Parking, a function for Autonomy.

Android app description
MIT App Inventor is an open-source web application developed by Google that allows you to create programs for two types of operating systems: Android and iOS. The platform uses a graphical user interface similar to the Scratch programming language, in which the programmer can create objects by drag-and-drop. Following the compilation, an application is created that can be transferred to the mobile device.

```
void Stanga(){
digitalWrite(A0, LOW);  //setare 0 la In1
digitalWrite(A1, HIGH);  //setare 1 la In2
analogWrite(EnA, 120);  //reglaj viteza intre 0-255  de preferat 100
digitalWrite(A2, LOW);  //analog pentru motorul 2
digitalWrite(In4, LOW);
analogWrite(EnB, 120);
}

void Inapoi(){
digitalWrite(A0, HIGH);  //setare 1 la In1
digitalWrite(A1, LOW);  //setare 0 la In2
analogWrite(EnA, 120);  //reglaj viteza intre 0-255  de preferat 100
digitalWrite(A2, HIGH);  //analog pentru motorul 2
digitalWrite(In4, LOW);
analogWrite(EnB, 120);
}
```



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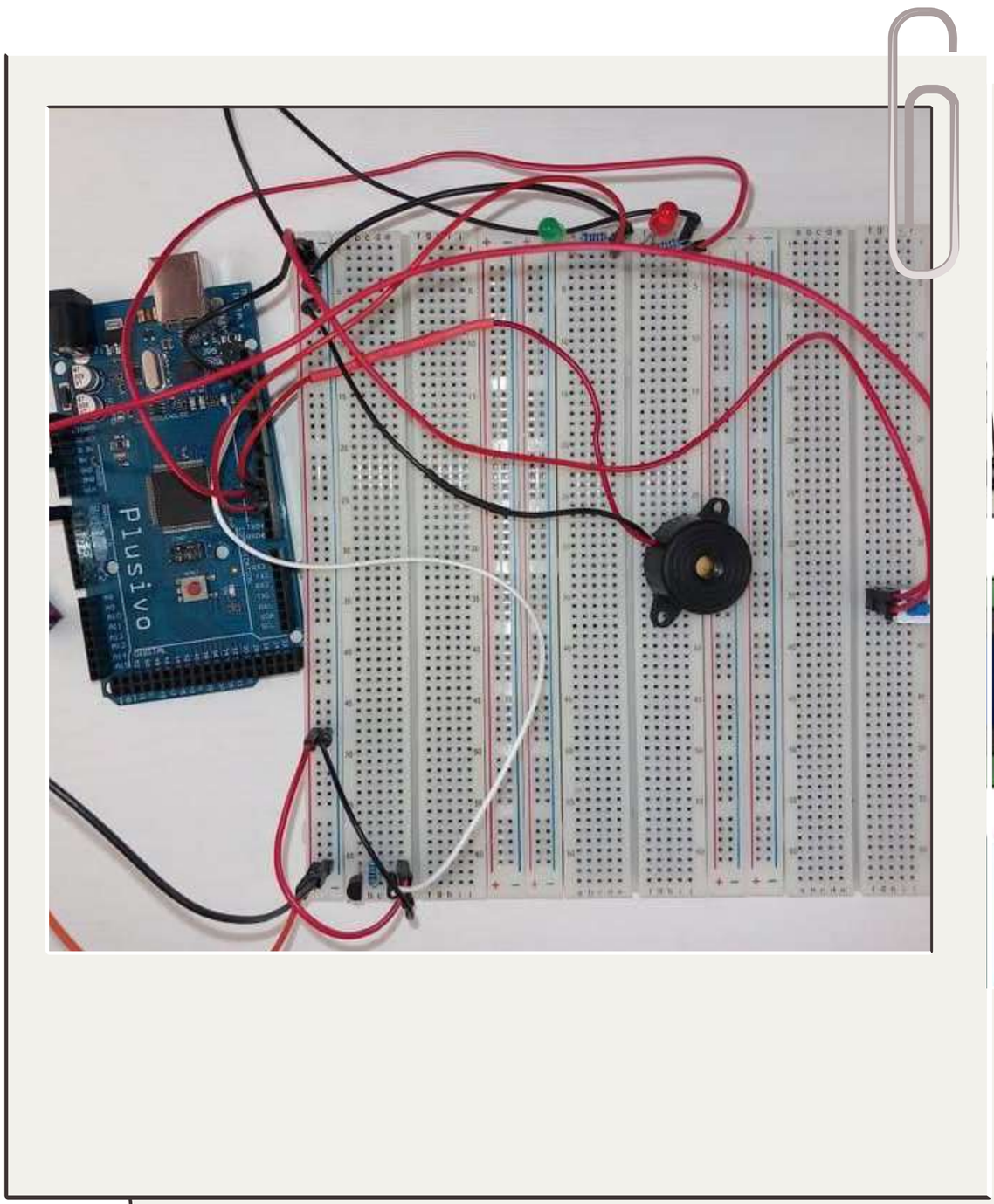
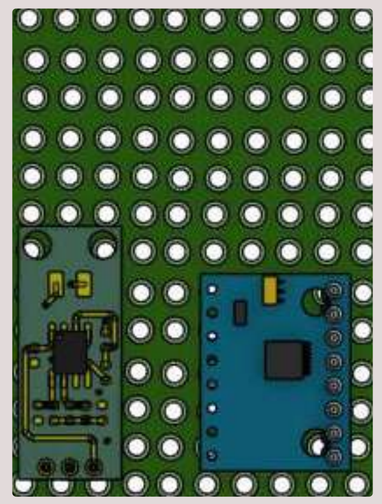
C

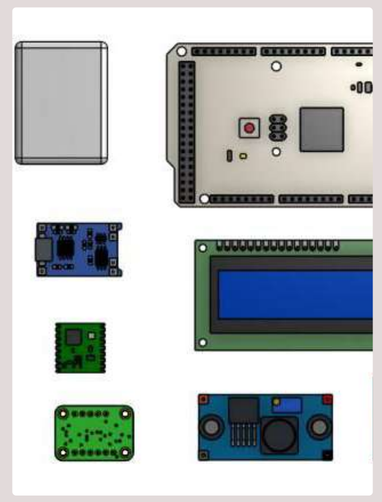
BlackBox

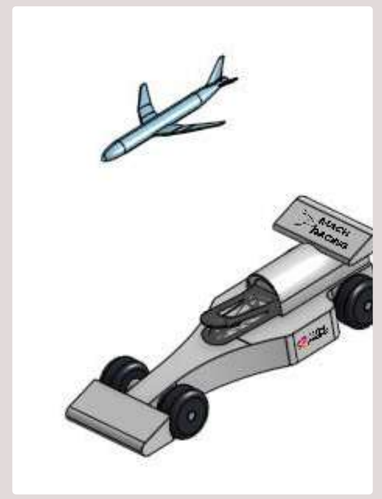
Authors: Madaras Levente
Moldovan Maia Emilia
Coordinator: Paul Țoța

This project brings together science and passion, creating a device that can be used both in general aviation and in Formula 1 racing. Essentially, it is a kind of "flight recorder" built from scratch with simple electronic components capable of collecting and storing essential data regarding the performance of the vehicle or aircraft. This probe can provide a time evolution of the elements surrounding the aircraft/vehicle, such as temperature, atmospheric pressure, UV radiation and even spatial displacement along with the recorded accelerations and speeds. It can even function as a calibrated altimeter in various modes and is useful for quickly calculating the distance traveled, along with the various types of aviation speeds (GS, IAS, TAS, CAS) without any input from the pilot, reducing the workload . This "flight recorder" is programmable and can be easily modified to perform different readings and calculations as needed.









- **Contact: contact@cexhd.ro**

MOBILE TRAINING GROUND FOR THE PRACTICAL TRAINING OF INTERVENTION AND RESCUE PERSONNEL IN TOXIC / EXPLOSIVE / FLAMMABLE ENVIRONMENTS

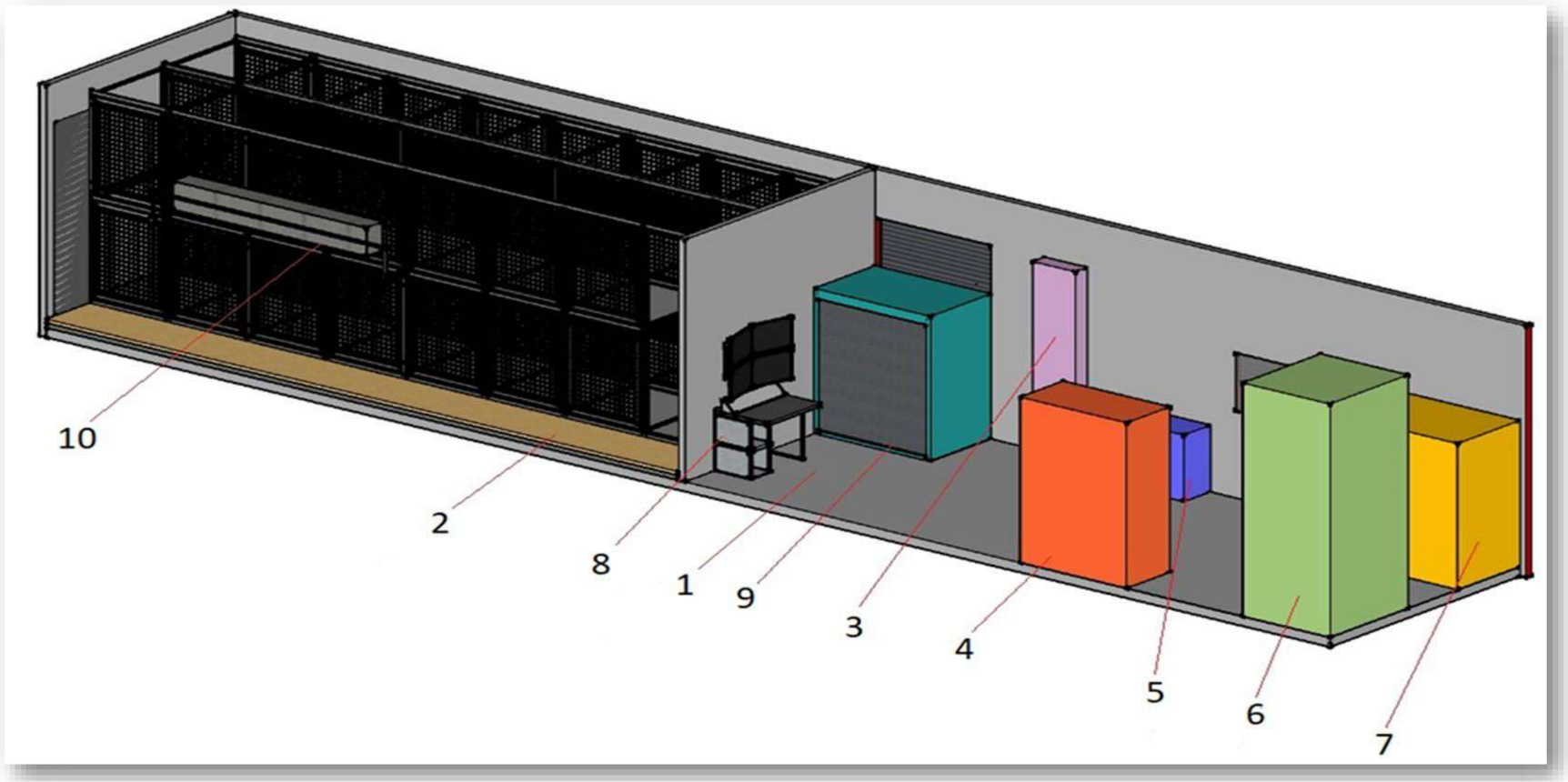
Patent/project number: CBI A 2022 00640

Author/s: Nicolescu Cristian, *Găman George Artur, Ghicioi Emilian, Pupăzan Daniel, Găman Angelica Nicoleta, Ilie Cosmin, Irimia Alin, Gireadă Andrei, Toth Lorand, Kovacs Marius*

C

In order to carry out the activity of intervention and rescue personnel in toxic / explosive / flammable environments in conditions of safety and health at work, and for the efficiency of the actions taken, a good physical training of the rescuers is necessary, which can be achieved by using a modern training infrastructure (mobile polygon) that can be made available to any economic agent regardless of the place and nature of the activity they carry out.

The mobile training polygon of rescuers allows the realization of a training route of rescuers in closed spaces with different degrees of difficulty, high temperature, low visibility, high humidity, as well as the training of rescuers in the fitness equipment area with the monitoring of the physiological parameters of the rescuers. All these factors lead to the selection of rescuers in order to form rescue teams that can intervene in the event of fires / explosions / releases of toxic gases, etc.



1-fitness equipment area with the monitoring of the rescuers' physiological parameters
2-the area of narrow spaces that make up a labyrinth that the rescuers go through
3-the scale of infinity
4-ergometer type bicycle
5-treadmill
6-impact device
7-stepper
8- computer control system with the necessary applications for training
9-cabinet for breathing protective devices
10-high temperature zone

Figure 1: 3D representation of the location of the equipment in the mobile training ground

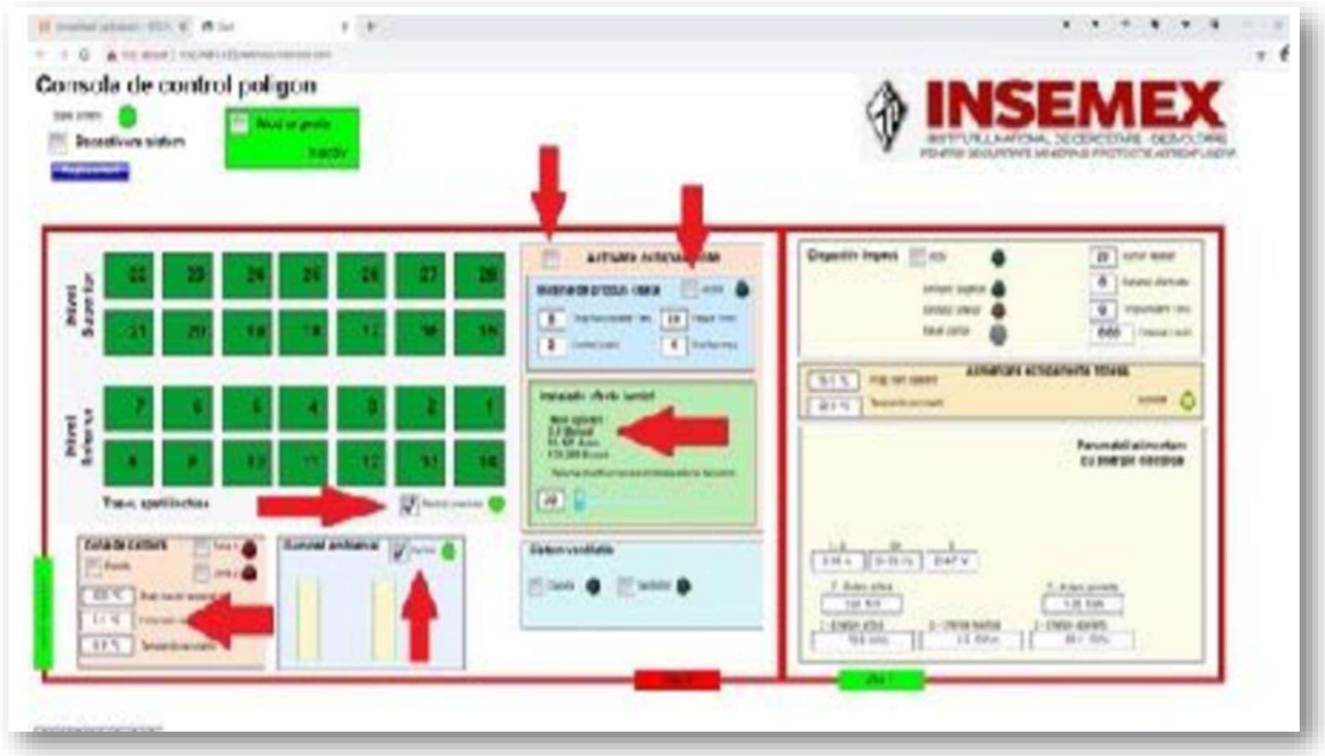


Figure 3: Control interface for activities in the narrow spaces area

Figure 2: Screenshot of monitored parameters

Contact: cristian.nicolescu@insemex.ro

Developing a Sustainable and Intelligent Digital Platform for Academic & Administrative Quality Enhancement at Onaizah Colleges, Saudi Arabia

Dr. Bandar Al-Humaidi Al-Mutairi
Dean of College of Humanities and Administrative, Onaizah Colleges, Saudi Arabia

Dr. Maged Farouk
Business Administration Department, College of Humanities and Administrative, Onaizah Colleges, Saudi Arabia

C

The main Idea of the Developed Digital Platform

Developing an intelligent digital platform that leverages artificial intelligence (AI) to support academic and administrative quality programs at Unaizah Private Colleges in alignment with international accreditation standards. This platform aims to cultivate an innovative and advanced educational ecosystem by enhancing curriculum quality, fostering faculty development, optimizing administrative processes, and creating an enriched learning environment for students.

The Main Suggested Steps

1. Define Goals & Vision

To enhance the quality of university education, this program focuses on integrating Artificial Intelligence (AI) into teaching and assessment. AI-powered tools can personalize learning experiences, provide real-time feedback, and improve educational outcomes. By embracing innovative methodologies, universities can ensure continuous improvement and alignment with global academic standards.

2. Form the Team

A multidisciplinary team is essential for successful implementation. Academics contribute expertise in pedagogy, AI specialists provide technical support, and administrators ensure smooth integration into existing educational frameworks. Collaboration between these stakeholders fosters a holistic approach to quality education.

3 .Feasibility Study & Analysis

A comprehensive feasibility study evaluates the financial and technological requirements for AI-driven education. This includes assessing costs, potential benefits, infrastructure needs, and scalability. Identifying key challenges and opportunities at this stage ensures a well-informed and efficient implementation process.

4. Select Tools & Technologies

Choosing the right AI tools is crucial for optimizing teaching and assessment methods. AI-powered platforms can facilitate adaptive learning, automate grading, and generate data-driven insights into student performance. These technologies enhance engagement and make education more accessible and efficient.

5. Develop an Implementation Plan

A phased approach ensures structured execution. The project is divided into four stages:

- Research: Identify best practices and AI applications in education.
- Development: Customize AI tools to fit the university's needs.
- Testing: Conduct pilot programs and refine methodologies.
- Implementation: Integrate AI into the broader educational system.

6. Measure Student Performance Using AI Systems

To enhance the quality of university education, this program focuses on integrating Artificial Intelligence (AI) into teaching and assessment. AI-powered tools can personalize learning experiences, provide real-time feedback, and improve educational outcomes. By embracing innovative methodologies, universities can ensure continuous improvement and alignment with global academic standards.

Benefits of Applying the Developed Digital Platform

- **Enhanced Education Quality**
  AI-driven teaching methods improve engagement, adaptability, and effectiveness.
- **Personalized Learning**
  AI tailors educational content to individual student needs, improving comprehension and retention.
- **Efficient Assessment & Feedback**
  Automated grading and real-time feedback streamline evaluations and ensure continuous improvement.
- **Data-Driven Decision-Making**
  AI analytics provide insights into student performance, helping educators refine teaching strategies.
- **Cost & Resource Optimization**
  AI reduces administrative workload, minimizes manual processes, and optimizes resource allocation.
- **Increased Accessibility**
  AI-powered tools support diverse learning needs, making education more inclusive.
- **Continuous Improvement & Sustainability**
  Ongoing training, system updates, and AI advancements ensure long-term success.
- **Alignment with Global Standards**
  AI integration keeps universities competitive and aligned with international accreditation requirements..

7. Sustainability

Ensuring long-term success requires continuous training for educators, regular updates to AI systems, and proactive maintenance. Universities must develop policies for AI ethics, data security, and ongoing improvement. By fostering a culture of adaptability and innovation, the program remains relevant and impactful in the evolving educational landscape.

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Smart Academic Management: Leveraging AI for a Data-Driven Future in Education: Implementation at Onaizah Colleges, Saudi Arabia

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C

Project Overview

The project aims to enhance and streamline the management of academic processes within the college by leveraging artificial intelligence and advanced technological tools. It is designed to facilitate student tracking, data collection, and the generation of highly accurate and efficient reports.
Additionally, the system offers several key advantages, including:

- Improved decision-making through data-driven insights.
- Enhanced communication between faculty and students.
- Reduced administrative workload by automating routine tasks.
- Increased efficiency and accuracy in report generation.
- Better data security and integrity to protect sensitive information.
- Seamless integration with existing academic systems.
- More focus on academic development and student support for educators.

Recommended Steps for Implementation

1. Define Goals and Vision

The first step is to set clear goals and a strong vision. The goal is to enhance academic process management through advanced technology, streamlining tasks, improving efficiency, and ensuring accuracy.

2. Form the Team

- A well-structured team is crucial for successful implementation.
- It should include academic administrators, IT specialists, AI experts, and data analysts, each contributing based on expertise. Effective collaboration ensures a robust system that meets academic and technological needs.

3. Feasibility Study

Before implementation, a feasibility study assesses technical and financial aspects. The technical study identifies required tools, AI solutions, and software, while the financial study evaluates costs, savings, and long-term benefits. This ensures project viability and sustainability.

4. Choose the Right Tools and Technologies

Choosing the right AI tools and platforms is key to meeting project goals. They must integrate with existing systems for seamless data transfer. This step evaluates AI solutions for attendance tracking, grading, and assessments to match institutional needs.

5. Design and Develop the System

System design prioritizes user-friendly interfaces for faculty and administrators. The development phase includes features for attendance tracking, grade management, and automated assessments, with flexibility for scalability and future upgrades. An intuitive user experience is essential for successful adoption.

6. System Testing

Before full implementation, the system undergoes thorough testing in a controlled environment to assess functionality and effectiveness. Simulated academic scenarios identify technical issues, while security measures are verified to protect sensitive academic data from cyber threats.

7. Train the Staff

To maximize benefits, faculty and administrators receive comprehensive training on navigating the system, inputting data, and using AI features effectively. Training is hands-on and includes troubleshooting to build confidence.

8. Deploy the System

Once testing and training are complete, the system is deployed across all departments. The process is closely monitored to address technical challenges and ensure a smooth transition, with ongoing support for troubleshooting and optimization.

9. Continuous Evaluation

Regular feedback from faculty, administrators, and students helps improve system performance, ensuring ongoing updates and alignment with academic needs.

10. Ensure Sustainability

A maintenance plan is established for routine updates, performance monitoring, and ongoing training. This ensures long-term success and uninterrupted benefits of AI-driven academic management.

11. Ensure Data Security and Privacy

Protecting academic data is a priority. Security measures like encryption, access control, and backups safeguard sensitive information, while compliance with data protection regulations ensures privacy and trust.

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AI-Driven Supply Chain Optimization: Revolutionizing Sustainable Logistics and Operations in the UAE

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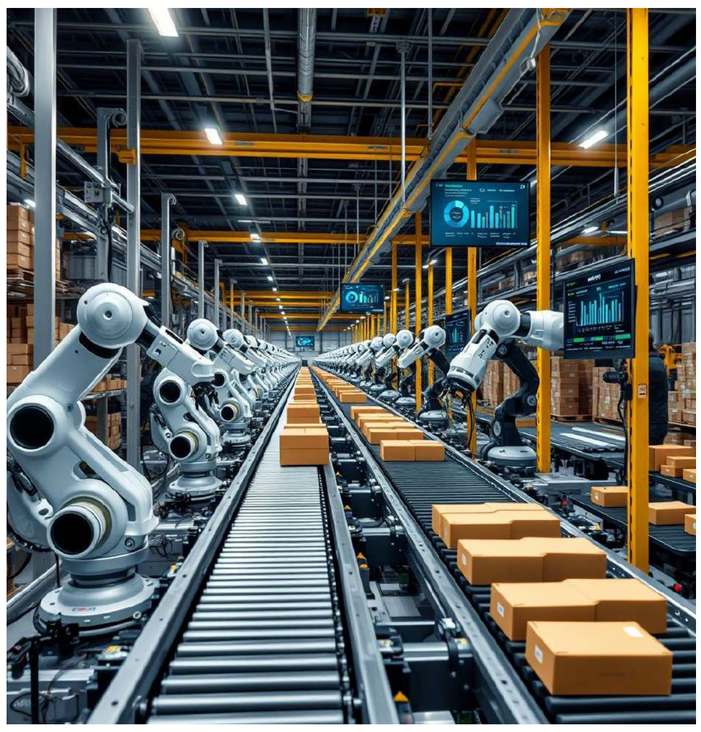
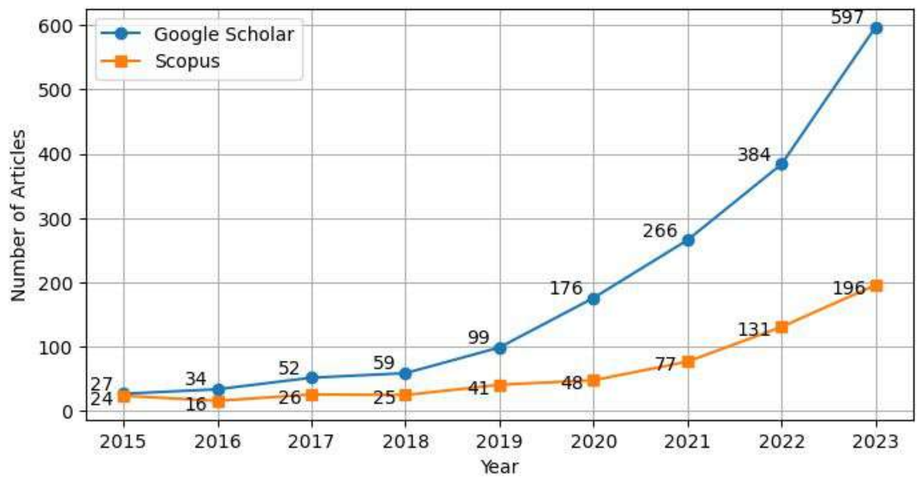
The Integration of AI and Supply Chain Management

The integration of artificial intelligence (AI) into supply chain management (SCM) is revolutionizing how businesses operate, enhancing efficiency, and reducing costs. Companies like Amazon are heavily investing in AI-driven automation to optimize their logistics networks, with plans to allocate up to $25 billion towards robotics-led warehouses, anticipating annual savings of about $10 billion over the next decade [1]. Similarly, FedEx has partnered with AI robotics firm Nimble to automate order fulfillment and inventory management, aiming to bolster its supply chain capabilities across North America [2]. In the fashion industry, AI-powered demand forecasting tools are addressing inventory challenges by analyzing complex data to predict consumer behavior more accurately, thereby reducing waste and enhancing profitability [3]. These developments underscore AI's pivotal role in transforming SCM, enabling companies to navigate complexities with greater agility and precision.



The Intersection of AI, Logistics, and Sustainability

Optimizing supply chains is essential for business success, allowing companies to meet customer demands and remain competitive. Logistics networks also play a key role in economic and social development. The World Bank's Logistics Performance Index (LPI) assesses logistics efficiency, reflecting the impact of policies on trade and growth. Given the importance of logistics in sustainability, integrating sustainable practices is crucial. AI in logistics can enhance efficiency, reduce emissions, and support sustainability goals, as demonstrated by the increasing research in AI and



AI-Powered Supply Chain Innovations by Pioneering UAE Companies

Emirates SkyCargo

the air freight division of Emirates Airlines, has adopted AI solutions to streamline its operations. They use AI to optimize flight and cargo capacity, predicting demand for air freight services. Additionally, AI-powered systems monitor environmental conditions during transportation to ensure that sensitive cargo, like pharmaceuticals and perishables, is handled properly, thereby improving reliability and reducing waste.

Al-Futtaim Group

has integrated AI in its supply chain processes to improve operational efficiency. By utilizing AI algorithms to analyze customer purchasing patterns, the group can better forecast demand and optimize its supply chain operations across various sectors, including automotive, retail, and electronics.

Noon

an e-commerce platform in the UAE, employs AI to enhance its logistics and warehousing operations. The platform uses AI algorithms to predict demand for products, allowing for better inventory management and distribution. Additionally, Noon has implemented AI-driven automated warehouses that use robotics for sorting and packing orders, increasing efficiency and reducing fulfillment times.

DP World,

a leading global logistics company based in Dubai, is leveraging AI and machine learning to optimize its operations. The company uses predictive analytics to forecast container traffic, improving resource allocation and reducing congestion at ports. By analyzing historical data and trends, DP World enhances its supply chain efficiency and minimizes delays in shipping and logistics.[5]

Dubai Customs

has implemented AI-driven solutions to enhance its supply chain security and efficiency. The department uses AI algorithms to analyze customs data and identify potential risks, improving inspection processes and reducing clearance times for goods. This integration of AI contributes to a smoother flow of goods through the UAE's ports and borders.

Etisalat

a major telecommunications provider in the UAE, uses AI to enhance its supply chain management. The company employs predictive analytics to manage its inventory and streamline the procurement process for network equipment. By analyzing data from various sources, Etisalat can optimize its supply chain operations, reduce costs, and improve service delivery.

Majid Al Futtaim,

a leading retail and leisure conglomerate in the UAE, has implemented AI-driven inventory management systems. The company uses machine learning algorithms to analyze sales data and predict customer demand. This enables Majid Al Futtaim to optimize stock levels in its Carrefour supermarkets, reducing excess inventory and ensuring product availability while minimizing costs.

References

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UAE In-Country Value (ICV) Certificate: A Framework for Sustainable Economic Growth

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What is " In-Country Value (ICV) Certificate"

ICV is a groundbreaking initiative by the United Arab Emirates (UAE) aimed at enhancing economic resilience, fostering industrial diversification, and advancing workforce development.

Launched by the Ministry of Industry and Advanced Technology (MoIAT) in collaboration with ADNOC and other local entities.

How Companies Obtain the ICV Certificate

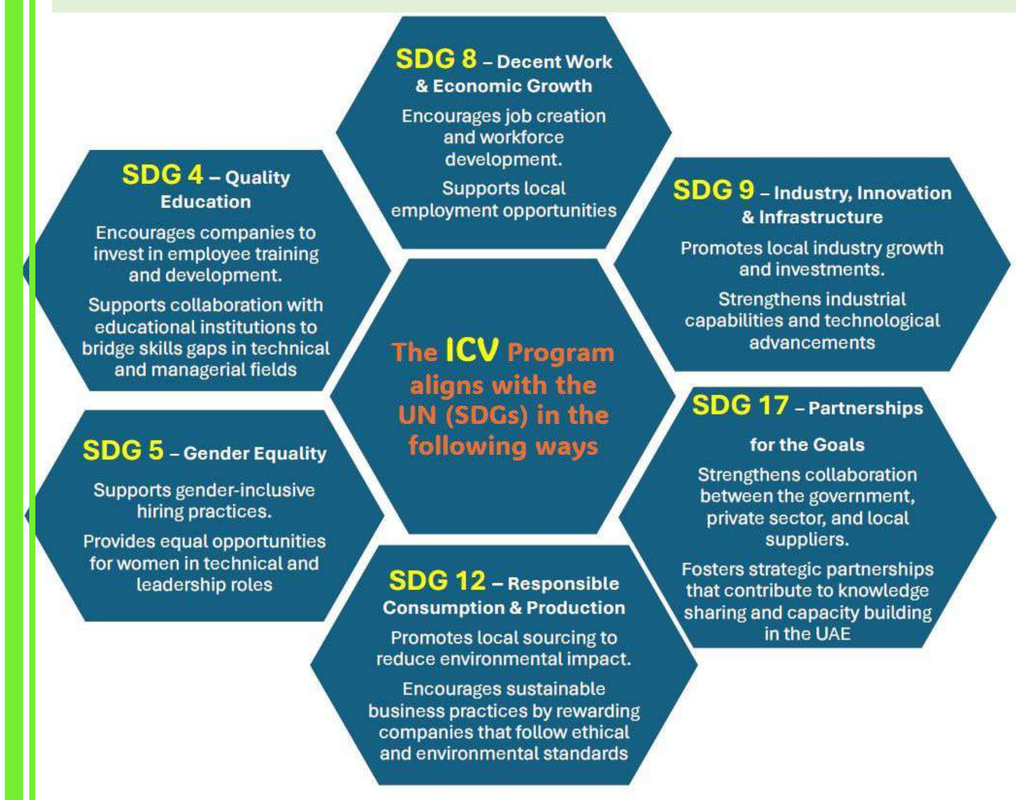
companies must follow a structured process:

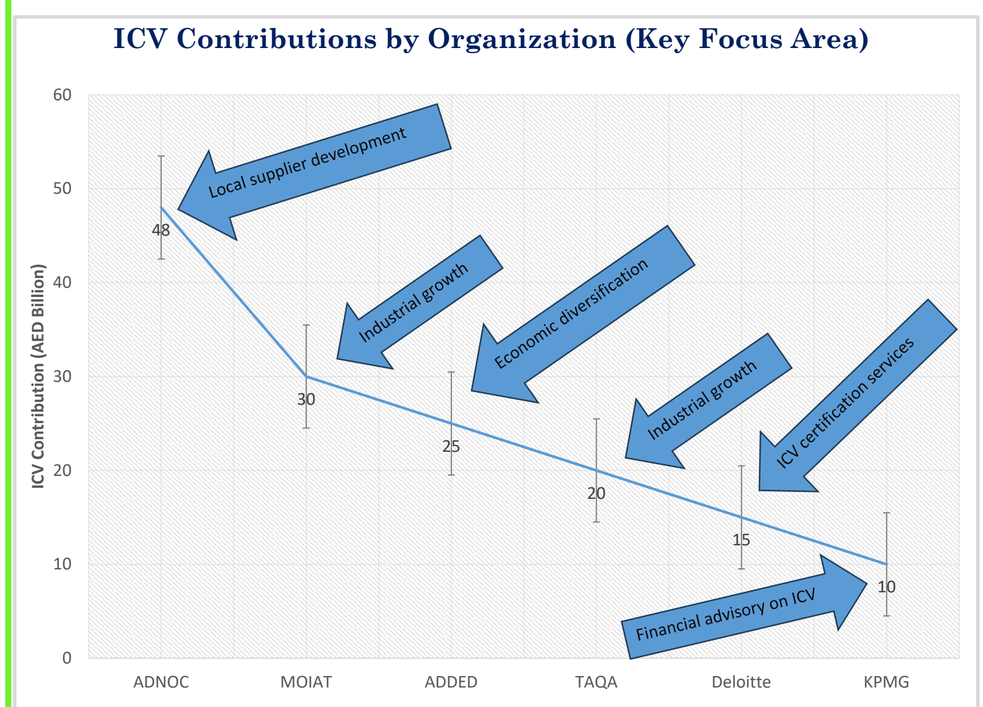
- ❑ *Engage an Approved Certifying Body*
  Register under the Ministry of Industry and Advanced Technology (MoIAT).
- ❑ *Submit Audited Financial Statements*
  Assessed to determine the company's local value contribution.
- ❑ *Provide Local Economic Data*
  Includes details on Emirati employment, local procurement, and investments.
- ❑ *Receive ICV Score*
  Valid for 14 months and essential for gov. tenders and contracts.

The Role of the ICV Program in Strengthening Local Industries and Workforce Development

The ICV program incentivizes businesses to strengthen their economic contributions within the UAE by focusing on:

- Prioritizing local procurement of goods and services.
- Increasing employment opportunities for Emirati nationals.
- Investing in research, development, and rial expansion.





Implementing Similar Programs: A Global Blueprint

Countries looking to enhance economic resilience and local industry growth can adopt strategies inspired by the UAE's ICV program:

- ➢ `Establish Local Value Assessment Models`
  Develop structured frameworks to assess local economic contributions in government contracts, ensuring alignment with national growth objectives.
- ➢ `Encourage Local Employment`
  Introduce incentives for businesses that prioritize hiring and upskilling local talent, strengthening the national workforce.
- ➢ `Harness Technology for Efficiency`
  Leverage digital tools to simplify compliance, enhance transparency & optimize program administration.

ICV's Economic Impact

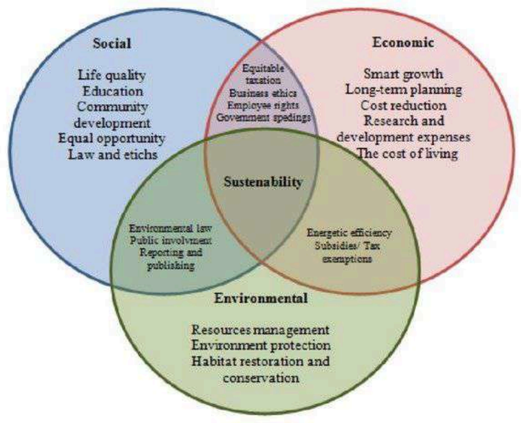
The ICV program is a key driver of the UAE's economic strategy, fostering a thriving business ecosystem for local and foreign investors.

- *Strengthening Local Businesses,* Supports SMEs and startups with preferential access to government contracts, enhancing supply chain resilience.
- *Job Creation for UAE Nationals* – Rewards companies with higher Emirati employment; in 2024, over 19,000 Emiratis were hired: a 40% increase from 2023.
- *Boosting Industrial Growth:* Encourages local manufacturing investment, reducing import dependency and enhancing self-sufficiency.

By promoting economic diversification and sustainability, the ICV program strengthens the UAE's long-term

ICV & Sustainability: Economic, Social & Environmental Impact

ICV supports the UAE's sustainable development goals by fostering a balanced economic ecosystem:



Conclusion: A Global Blueprint for Economic Growth

- ✓ The UAE's ICV model stands as an inspiring blueprint for nations around the world, offering valuable insights into how governments can stimulate local economic growth while maintaining global competitiveness.
- ✓ Through its structured and sustainable approach, the ICV model demonstrates that fostering local industry, empowering the workforce, and encouraging strategic investment are essential drivers of economic prosperity and innovation.
- ✓ The UAE's ICV initiative transcends traditional economic policies, it represents a visionary strategy for the future.
- ✓ By empowering businesses, nurturing innovation, and setting a benchmark for sustainable national development, it offers a powerful model for countries seeking long-term success on the global stage.

References

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STAND FOR STUDYING THE IGNITION OF EXPLOSIVE GASEOUS MIXTURES BY THE CORONA EFFECT

Patent/project number: CBI A 2022 00706

Author/s: Emilian Ghicioi, *Irina Nalboc, Artur George Gaman, Daniel Pupazan, Maria Prodan, Nicolae Vlasin, Doru Cioclea, Sorin Burian, Robert Laszlo, Cristian Nicolescu, Daniel Florea, Adrian Jurca, Adrian Simon-Marinica, Dan Gabor, Vlad Pasculescu, Sonia Suvar, Andrei Szollosi, Florin Manea, Ligia Tuhut, Cosmin Colda, Marius Suvar, Emeric Chiuzan, Zoltan Vass*

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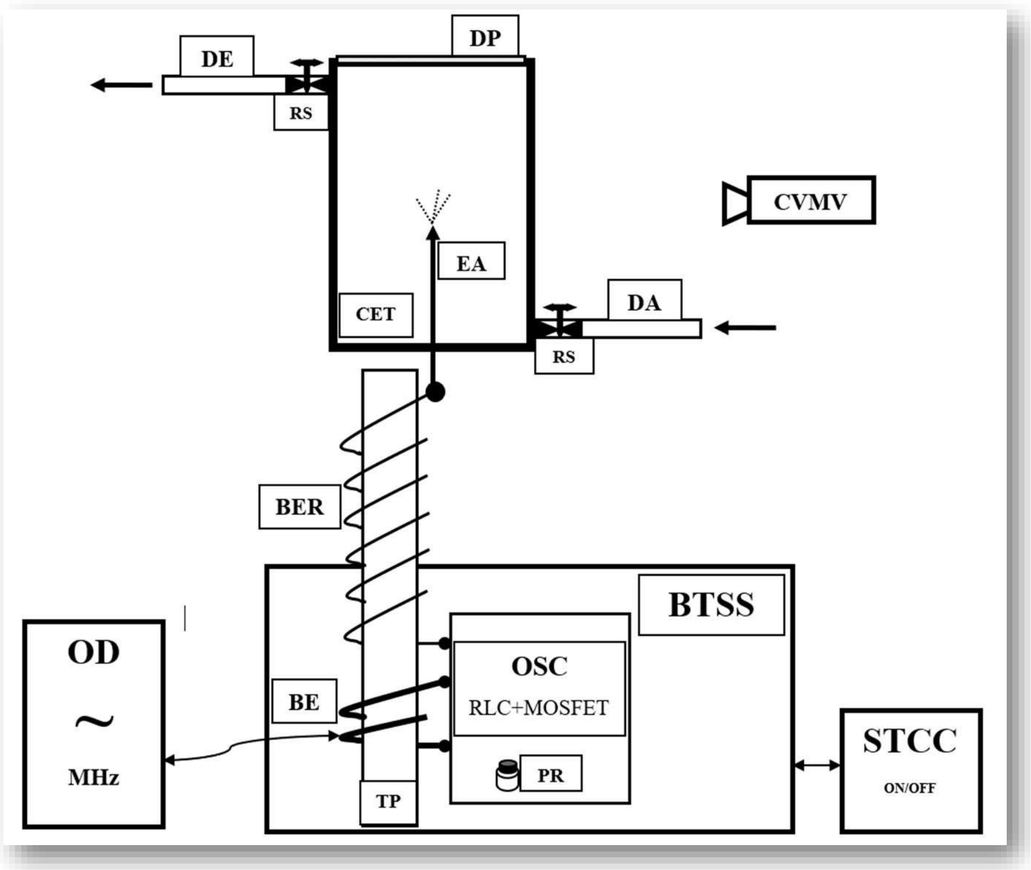
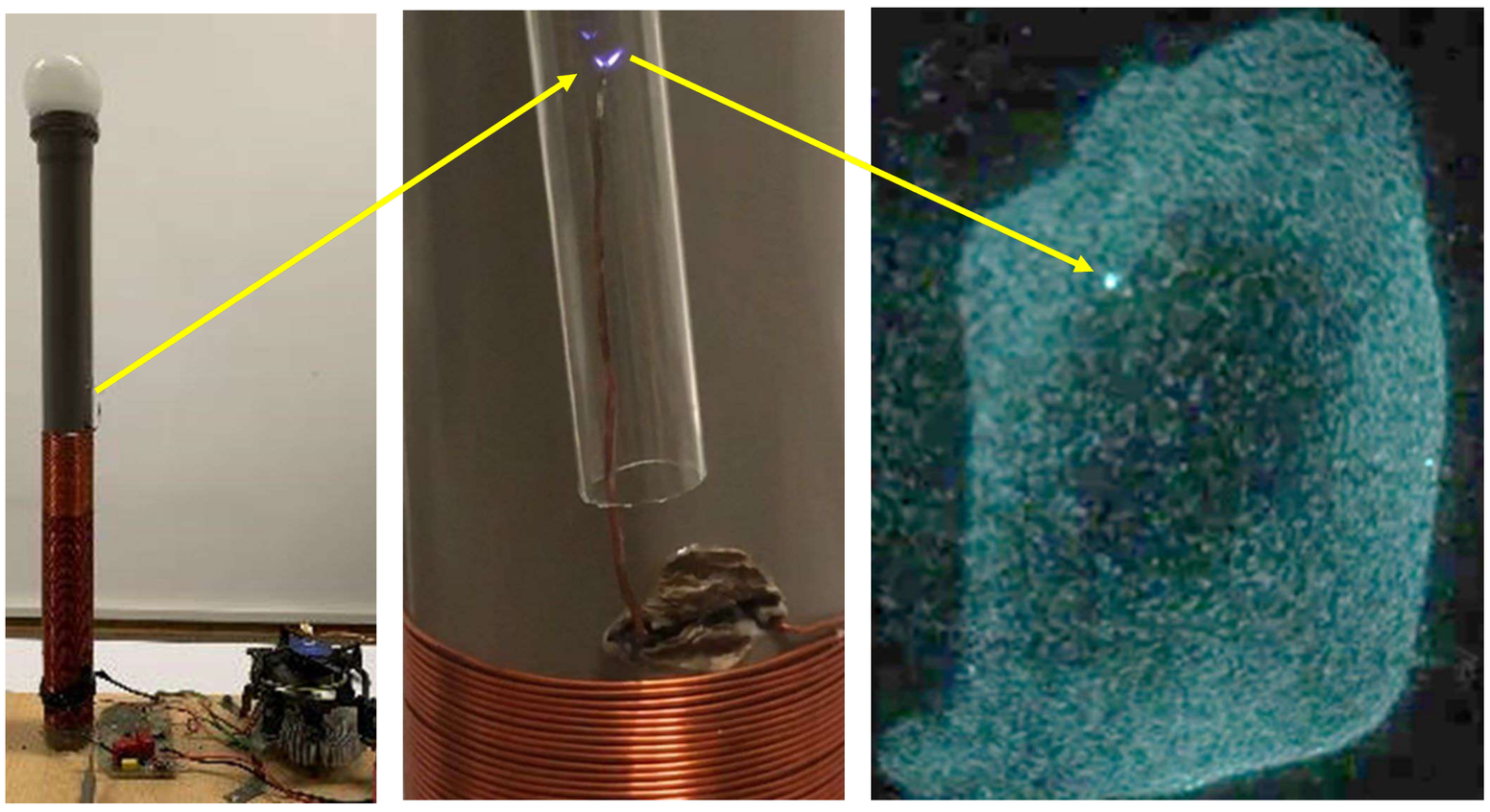
This invention presents a stand for investigating the ignition of explosive gas mixtures using the corona effect. It features a transparent explosion chamber with a single sharp electrode, connected to a solid-state Tesla coil, for generating the corona effect. Equipped with gas inlet/outlet nozzles, a pressure relief membrane, and a high-speed camera, the stand captures critical data such as ION channel formation, ignition induction time, and flame front propagation. The results are vital for assessing explosion risks in industries handling flammable gases.



The stand for studying the ignition of explosive gas mixtures by the corona effect is characterized by consisting of a transparent explosion chamber, into which a single sharp electrode is introduced. This electrode generates the ION channel, the corona effect and is connected to the free end of the resonant-excited coil, of the solid-state Testa coil assembly. The transparent explosion chamber is also equipped with an intake nozzle with a separation valve for introducing the pre-mixed flammable gas at concentrations within the explosive range, an exhaust nozzle with separation valve for evacuating the reaction products, as well as for pre-purging with a gaseous mixture. It also features a pressure-relief membrane for explosion overpressure, and a high-speed camera to record the physical and chemical phenomena, and for obtaining specific information about the explosive mixture: the formation of the ION channel, the introduction time for ignition, and the propagation of the flame front through the unburnt mixture.



Less common in unwanted gas explosion events, this phenomenon must nevertheless be considered as an effective source of ignition of combustible mixtures. The data obtained using the stand, are useful in evaluating the hazards and explosion risk posed by industrial installations where flammable gases are processed, stored, or used under pressure. This information can be used to develop preventive measures against corona effect ignitions in case of accidental gas leaks.

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KOATEEN: A Gamified Mobile Health App to Promote Balanced Nutrition and Healthy Habits in Teenager

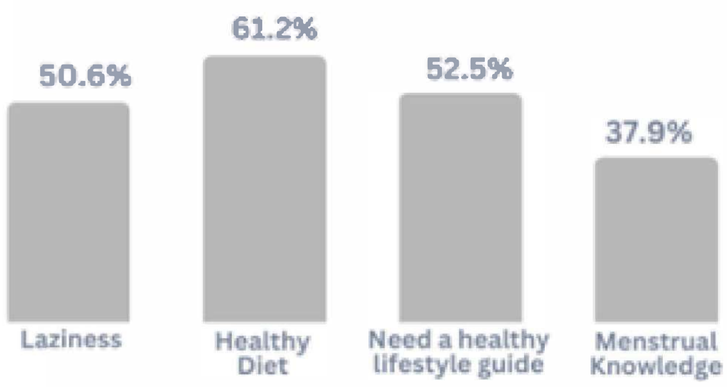
Patent APPLICATION: No. 000825052/2024

Authors: Arefa Fiskiawan - Audrey Syafa - Alyssa Wahyudi - Naura Ramaditya - Neysa Maulida (SMA Thursina IIBS)
Mentors : Risa Nur Fitriyana, S.Psi and Ali Akbar, S.Pd

Adolescence is a critical developmental stage where teens undergo significant physical and psychological changes. They often face insecurities due to unrealistic beauty standards, leading to unhealthy diets and habits. A balanced diet is essential for overall health, but many teenagers do not monitor their intake, prefer lazing around over exercise, and engage in less physical activity. Our study found that 62.9% of teenagers desire a platform to help them adopt healthier habits, prompting the creation of the Koateen app. The Koateen app aims to assist users in developing new habits and leading a healthier lifestyle by providing features like KoaJournal, KoaFit, KoaChef, KoaFacts, KoaSleep, and KoaLander. Koateen's goal is to increase the stability of the unstable generation by encouraging healthier lifestyles and fostering a more conscious generation with the help of technology.

ANALYSIS

Based on the surveys we've conducted with a total of 103 respondents around the world, an overall result was given:



DESIGN

The Koateen app is designed to help teenagers easily lead healthy lifestyles. Its notifications remind users of aspects of their food, physical, or sleep patterns. The app is measured according to BMI and BMR to adjust to the needs of each teen's body.

Our Memberships

Super Koa
Rp. 25.000/Month
All Features

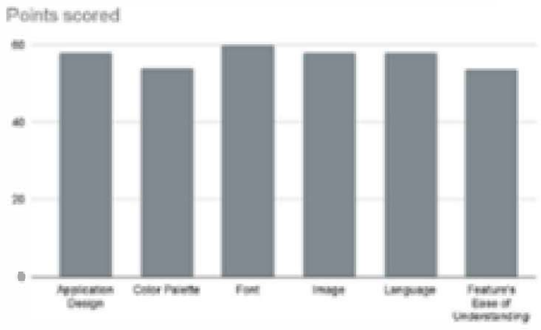
Koateeners
Rp. 250.000/Year
Unlimited Access & All Features

Baby Koa
2 Weeks Free Trial
Limited Access

DEVELOPMENT

Wireframe
↓
Mockup
↓
Feedback regarding UI/UX and customer preference
↓
KOATEEN

IMPLEMENTATION



A UI/UX evaluation survey was conducted to evaluate KOATEEN's application design and feature focusing on the application design, color palette, font, image, language and feature's ease of understanding.

EVALUATION

Strengths
Menstrual Tracker & Eye friendly color pallete

Weaknesses
Still in beta-prototype

Opportunities
Helping teens to have a healthy lifestyle

Threats
Has many competitors

Validated by Nutritionist

Validated by Media Expert

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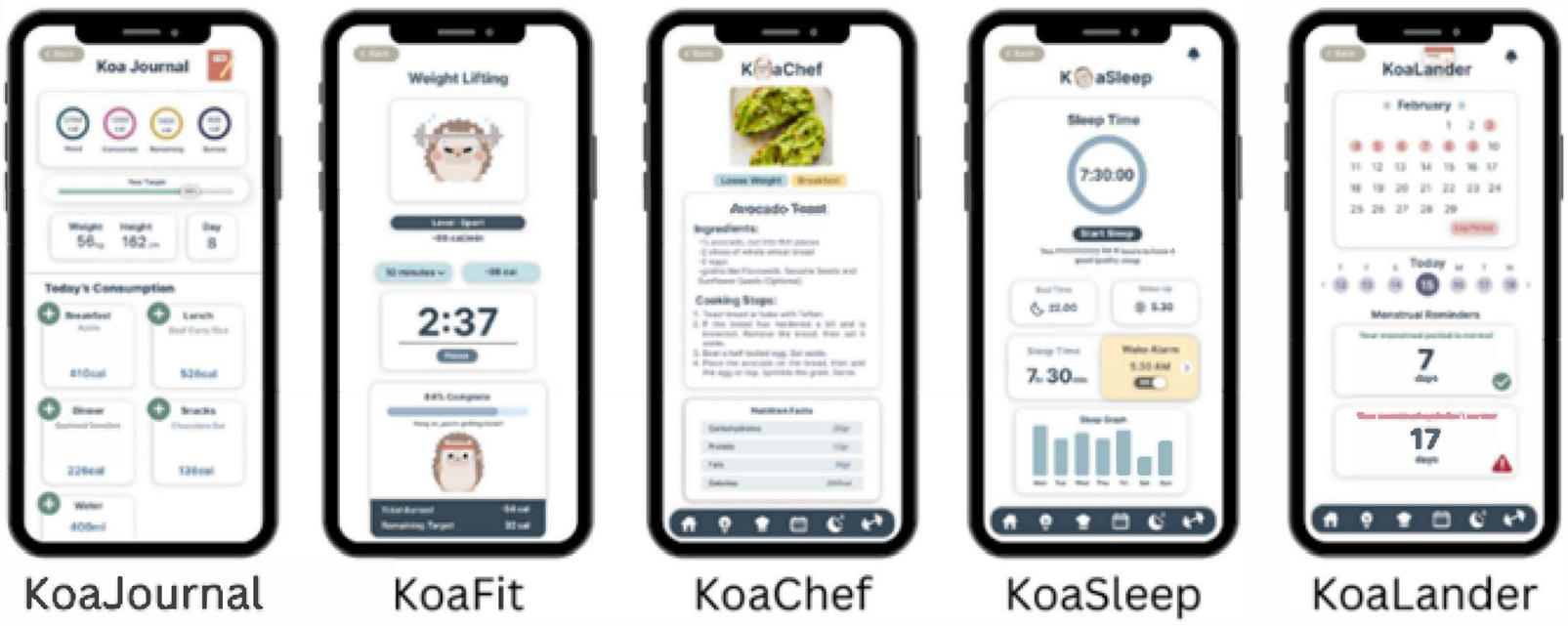
PROTOTYPE OVERVIEW



CONCLUSION

Adolescents aged 13 to 18 face health challenges influenced by diet, physical activity, and lifestyle choices. **KOATEEN** addresses these issues by empowering teenagers with knowledge and resources to **manage their lifestyles, focusing on balanced dietary practices for improved overall well-being.**

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REFERENCES

"Sea Bedder" Innovative Mapping Tool To Mitigate Coral Reef Damage From Ship Anchoring Practices Using AIS Data For Effective Conservation Strategies

Patent no. EC002024250700, patent officially issued by the Directorate General of Intellectual Property (DGIP), Ministry of Law, Republic of Indonesia on 12 December 2024

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Author/s: Risala Sujat Swara, Novi Istiyani, Nikken Permata Rahmasari

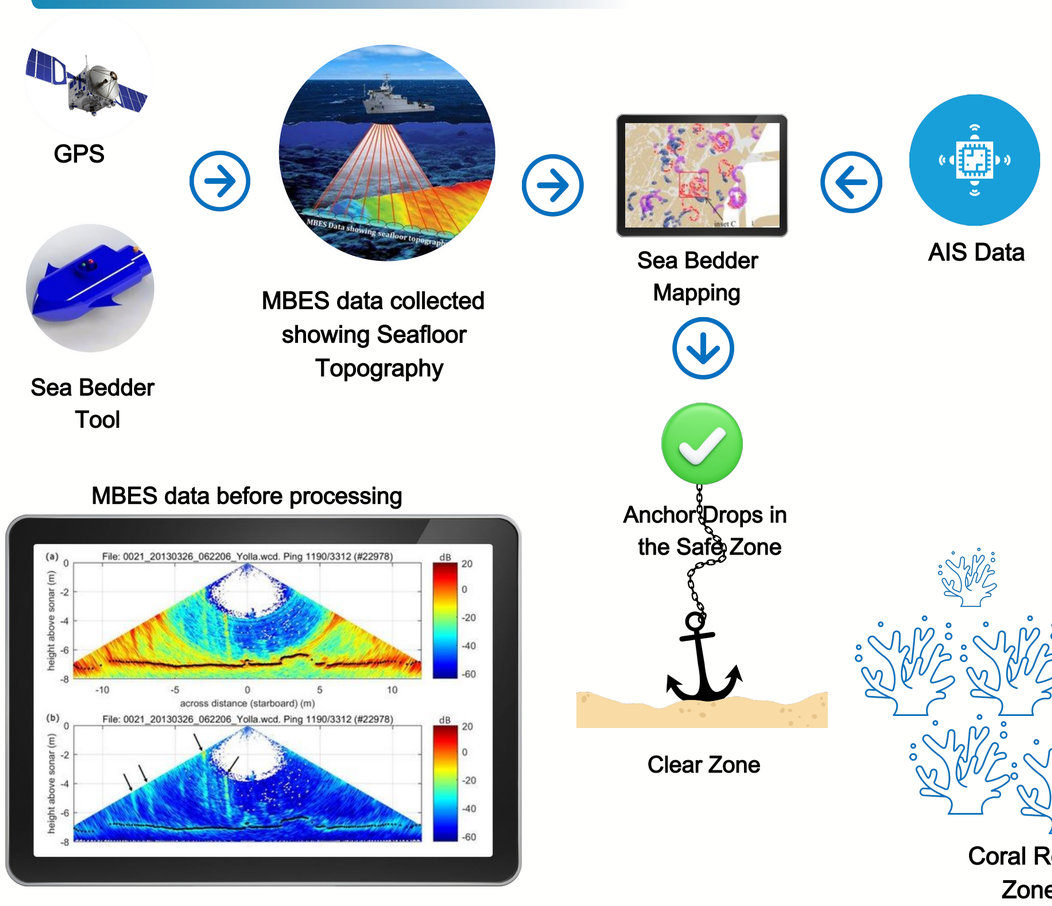
Description

Sea Bedder is an innovative solution designed to protect coral reefs from physical damage caused by unregulated ship anchoring. Coral reefs, often referred to as the "rainforests of the sea," are critical ecosystems for biodiversity, coastal protection, and economic activity. Indonesia, home to 750 coral species across a total reef area of 2.53 million hectares, holds the largest coral reef system in the world. However, 30.4% of Indonesia's coral reefs are in damaged or poor condition due to human activities such as anchoring, reef walking, and chemical pollution from tourism. For example, in Gili Trawangan, 55% of coral reefs are severely degraded due to anchor drops in ecologically sensitive areas.

Sea Bedder uses AIS-based technology and real-time mapping systems to guide vessels to safe anchoring zones, ensuring ships avoid fragile coral ecosystems. By minimizing the impact of anchoring activities, Sea Bedder supports sustainable tourism, preserves marine biodiversity, and helps restore balance to fragile marine ecosystems. Its pilot project in Gili Trawangan demonstrated significant potential for reducing reef damage and creating a scalable conservation solution.

The anchors of tourist ship cause severe damage to coral reefs, turning vibrant ecosystems into lifeless structures. This destruction disrupts marine biodiversity and can take hundreds to millions of years for coral reefs to naturally recover to their original state.

How it works?



1. Data Collection:

- **Sea Bedder integrates AIS (Automatic Identification System) data to track the real-time location of ships in high-traffic areas.**

2. Coral Mapping:

- **A detailed map of coral reef zones is created, identifying protected areas and safe anchoring zones.**

3. Data Processing:

- **The system processes AIS data to determine a ship's position relative to coral reefs and overlays it on the mapped zones.**

4. Real-Time Guidance:

- **Sea Bedder provides real-time alerts and guidance to ship operators, directing them to safe anchoring zones away from coral reefs.**

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ECONOMICAL SYSTEM FOR AUTOMATIC ADJUSTMENT OF THE POWER FACTOR, WITH CAPACITOR BANKS, IN THREE-PHASE LOW-VOLTAGE INSTALLATIONS

Patent no. A 00491, 04.08.2020

Authors: Gabriel Nicolae Popa, Corina Maria Diniș, Iosif Popa

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Description: The invention relates to an economical system for automatic regulation of the power factor with capacitor banks in three-phase low-voltage installations. The technical problem is the design of an economical system of automatic regulation of the power factor, with capacitor banks, for three-phase low voltage installations, which uses a three-phase static electronic power relay common to all stages of capacitor banks, to improve the power factor in three-phase low-voltage installations. It consists of a current transformer (which measures current in a phase), a VAR-metric controller with microprocessor, two small capacity PLCs, a three-phase static electronic power relay, twelve electromagnetic contactors and six capacitor banks (Figs.1,2).

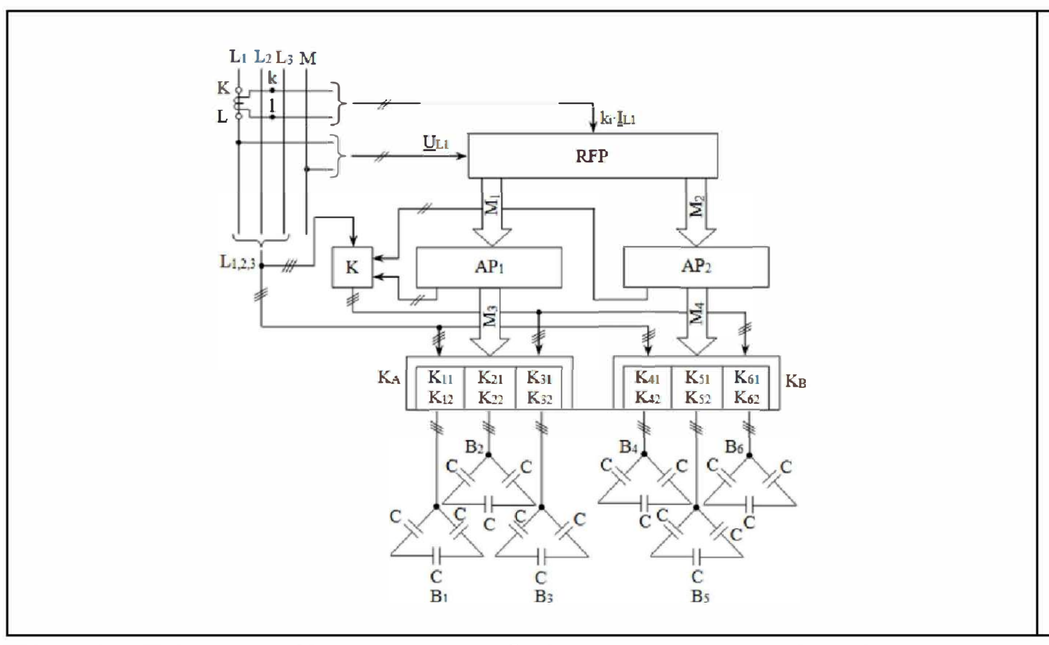

Fig.1. Block diagram of the economical system for automatic adjustment of the power factor.

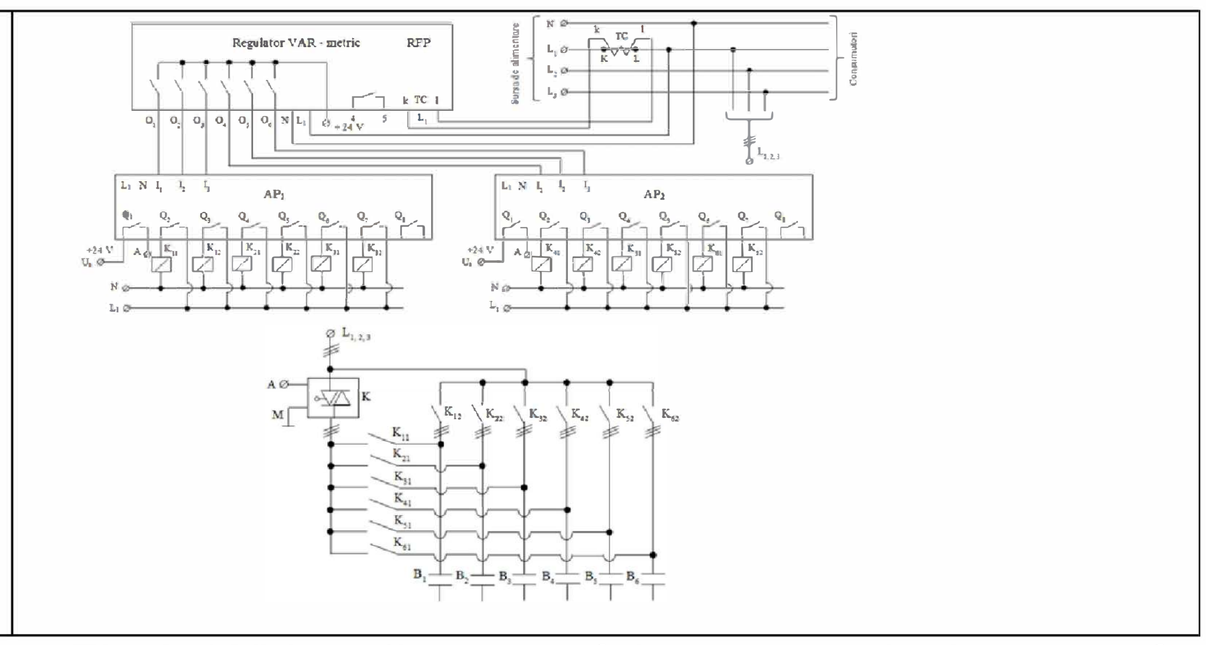

Fig.2. Wiring diagram of the economical system for automatic adjustment of the power factor.

The advantages of the invention are the following: the currents at the connection of the capacitors are much diminished, from (20-50) xIn to In; switching is done at zero voltage; no electric discharge occurs at switching; high reliability; lower costs than when using a three-phase solid state relay for each capacitor bank; very high input/output isolation voltage; does not generate disturbing electromagnetic fields; superior service life compared to systems where the connection of capacitor banks is made with conventional contactors.

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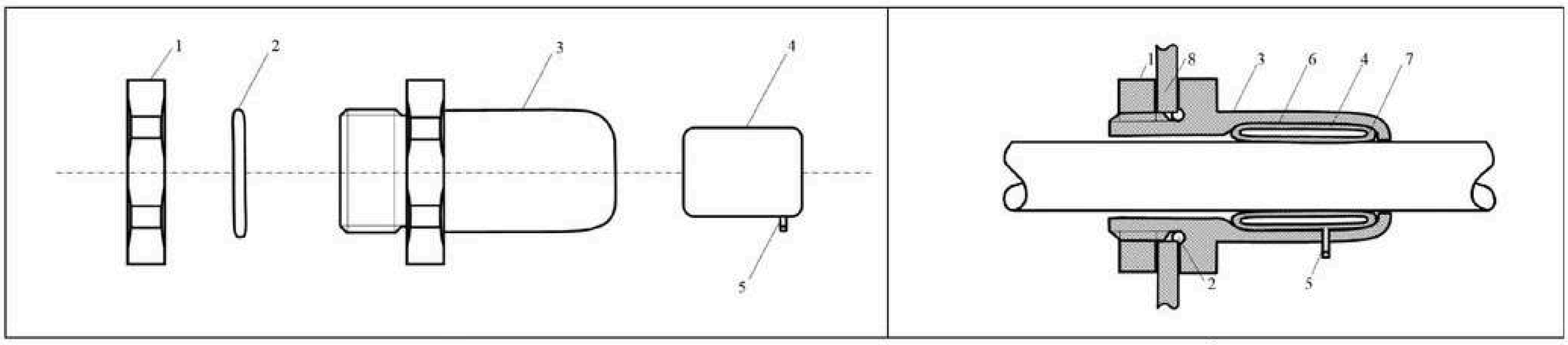
METAL GLAND FOR LARGE DIAMETER ELECTRICAL CABLES

Patent no. 133730, 30.04.2024

Authors: Dan Ciortea, Gabriel Nicolae Popa

Description: The invention relates to a single-body metal gland intended for sealing large diameter cables or metal pipes, when passing them through the wall of an enclosure. The gland consists of the metal body, the toroidal chamber with filling - emptying valve, the rubber gasket and the locking nut. In the body of the gland is a rubber chamber with valve (Fig.1.a). The rubber chamber with the valve is the sealing element between the outer surface of the electric cable and the inner surface of the gland body. An inert gel is inserted under pressure into the rubber chamber which inflates the toroidal chamber to its maximum contact with the outer surface of the cable or pipe. The deformation of the toroidal chamber allows the perfect sealing regardless of the geometry of the large section electric cable (Fig.1.b).



a. b.

Fig.1. a. The gland components for large diameter electrical cables or metal pipes; b. Longitudinal section by gland after sealing a large diameter electric cable or metal pipes.

The metalic gland can have various areas of use:
-transmission, distribution and use of electricity;
-machine and plant manufacturing industry;
-metal drive cabinets.

The single-body metalic gland has the following advantages: it is simple, having only four component elements; it has a low-cost price; adapts well to irregular surfaces of large diameter reinforced electrical cables; can be used for a wide range of electrical cables of different diameters, compared to other types of glands; the sealing process of the cable / pipe is performed in a very short time, on the order of seconds, it does not require a torque wrench or special technical skills; the amount of air initially existing in the toroidal chamber acts as a buffer element and allows maintaining the contact pressure between the toroidal chamber and the external insulation of the cable; it is reliable in operation.

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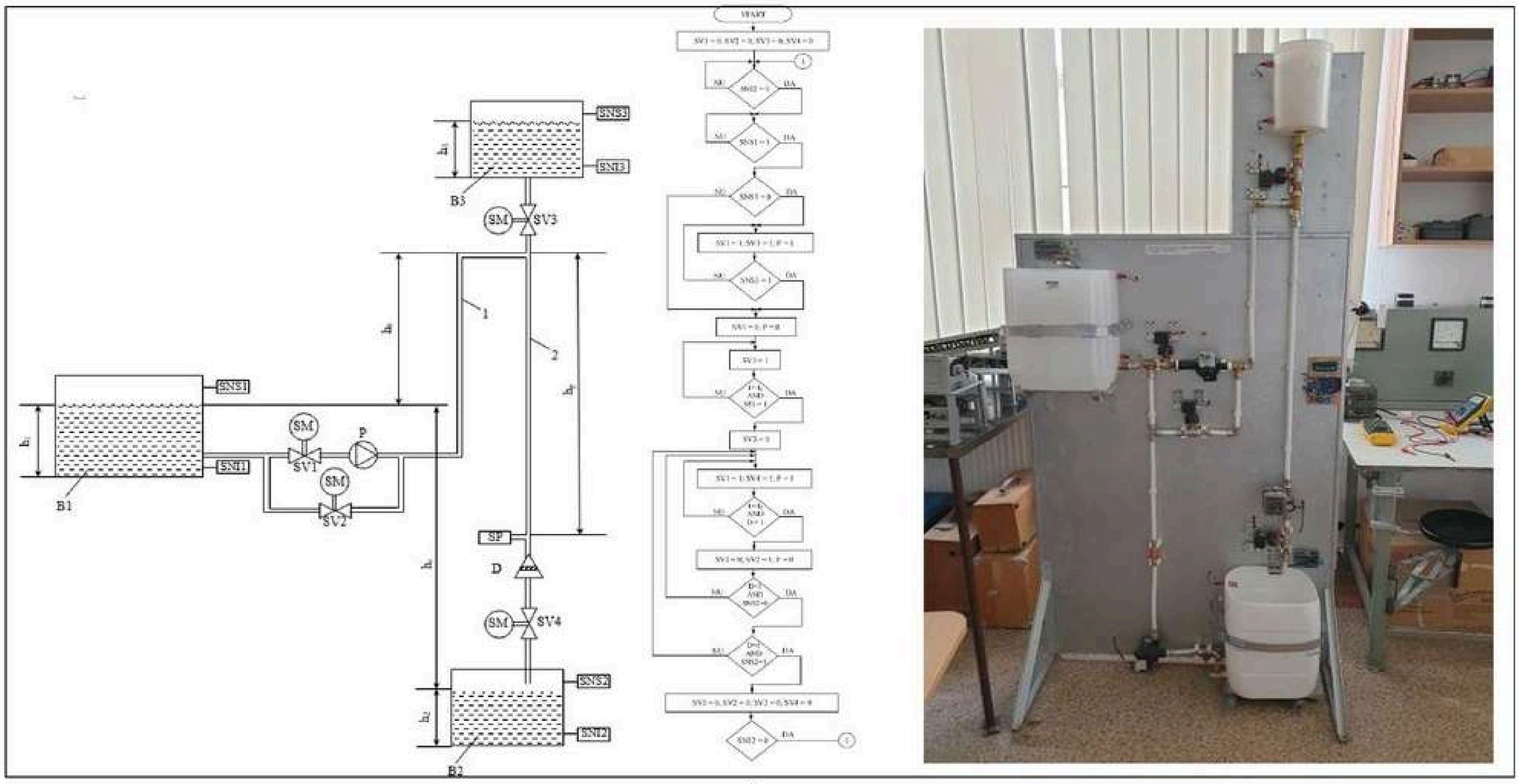
AUTOMATIC SIPHON INSTALLATION

Patent no. A 00492, 04.08.2020

Authors: Gabriel Nicolae Popa, Iosif Popa

Description: The invention relates to a hydraulic installation which can be used to transfer a liquid between two basins, the first for storage and the second for feeding consumers, located at different levels at which the route of the supply pipe must pass, due to natural causes, over the water level in the accumulation basin. The hydraulic flow pump is used for a short time, and the principle of the siphon is used to transfer the liquid. The proposed installation has the role of transferring the liquid between two basins by achieving a significant saving of electricity. The hydraulic installation is connected between three basins: two main basins and one for filling and aeration with small capacity (Fig.1.a). The control of the siphon system can be done with microcontroller or PLC (Figs.1.b,c).



a. b. c.

Fig.1. a. Block diagram of the automatic siphon system can have various fields of use; b. The flowchart of the program; c. Picture of the laboratory stand.

The automatic siphon system can have various fields of use:
-at the drinking water supply installations of the localities;
-in mining operations;
-other industrial branches;
-in agriculture.

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DRY CYLINDRICAL-TYPE ELECTROSTATIC PRECIPITATOR WITH PARALLELEPIPED HOUSING

Patent no. 132976, 30.04.2024

Author: Gabriel Nicolae Popa

Description: The invention relates to a dry cylindrical-type electrostatic precipitator with a parallelepiped housing, according to the invention, for low power plants that used fossil fuels or dry wood. The first two sections work on the electrostatic principle. The precipitator consists at the bottom, a gas distributor, two electric sections connected in series (without changing the gas flow), used to collect dust particles with larger diameters, which can be supplied from two high-voltage sources, which can operate at different voltage levels, and even with different forms of voltage. The collecting electrodes are cylindrical-type and the discharge electrodes can be uninsulated or insulated. The third collection section consists of an electrostatically charged fiber filter for collecting small particles (Figs.1,2).

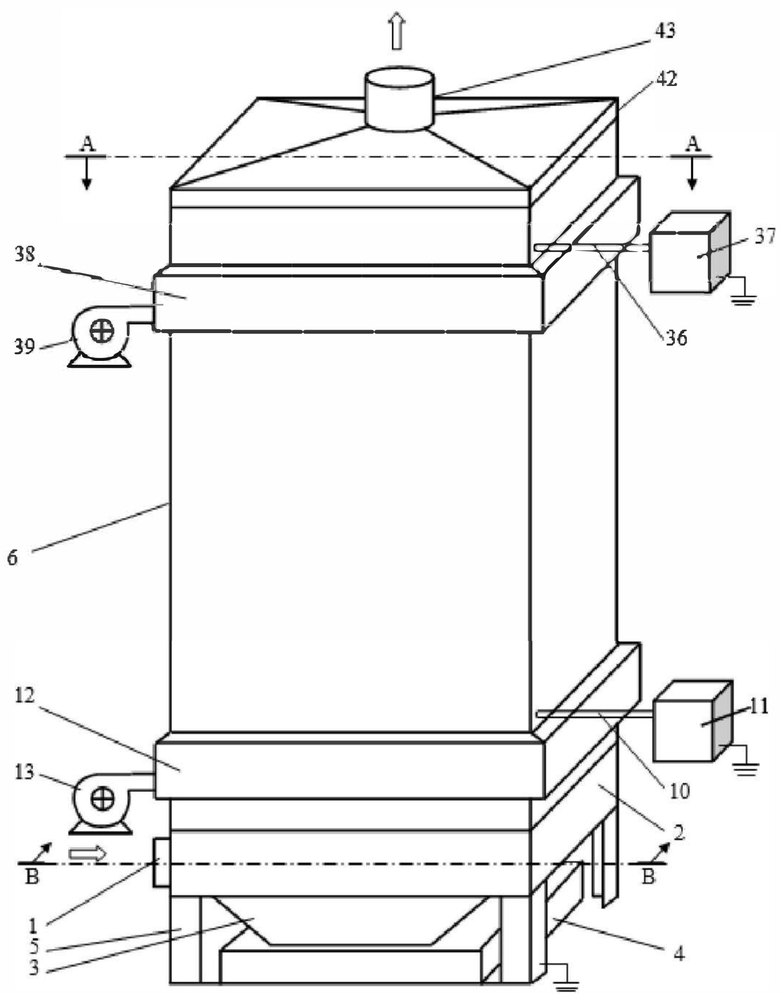

Fig.1. Dry cylindrical-type electrostatic precipitator with parallelepiped housing.

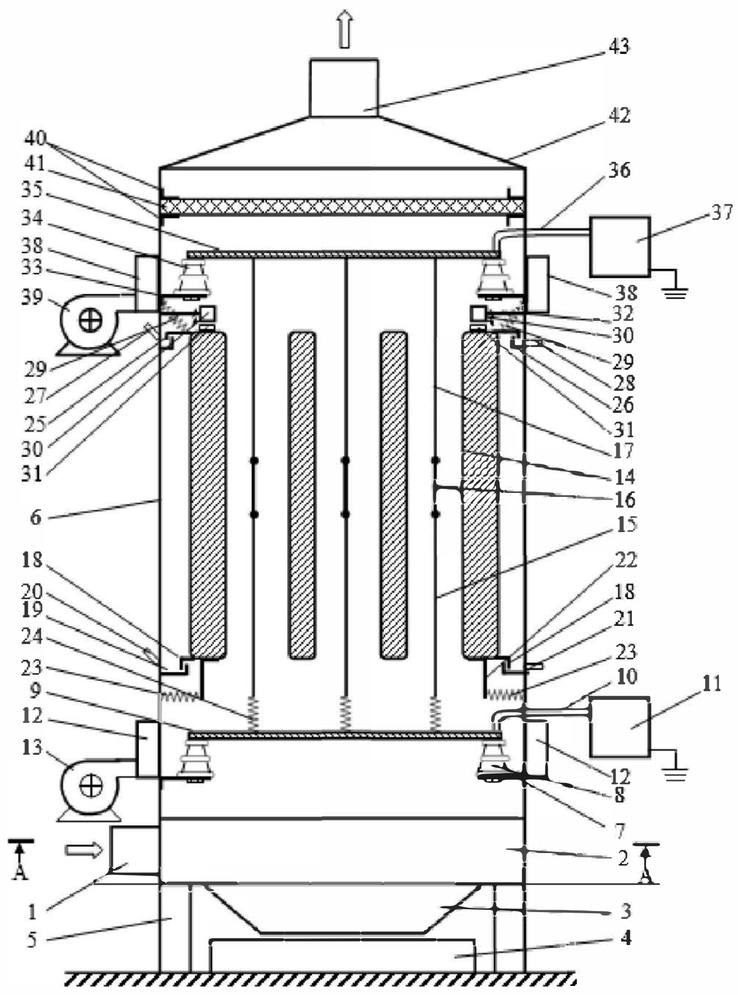

Fig.2. Cross section A-A from Fig.1.

The precipitator has the following advantages: has three filtering areas; can be used in small thermal power plants (fossil fuels and dry wood); only the collecting electrodes can be shaken; the inlet distributor ensures constant gas flows; cleaning with pressurized air directed to high-voltage electrical insulators is ensured; the footprint is small.

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HEARTBEAT SMARTPHONE AUDIO CLASSIFICATION USING DEEP LEARNING

Research project

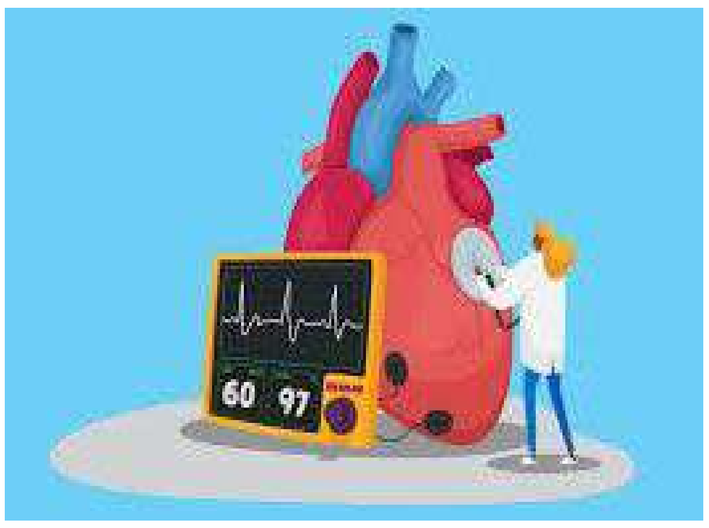
Authors: Mohamed Omer, Musab Alosaimi

Supervised By: Dr. Neyara Radwan

College of Applied Sciences,

Al Maarefa University, Saudi Arabia

C

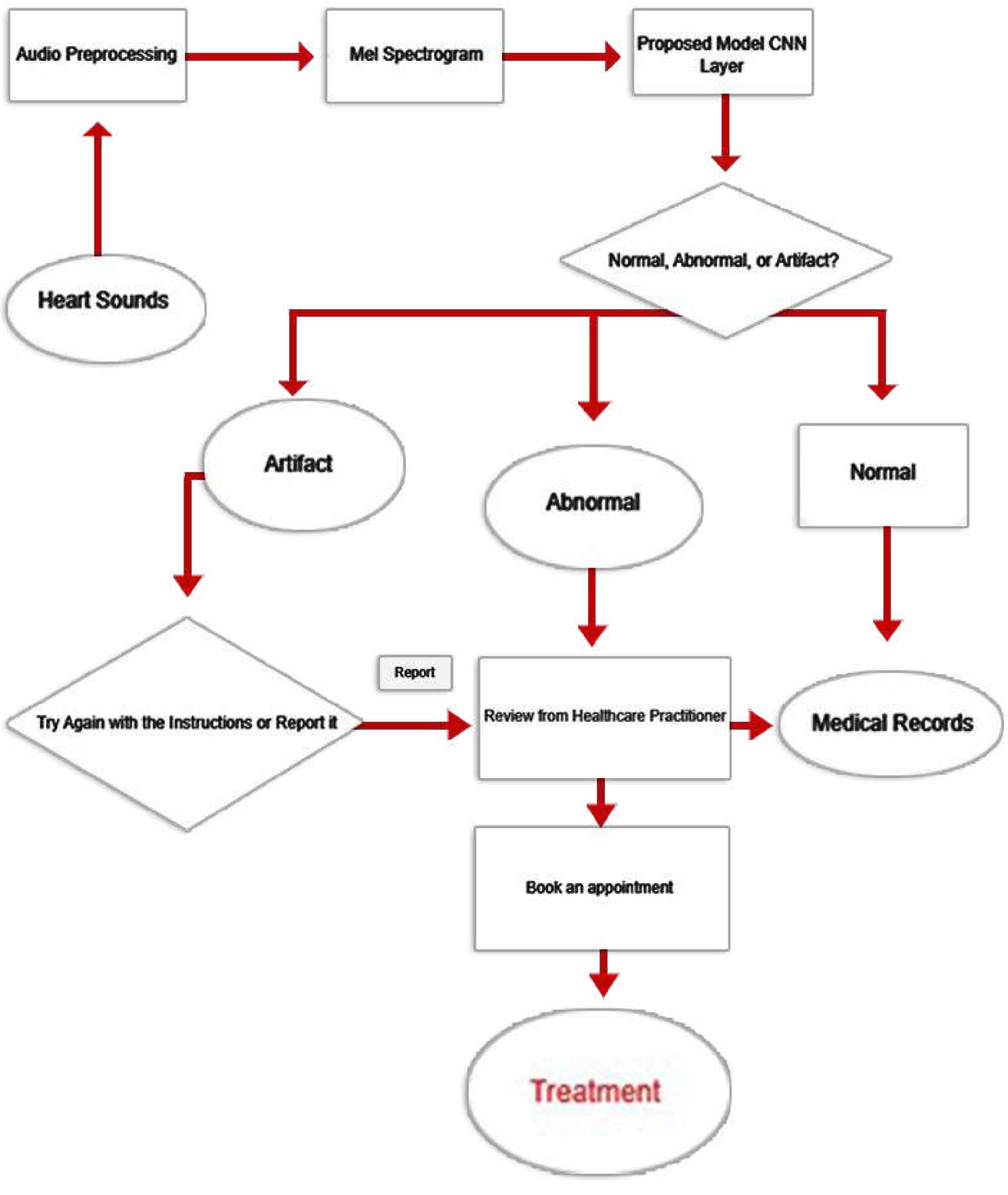


- KSA faces serious health challenges due to the high death rates from heart diseases, where it ranks 24th globally in this context.
- This necessitates enhancing health care and community awareness.
- In addition, the country is witnessing a spread of respiratory and obstructive pulmonary diseases, which requires enhancing awareness and taking preventive measures to address these ongoing health challenges.

The core Concept of Utilizing Deep Learning for Smartphone Audio Classification of Heartbeat Signals

- ✓ A mobile App designed to listen to and analyze heart and lung sounds aims to detect health changes early, offering immediate reassurance to users.
- ✓ By facilitating communication with medical professionals, it fosters early detection, thereby streamlining healthcare and enhancing overall well-being effortlessly.

The proposed Mobile App's Flow Chart Diagram



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6th International Exhibition, INVENTCOR
3-5 April 2025, Deva, Romania

UPCYCLING PLASTIC FOR 3D PRINTING TO CREATE BRAILLE LANGUAGE RESOURCES

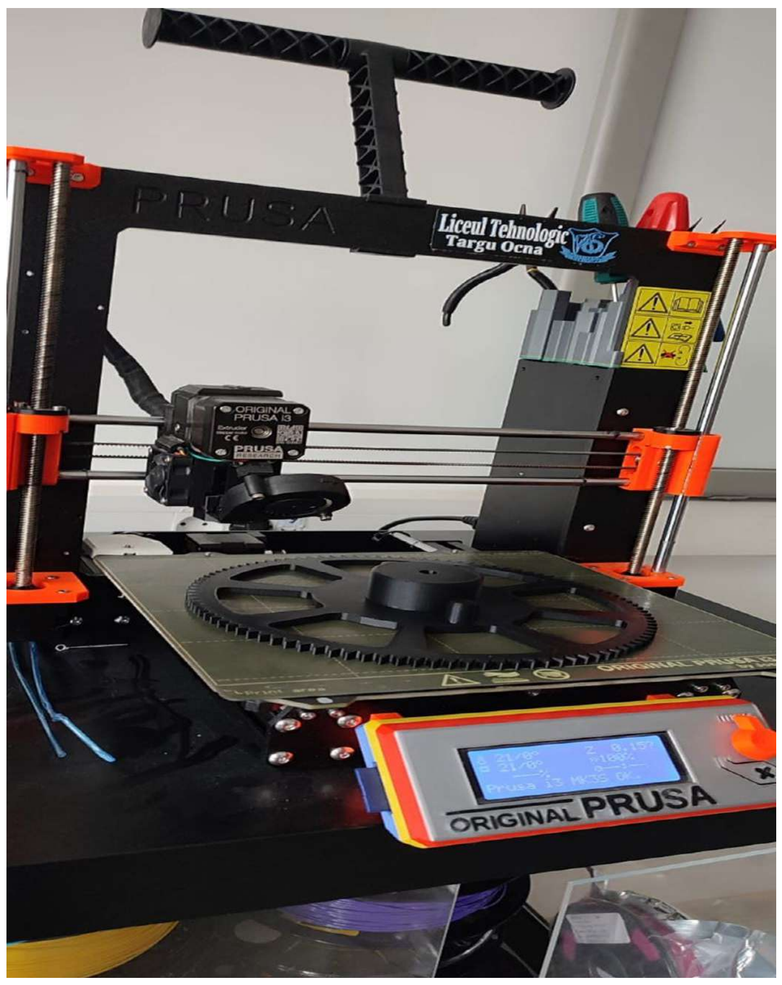
C

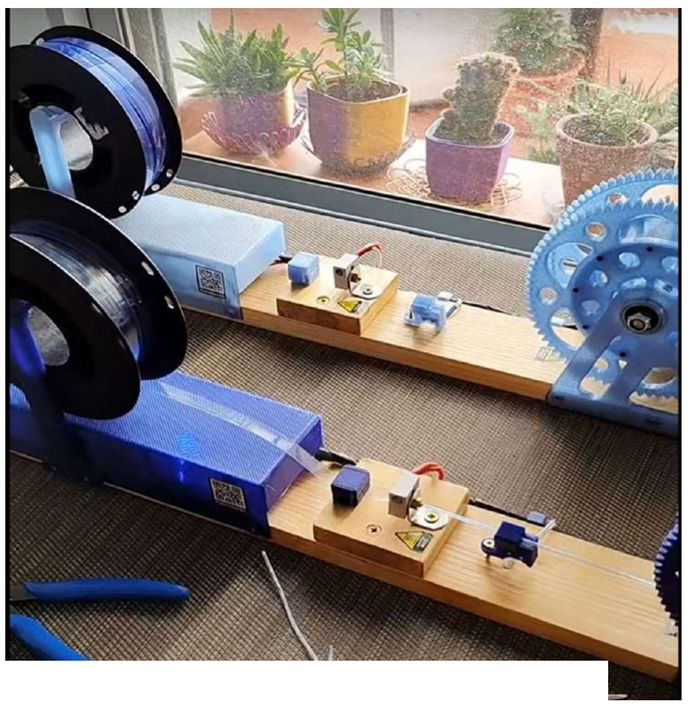
Authors: **Nicoleta VARTOLOMEI, Simina TĂNASĂ*, Andrei PÎRVU**

The Braille is an incredibly important accessibility aid, and yet it is left out of our home projects simply because of a lack of knowledge. With the help of 3D printers, we can create different shapes, puzzles, objects and much more. But we can also use them for much better purposes. This project supports and gives blind children the chance to learn to read the "Braille" alphabet much easier, and not only, geometric shapes and much more. They are made with a tactile Braille system on the front surface, allowing blind people to read and interpret information by touch.

3D printers – initially only available to science labs and a small number of privileged designers – are becoming more affordable and useful for the general public, with one problem: the printing material is far too expensive.

The overall objective of the project is the creative use of collected unwanted plastic materials and reintroducing them into a new cycle, beneficial in protecting the environment by making filament for 3D printers and creating accessible resources for those who use Braille language.





All electronic components are easily accessible and all structural parts can be 3D printed or purchased from hardware stores. Plastic bottles have found a new use: raw material for 3D printers.

Increasing involvement in environmental protection through the implementation of an experimental station for the recycling of plastic materials in order to produce filament for 3D printing, proposes an integrated approach in the management of plastic waste and recycling them into filament for 3D printing.

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6th International Exhibition, INVENTCOR
3-5 April 2025, Deva, Romania

WASTE MATERIALS SUSTAINABLE IN A NEW TEXTILE CONCEPT AND 3D TEHNOLOGY

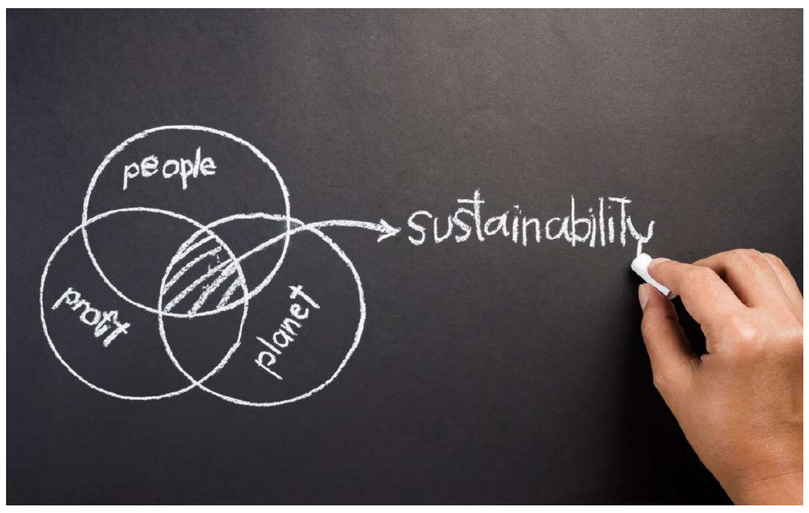
D

Author: Andrei PÎRVU
Mentors: Prof.ing.dipl. Simina TĂNASĂ& Prof.dr.ing. Nicoleta VARTOLOMEI

The main problem comes when the products reach the end of their life, that is, when they leave the wardrobe and end up, most of the time, in the landfills. Sustainability in the fashion industry is the commitment to practices that minimize the negative impact on the environment and society. It means using recycled or sustainable materials, reducing production and waste, ethical working conditions and social responsibility, all for the benefit of future generations.

Sustainable consumption does not, implicitly, imply giving up consumption, but rather implies a change in consumer behavior, it emphasizes the concerns regarding qualitative aspects at the expense of quantitative ones.

The aim of the research is the recycling of textile materials giving them a new life and their customization with the help of a 3D printer using a recycled pet filament with the motivation to adopt more circular practices all with the aim of reducing the impact on the environment.



This type of materials are in an overwhelming proportion, over 90%, reusable in the same form, or as raw material for other clothing elements. Through the 3D printing technique, they can be easily transformed into ideal elements for future clothing elements, depending on the nature of the material and its degree of use.

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DIGITAL TRANSFORMATION - AN APPROACH IN THE OIL AND GAS INDUSTRY IN A LOCAL, REGIONAL AND GLOBAL CONTEXT

C

Scientific paper

Author/s: Valentin-Paul TUDORACHE[1], Niculae-Napoleon ANTONESCU

In a global context where governments are setting increasingly ambitious targets to reduce carbon dioxide emissions while also addressing a greater presence of renewables in their local energy mix, the oil and gas industry needs to turn to new clean technologies - to find the best strategies to re-establish itself in the new era of the energy sector and beyond. It is estimated that in the new era of the oil industry - despite a price boom - oil and gas will provide more than 50% of the world's energy needs by 2050. As organisations in the oil industry accelerate the pace of their economic diversification strategies, this is driving an even greater and faster adoption of sustainability measures across the industry. Optimism, in terms of resource abundance in a new era of major social, technological and political trends, must be that of adapting to the current demands in which oil industry organisations operate.

In a complex world, nobody can do everything. In the quest for cost reduction and profitability in the short to medium term, both operators and organisations in their field need to collaborate more, exploring multiple strategies to succeed in this digital transformation. Clearly, more and more oil and gas organisations are testing - often successfully - a growing range of technologies and solutions to help them become more sustainable, reduce costs and, at the same time, reduce carbon dioxide emissions into the atmosphere.

There are many different components of digital transformation, but some common examples include the use of data analytics for production optimization, the use of drones and robots for exploration and maintenance, and specifically the use of virtual reality for training and simulations. An offshore platforms approach to better use of data, specifically properly implemented data analysis systems and tools can overcome the operational complexity of offshore platforms, quickly delivering returns of up to 40-50 times the initial investment and thus reducing environmental impact by reducing costs, accidents and bottlenecks. Advances in technologies, falling cost through digitisation and exponential growth in device connectivity offer not only a real opportunity to beat supply chain competition, but also potential material externalities for society at large. The use of digital technologies and how they are transforming the oil industry, such as: Big data; AI (Artificial Intelligence); IoT (Internet of Things/Things); RPA and AI (Robotic Process Automation and Intelligent Automation); AR and VR (Augmented Reality and Virtual Reality); Blockchain (Data Integrity) place a strong emphasis on Cyber Security (CS) and Industrial Control Systems (ICS) security, but also on worker protection and security, industrial assets, i.e. critical infrastructure and physical security; (*see Figures below*). Of course, it is no coincidence that the focus on Industry 5.0 is accelerating. Today, Industry 5.0 is a complement to Industry 4.0 and focuses mainly on a sustainable, human-centred and resilient industry.

Source: www.google.com (processed)

Overview: Offshore platform
(use of data analysis systems and tools with digital technology)

Source: www.google.com (processed)

Digitisation of the oil sector (*Upstream, Midstream and Downstream*)

Source: www.google.com (processed)

Overview: Using digital technologies

Today – ***in the DIGITAL ERA*** – several modern orientation technologies are established that can answer these problems, such as: *Rotary Steerable System; Reel Well Drilling; Geosteering Drilling; Autonomous Directional Drilling*.

and which, use bottom motors and measurement devices while drilling (MWD), providing access to real-time data.

For example, **Autonomous Directional Drilling (***see Figure below***)** is a significant step forward for the industry's digital transformation, helping organizations achieve new levels of well construction efficiency, consistency and sustainability. This technology allows - within the drill string - a self-steering bottom assembly (BHA) capable of drilling through any section of the wellbore. As one of the four pillars of autonomous directional drilling, downhole automation capabilities drive directional adjustments as conditions are encountered to significantly increase penetration rates (POR) and improve well quality, leading to a potential for higher production and lower emissions.

Source: www.google.com

Overview: Autonomous Directional Drilling

Source: www.google.com (processed)

DrillTronics Functions and Data Flow

In terms of the offshore digitization initiative, today's drilling operations on offshore platforms range from DrillTronics (Drilling Automation), DrillScene (Real-time Well Transient Monitoring), DrillExpect (Drilling Simulation) to implementation integrated project Drill Well on Simulator, providing the oil industry with advanced modeling and analysis, respectively leading global services. For example, **DrillTronic** (*see Figure above*) reduces risk and ensure maximum drilling efficiency through automatic functions: automatic tripping; automatic friction tests; automatic reciprocation; automatic start of mud pump.

Advantages , recommendations and conclusion:

As advantages: Based on the recent World Economic Forum White Paper, new technologies are expected to support the oil industry by: 20% reduction in drilling-extraction costs; 25% reduction in maintenance costs (inspection and maintenance); 20% reduction in labour costs.

Is recommended: The digital transformation of the oil and gas industry needs to address all elements of the operating model (so from strategy and capabilities to organisational structure). Therefore, organisations in the oil and gas industry need to approach digitalisation from the perspective of building new capabilities and leveraging technology in all key aspects of the value chain.

As a general conclusion: It is already a recognised fact that every organisation that benefits from this trend where operations and relationships are fully digitised, or at least improved in this respect, will generate growth far beyond traditional operating models. So, digital transformation means progress and growth, although -in the present- with trillions of dollars already being spent globally on the digital shift.

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ASPECTS REGARDING OF OIL SLUDGE CLEANING FROM CRUDE STORAGE TANKS USING ROBOTS

C

Scientific paper

Author/s: Valentin-Paul TUDORACHE[1], Niculae-Napoleon ANTONESCU

It is known that crude oil extracted from the deposit contains, along with hydrocarbons, variable amounts of water with organic salts, but also mineral impurities from rock, such as: sand, clays, crushed rock. Also, crude oil contains components with high freezing temperatures and limited solubility in the mass of liquid hydrocarbons (for example: heavy paraffins, asphaltenes, carbenes, carbohydrates, asphaltogenic acids etc.) which tend to separate from the liquid mass and encompass mineral impurities. Thus, over time, a semi-solid layer is formed at the bottom of the tank that can no longer be drained, and crusts consisting of mineral impurities embedded in paraffin and other similar products are formed on the pipes of the heating coil inside the tank that copolymerize under the influence of temperature, strongly adhering to the surface of the metal. These deposits that can no longer be drained from the tank are called oil sludge. Through definition oil sludge is a hazardous waste of organic and inorganic nature that separates from crude oil and settles on the bottom of the tank following the technological storage process. Regarding the methods or techniques of oil sludge cleaning, obviously, several techniques for cleaning crude oil tanks are known, such as: manual cleaning, mechanized cleaning, or automated cleaning. [1],[2],[5],[6].

In the petroleum industry, there are different types of tanks that store or process fluids. Currently, the most widespread tanks are metal ones.

Metal tanks for storing liquid hydrocarbons are containers with capacities greater than 3 m.c. of different shapes and sizes, made of a wide range of materials, all working at atmospheric pressure.

However, due to their simple and inexpensive construction, vertical cylindrical tanks are the most widespread. Figure 1 shows a tank storage with capacities between 1,500 m3 and 50,000 m3, of metallic construction, cylindrical, located vertically, aboveground, with fixed or floating lid, with automatic measurement system of the quantity of crude oil stored and with fire extinguishing system, respectively. The vertical cylindrical tanks with floating lid (see Fig. 2.) have a floating roof, provided with floats on the surface of the stored liquid (thus, when increasing the volume rises, and when decreasing the volume decreases), being a response to the need to diminish, as much as possible, the leakage of volatiles during storage (losses by evaporation of light fractions).

One of these is the crude oil reservoir, which can be seen in Figure 3. (for example: the tank has a capacity of 50,000 m3, is equipped with a floating metal lid, has a height of 18 m, a diameter of 60 m and a bowl of 10,000 m.p).

Fig. 1. Tank storage for storage of crude oil [11]

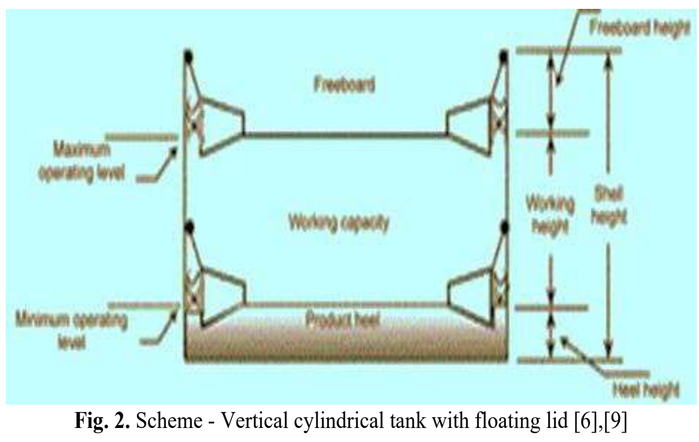

Fig. 2. Scheme - Vertical cylindrical tank with floating lid [6],[9]

Fig. 3. Overview - Vertical cylindrical tank with floating lid [1],[10],[11]

It is worth mentioning that the type of tank, dimensions and material vary depending on the storage conditions of the crude oil (pressure, temperature), the properties of the crude oil (composition, toxicity) and, obviously, the amount of storage required (operating volume).

Its main parts, are: housing, bottom, roof (fixed or floating), nozzles, pipes and tools, double sealing system, fire protection system, cathodic protection system and steel structures for personnel service. [1],[4],[6],[8]

Currently, sludge extraction from crude oil tanks is done manually and/or mechanized using an appropriate pump. Otherwise, if the sludge has various characteristics that make it non-pumpable (for example: high viscosity), manual intervention is required - qualified human intervention (see Fig. 4) - which, obviously, involves high costs and a series of risks, both from the point of view of labor protection for the working personnel and for the equipment.

Fig. 4. Manual intervention - Oil sludge at the bottom of the crude oil tank [6],[8]

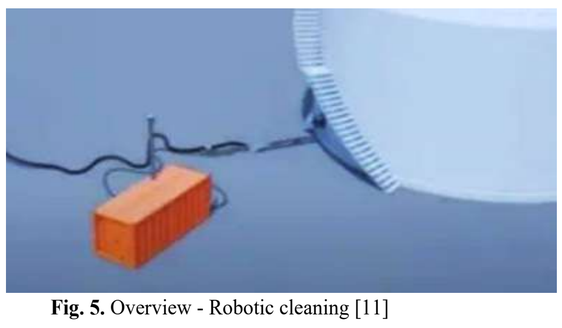

Fig. 5. Overview - Robotic cleaning [11]

Fig. 6. Photo image - Cleaning process preparation

Fig. 7. Photo image - Execution and monitoring of cleaning process

The robotic cleaning system is usually removable and houses the necessary equipment in containers (three semi-trailers). Thus, all equipment is easy to transport by truck and therefore the robot is maneuvered to enter the tank by performing the cleaning operation – so, it is used to break and remove oil sludge from the bottom of the tank (see Fig. 5). As for the basic components of the robot, these are as follows: hydraulic motor, cylinder, gas detector, explosion-proof junction box, solenoid flow control valve, explosion-proof infrared lamp, explosion-resistant/dust ignition chamber, explosion-proof fuel, wipers, water jet, video camera and vat. After installation, the robot is prepared on a ramp to enter through the manhole into the tank, moves to the bottom of the tank to begin the operation of cleaning the oil sludge (see Fig. 6). The system is fully automated. Thus, from the outside, from a control remote panel existing in the first container, the entire cleaning operation is performed and monitored by a specialized and experienced operator (see Fig. 7). Everything is done in a closed circuit, and residues are collected in a tank located in the second container.

Conclusion:

Regular cleaning of crude oil storage tanks is essential to maintain the absolute quality of the product inside, namely health and safety standards. Cleaning oil sludge from crude oil storage tanks using robots (robotic cleaning) is less expensive than manual and automatic cleaning. The equipment is installed in three semi-trailers and transported by truck. It can be installed on any terrain thanks to its flexible hydraulic system. The installation takes place in a very short time (3–5 hours) and does not require the use of other machines, such as cranes. Systems and robots operate in extreme conditions, are resistant to hazardous waste and chemicals.

As a general conclusion, robotic cleaning, in addition to being a modern technology, is so effective that even the most difficult parts inside the tank can be cleaned, eliminates the need for human penetration into confined spaces, reduces the cost of transportation and the risk for working personnel, and increases overall safety. It is a very environmentally friendly technology.

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ELECTRICAL DISCHARGE DEPOSITION TECHNOLOGY AND EQUIPMENT

Author: Ana – Cristina IUGA
Mentor: Prof. dr. ing. Liviu – Daniel GHICULESCU

C

Electrical Discharge Deposition (EDD) represents an advanced coating methodology that employs electrical discharges to apply metallic layers onto a workpiece. In contrast to Electrical Discharge Machining (EDM), which removes material from a surface through electrical sparks, Electrical Discharge Deposition (EDD) functions as the inverse process, transferring material from the tool-electrode to the workpiece. This method is particularly cost-effective because it allows the use of standard EDM machines (Figure 1), eliminating the need for specialized coating equipment. In recent years, EDD has gained considerable attention for its ability to improve surface properties, such as increasing wear resistance, enhancing corrosion protection, and improving high-temperature performance. Industries such as automotive, aerospace, medical and electronics can significantly benefit from this technology as it improves wear resistance, friction reduction, corrosion protection and biocompatibility.

A numerical simulation of the EDD process was conducted using Comsol Multiphysics (Figure 2), applying two connected modules: Magnetic Fields – Figure 3 (to generate the magnetic forces influencing ion movement) and Charged Particle Tracing – Figure 4 (to analyze particle distribution using Poincaré maps – Figure 5 and 6).

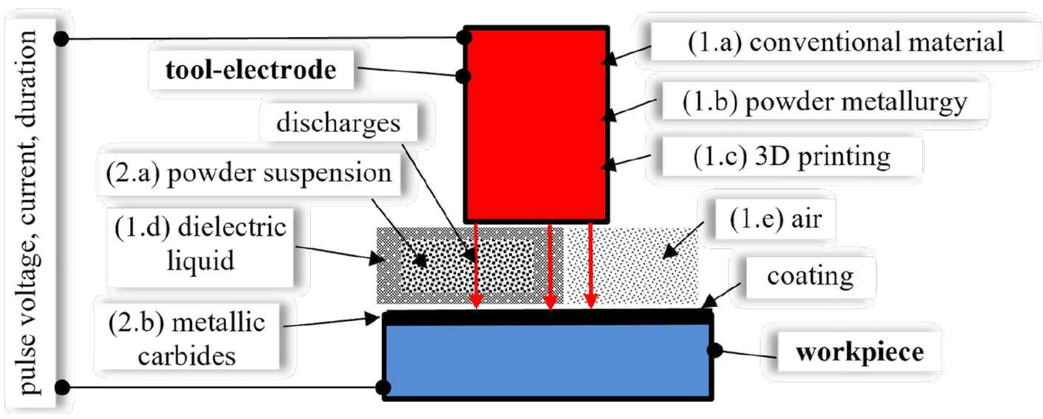

Figure 1. Block diagram EDD process

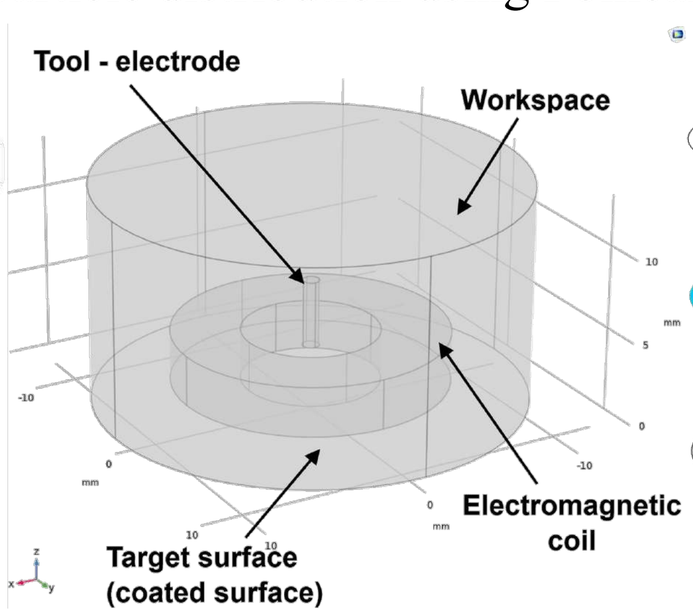

Figure 2. Geometry of the model

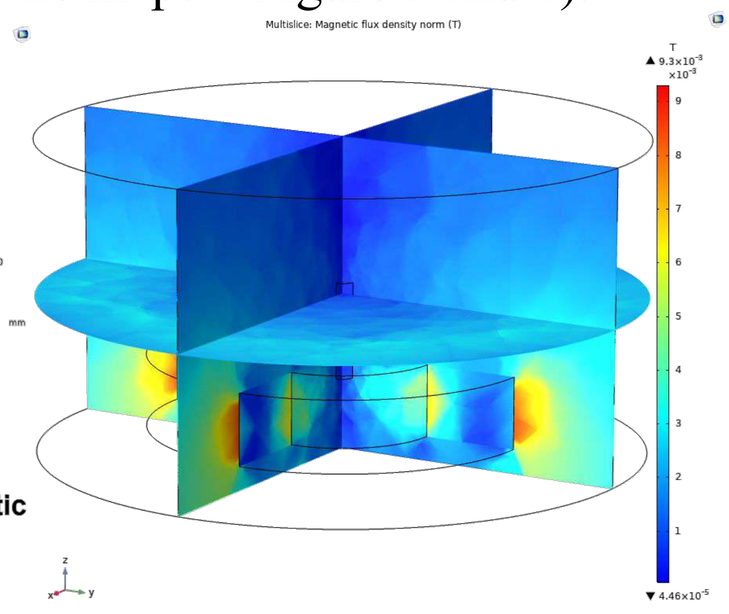

Figure 3. Magnetic flux density

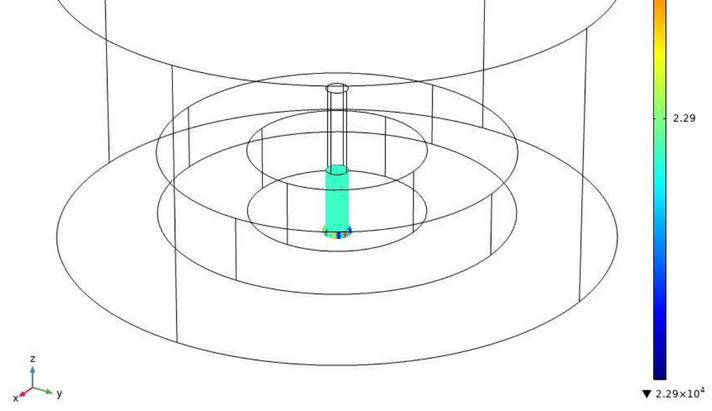

Figure 4. Particle trajectory simulation

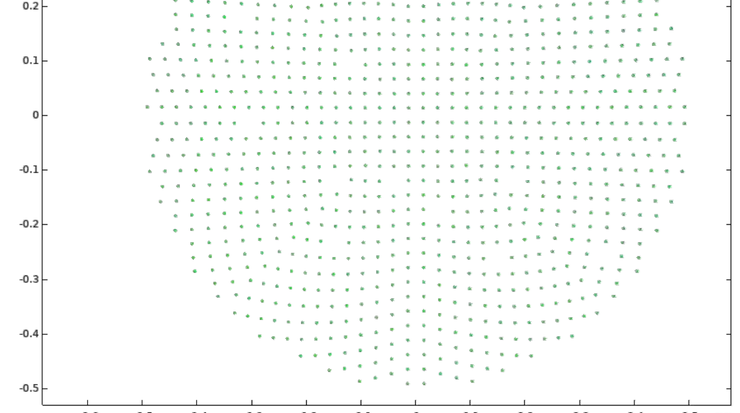

Figure 5. Poincaré map

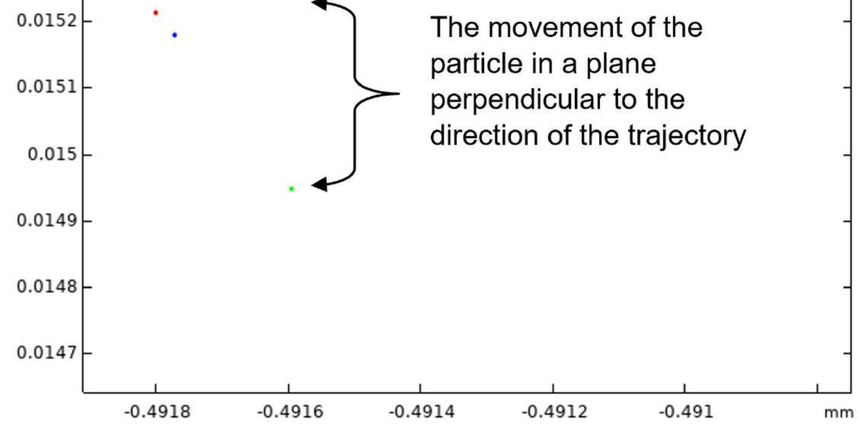

Figure 6. The focus of a particle

Electrical Discharge Deposition (EDD) represents a promising technology for high-performance coatings, with broad applications across various industries. As research advances, EDD has the potential to become a leading method for surface engineering, offering enhanced durability, efficiency, and cost savings in modern manufacturing.

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RESEARCH AND CONSTRUCTION OF INNOVATION TO REDUCE AIR HUMIDITY BY APPLING ELECTRIC FIELD INTENSITY ENERGY

Research project

Siseerot Ketkaew

C

This research project presents research and construction of innovation to reduce air humidity by appling electric field intensity energy consists of 2 parts: Part 1, a set of high-intensity non-uniform electric field cells with the corona discharge process to cause ionization to break the bonds of water molecules for use in reducing the relative humidity in the air using the technique of adjusting the high voltage voltage in the high voltage circuit to control the intensity of the electric field, and Part 2 is a set to reduce the amount of ozone gas using an ultraviolet light with a wavelength of 253.7 nm. Part 1 has designed and construction a set of electric field cells consisting of a corona wire placed between two aluminum plates and High voltage flyback converter circuit consists of a high frequency pulse generator using IC number 555 for adjusting the electric field intensity from 5 kV/cm to 25 kV/cm under the adjustment of a high voltage of 1 kilovolt to 5 kilovolts, respectively, by using a pulse signal to stimulate the work of the IGBT to control the operation of high-frequency high-voltage transformers to produce high voltage electricity for supplying electrical energy to a set of electric field cells.

The test results were that when measuring the relative humidity in the air, it was found that the electric field intensity was 25 kV/cm at a wind speed of 1 m/s able to reduce the amount of relative humidity in the air by 50%RH and produce 1 ppm of ozone gas in the electrical laboratory, area size 20 square meters, in 60 minutes, and in the set to reduce the amount of ozone gas, it will be found the amount of ozone gas produced by the electric field set will be reduced to 0.01 ppm. This research has passed the overall power consumption analysis test and analyze safety standards regarding electrical leakage for the safety of users, It is already completed and in the future it can be further developed into a commercial innovation.

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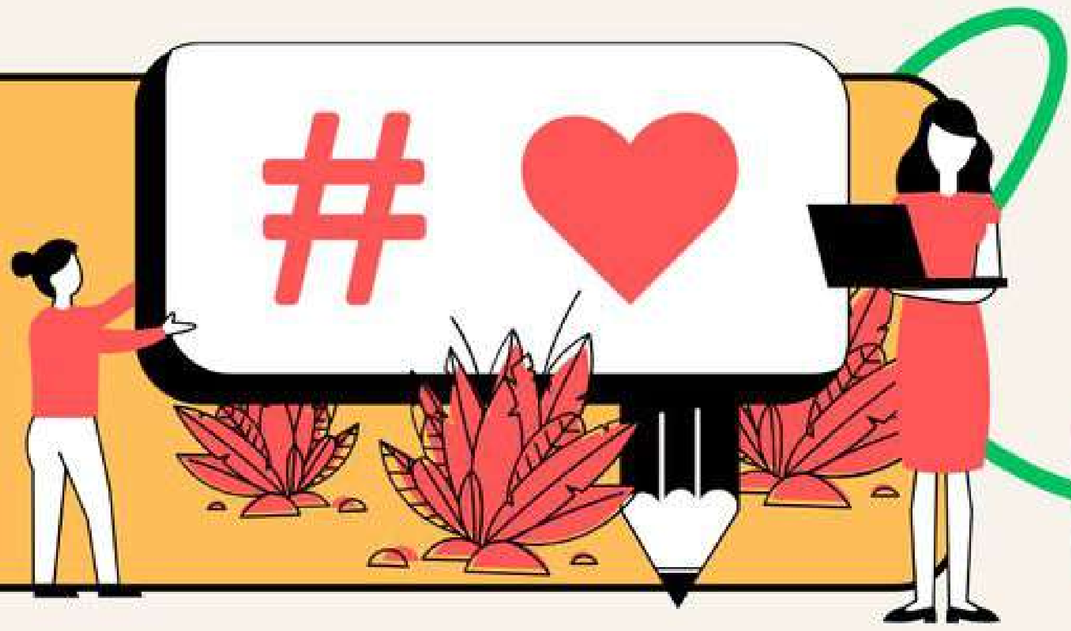
The impact of international regulations on the lighting and energy efficiency market

-Student Project-

Authors: Gabor Antonio, Petruț Adriana
Coordinators: Mihaela Ştefan, Ioana Fărcean

Category C



In addition to macro-economic developments, regulations affecting lighting products are a key determinant of the future of the lighting market. One regulation is to ban inefficient technologies, the other is to adopt stricter laws on high energy efficiency requirements and provide incentives for the development of a comprehensive infrastructure. Bans on certain technologies are increasingly being adopted by various countries, including residential lighting and commercial lighting products. For example, China has updated the Proclamation on Banning Incandescent Light Bulbs, backed by the Energy Conservation Law. Europe is also further accelerating the shift to more green lighting sources by extending its regulations to ban the use of low-voltage halogen lamps.

International regulations on lighting products aim to set clear standards for their energy efficiency, safety and environmental impact, thereby helping to reduce energy consumption and protect the global environment. This study aims to analyze the impact of international regulations on the lighting market, in particular in terms of banning inefficient technologies and adopting stricter energy efficiency laws. It also explores how switching to green technologies such as LEDs can make a significant contribution to reducing energy consumption and protecting the environment.

Adopting LED lighting can significantly reduce global electricity consumption equivalent to the output of nuclear power plants. However, LEDs are not a direct solution to eliminating nuclear power, but just one component of a broader plan that must include renewables and energy efficiency in other areas.

LED versus nuclear energy comparison

Factor	Traditional lighting	LEDs	Nuclear energy
Global energy consumption for lighting [TWh]	around 4.000	around 2.000	around 2.700
LED energy savings [TWh]	-	around 2.000	-
Contribution to energy demand reduction [%]	-	5-7% of global consumption	10% of total production
CO2 emissions	raised	low	zero
Sustainability	1-2 years (incandescent)	10-20 years	30-60 years

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Sign Translator

Author/s: Deșan Dumitru
Mentor: physics teacher Ciuvaga Victor

C

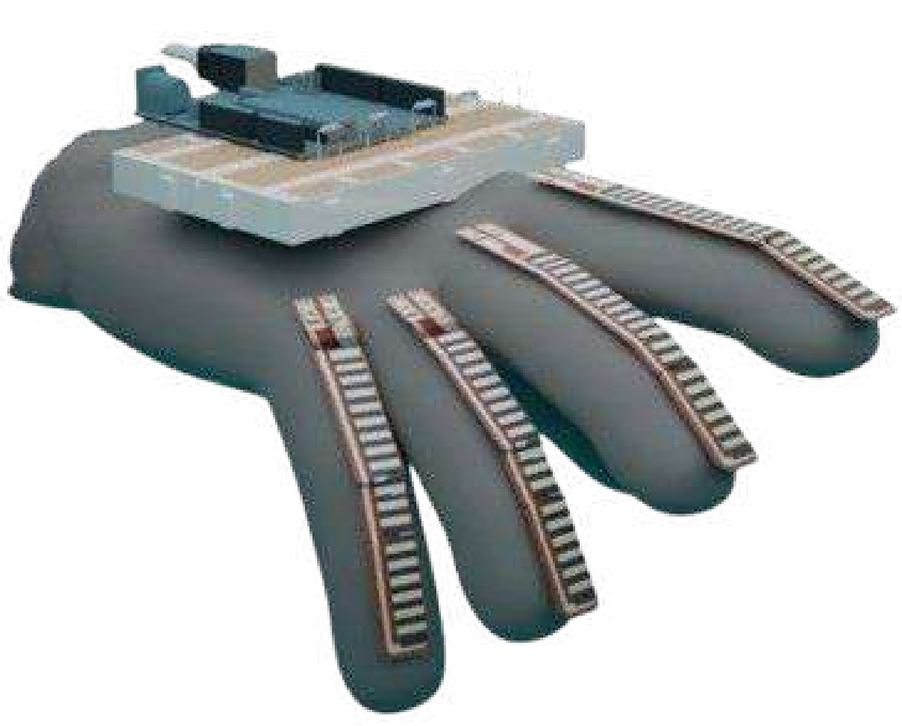
The **Sign Language Translator** is a **wearable assistive device** designed to help individuals with hearing impairments communicate more effectively with those who do not understand sign language. By translating **hand gestures into text in real-time**, this system eliminates communication barriers and promotes inclusivity in social, educational, and professional settings.

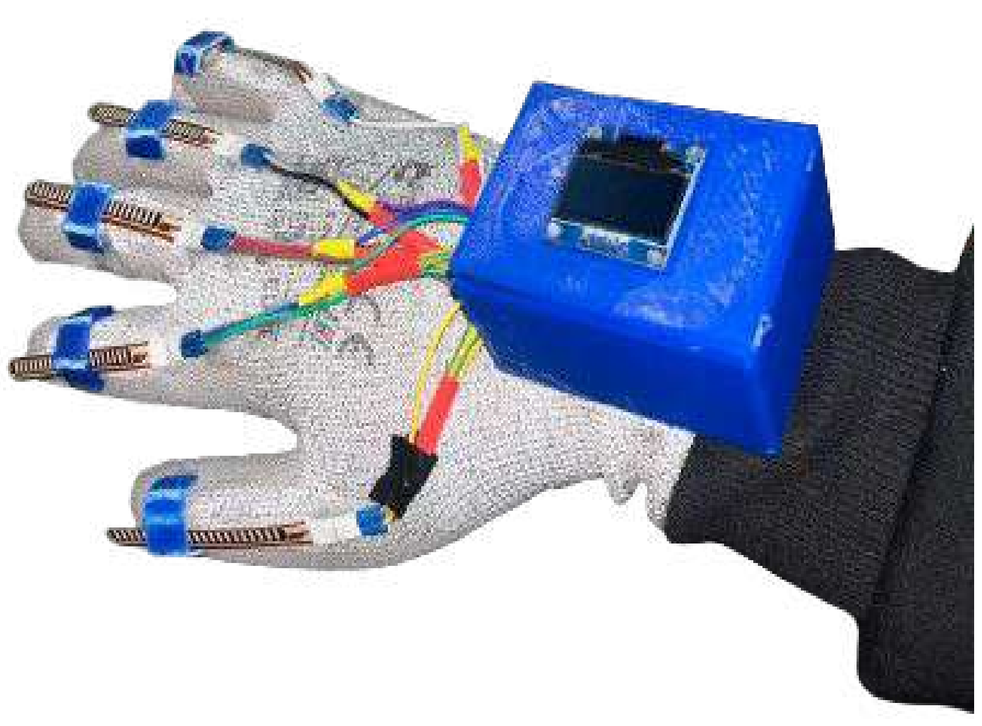
How It Works

The system consists of a **glove embedded with flex sensors**, an **Arduino microcontroller**, an **OLED display**, and **Bluetooth connectivity**. As the user performs gestures, the sensors detect the **bending and positioning of fingers**, sending signals to the microcontroller, which translates them into **letters, words, or phrases**. The interpreted text is then displayed on the OLED screen or sent to a smartphone via Bluetooth.

Key Features:

•**Real-time Gesture Recognition** – The system instantly translates hand movements into text for immediate communication.
•**OLED Display** – Provides instant visual feedback on the glove, ensuring the user sees the translation without needing an external device.
•**Bluetooth Connectivity** – Allows the translated text to be sent to a smartphone for further processing, storage, or conversion to speech.
•**Compact and Portable Design** – Unlike camera-based systems, this glove is lightweight, standalone, and does not require an internet connection.
•**User-Friendly Interface** – Simple to operate, making it accessible for people of all ages.





Technical Components

•**Flex Sensors** – Detect finger movement and bending angles.
•**Arduino Microcontroller** – Processes sensor input and converts it into corresponding text.
•**OLED Display** – Shows translated text in real-time.
•**Bluetooth Module** – Enables wireless transmission of text to mobile devices.

Future Developments

To improve functionality, the **Sign Language Translator** could be enhanced with:
•**Machine Learning Integration** – AI-based recognition for dynamic gestures.
•**Text-to-Speech Output** – Converting translated text into spoken words.
•**Multi-Language Support** – Adapting to various sign languages worldwide.

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THE INTELLIGENT INTERSECTION

C

Author/s: Tofan Cezar
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Objective:
Develop an intelligent intersection management system using AI and real-time sensor data to improve traffic flow and enhance road safety.

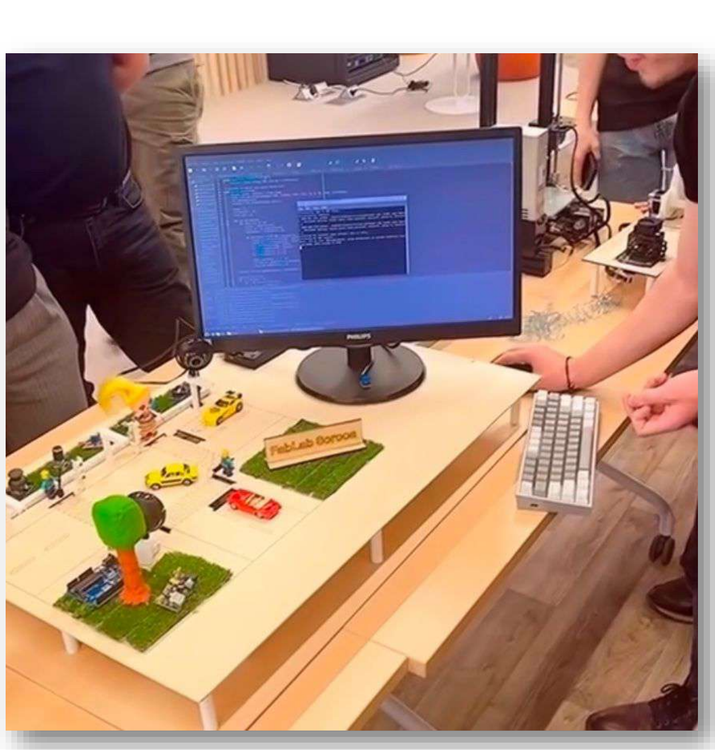
Innovative Features:
- **AI-Driven Control:** Adaptive traffic signals based on real-time conditions.
- **Advanced Sensor Integration:** Automatic detection of vehicles and pedestrians.
- **Energy Efficiency:** Optimized traffic light operation to reduce consumption.
- **Scalability:** Compatibility with smart city infrastructure for future integration.

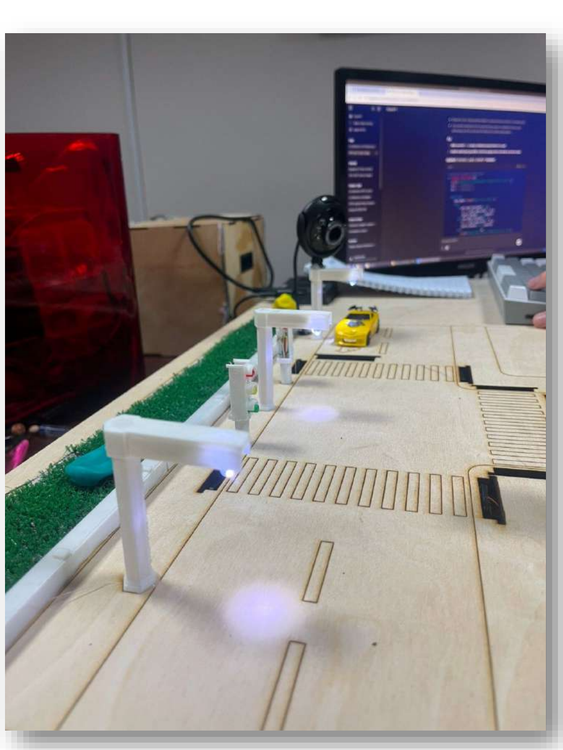
Key Benefits:
- **Traffic Congestion Reduction:** Over 30% reduction in waiting times.
- **Increased Safety:** Adaptive signaling reduces accidents.
- **Resource Optimization:** Automatic real-time adjustments for energy savings.

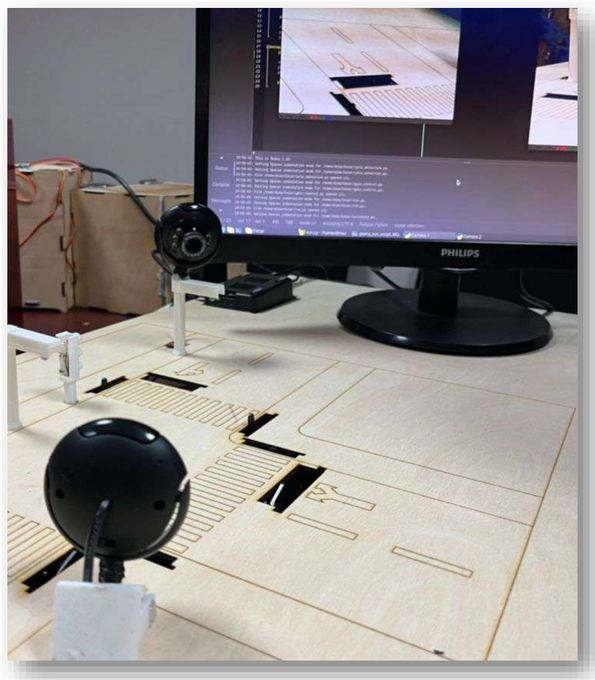
Project Phases:
1. **Research & Analysis:** Studied traditional intersections to identify issues.
2. **Concept Development:** Designed system architecture and selected technologies.
3. **Technical Implementation:** Developed AI algorithms and integrated sensors.
4. **Testing & Optimization:** Simulated and fine-tuned system performance.
5. **Conclusions & Proposals:** Evaluated results and proposed future improvements.

Next Steps:
- Integrate vehicle-to-infrastructure (V2I) communication.
- Expand real-world testing at intersections.
- Develop a mobile app for real-time traffic updates.

Impact:
The Smart Intersection system offers a sustainable, scalable solution to optimize urban mobility, improve safety, and enhance traffic efficiency.







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qSI - Quick Sound Interface

Authors: Larisa-Maria GÎDEI, Alexandru David BUȘOI,
Eduard Raul GRĂDINARU
Mentor: Prof. Mihaela SOPINCEAN

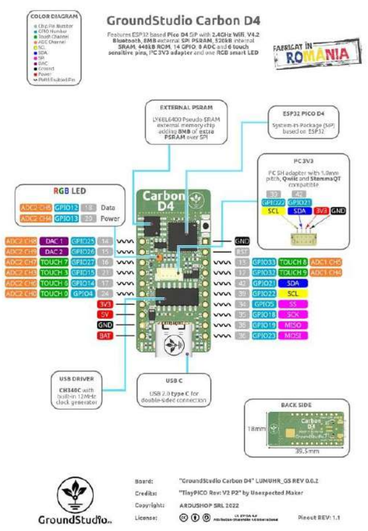
C

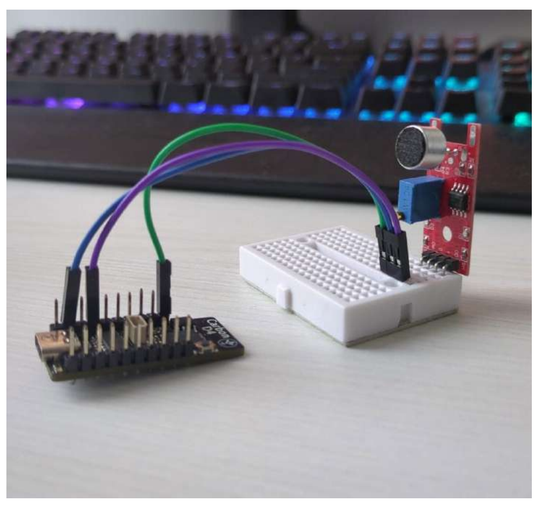
qSi is an appliance for rapid recording of sound intensity, used to measure the sound power in a classroom. To build the device, we used:

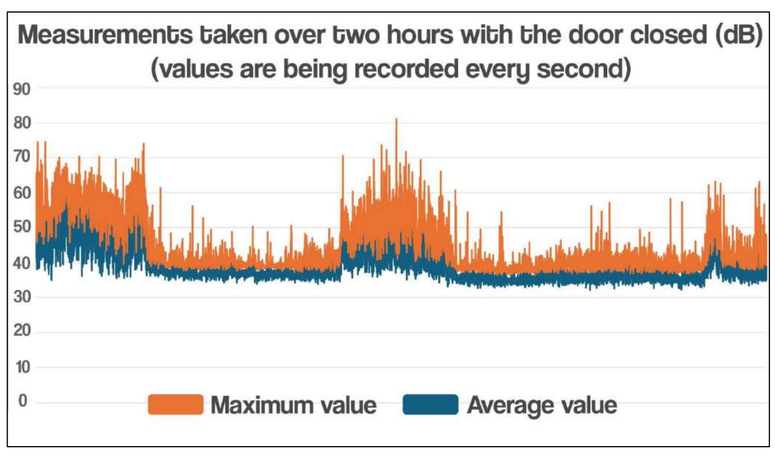
- an ESP 32 microcontroller from Groundstudio;
- a KY audio sensor, and
- a 128×64 OLED display that operates via SPI.

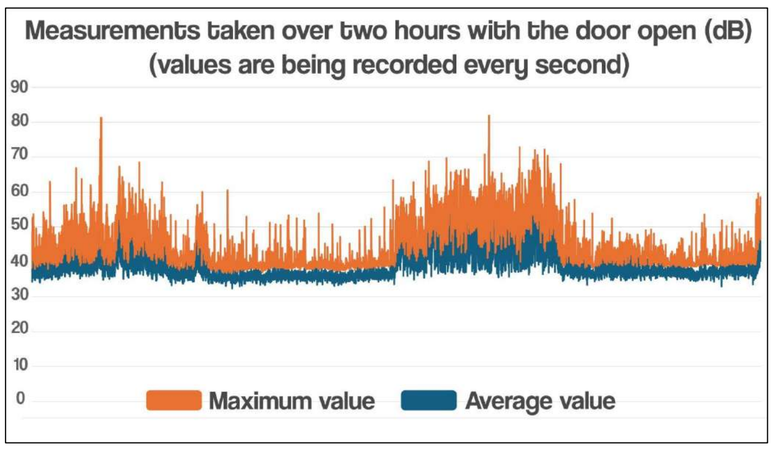
For programming, we used:

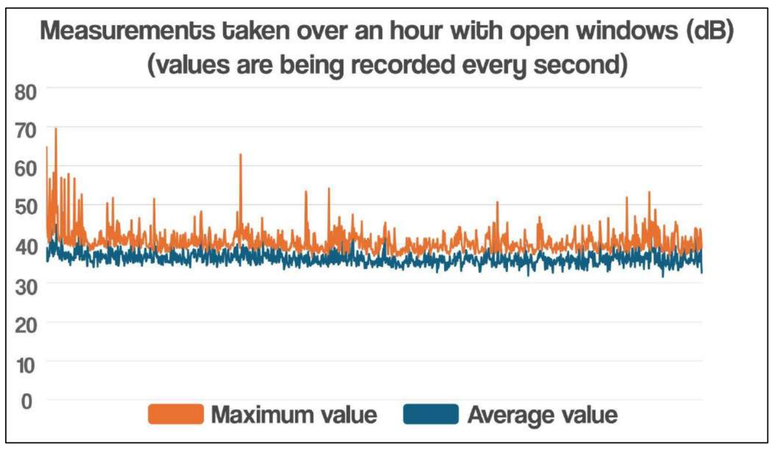
- Arduino and for data storage;
- a Python script that monitors Serial outputs and then writes them to a CSV file.











This study presents three different measurements take throughout a school day, considering, in turn, two external factors that affect the average sound intensity in a classroom: the sound power from the institution's hallways and the sound power from the schoolyard.

When the door or window is open, we can observe a decrease in sound intensity. This is due to the fact that sound intensity is inversely proportional to the surface area that sound can cover: I = pv, where p is the acoustic pressure and v is the particle velocity. Additionally, the difference between the values recorded during the study with the window open versus the door open is due to the difference in intensity between the two environments, with the sound intensity inside the building being higher than that in the external courtyard.

The results obtained from the recordings helps classify and study the factors considered as sound pollutants, allowing for measures to be taken to improve the acoustic environment in educational institutions.

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MOBILE INTEGRATED SURVEILLANCE SYSTEM/RO 2023 00039

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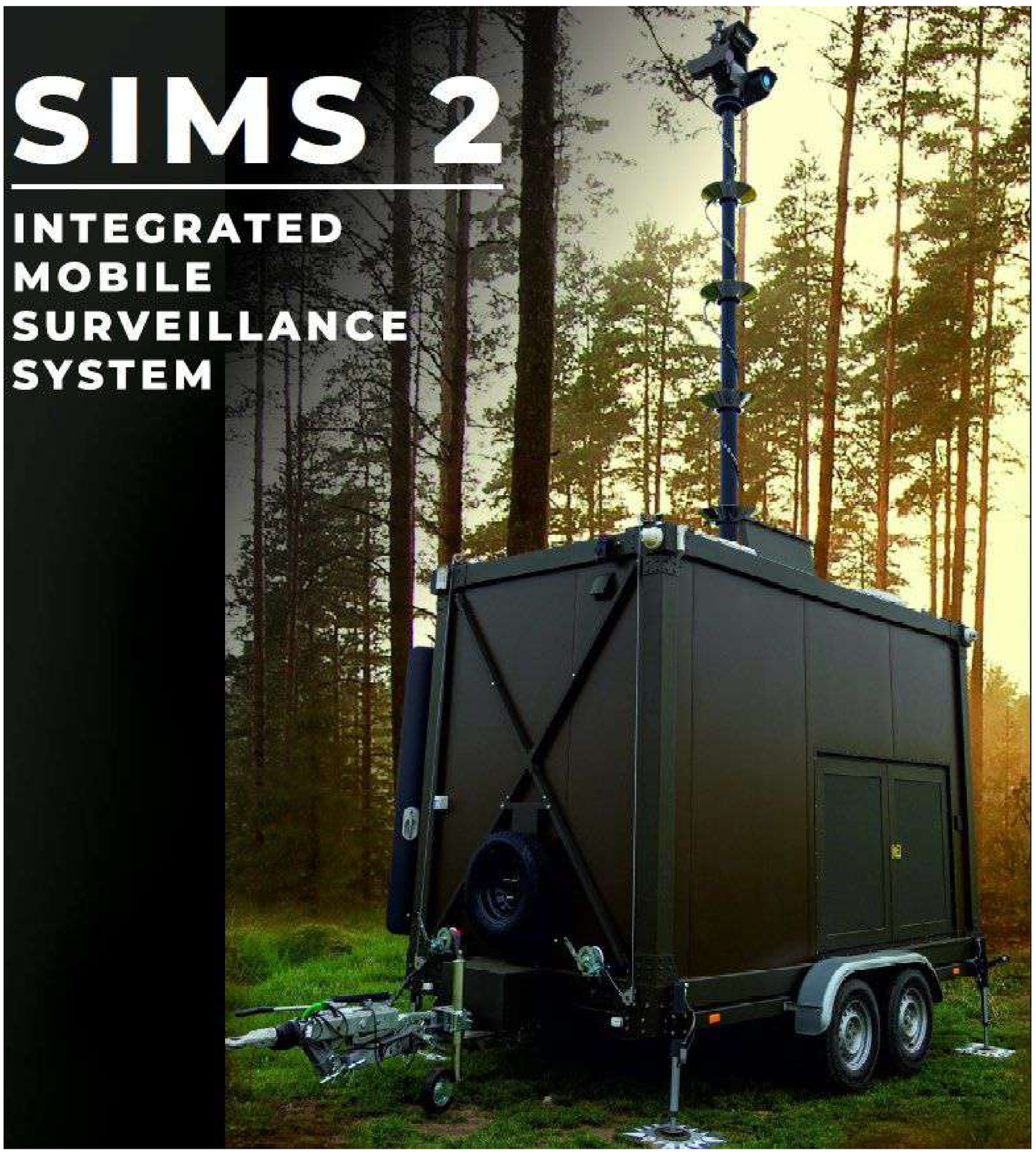
C

The product is a multispectral surveillance system which allows to detect recognize and identify different type of threats in various atmospheric conditions using visible, short wave infrared and medium wave infrared cameras.

The product performs the following tasks:

- ***Gathering information from different type of sensors: optical, distance measurement, positioning, recognition;***
- ***Processing and integrating obtained information into the GIS application running on a ruggedized PC;***
- ***Transmitting and receiving information to / from other structures;***
- ***Monitoring the response activities and their results.***
- ***Storing the data and images needed to prove the identified activities***



Contact:www.electro-optic.ro; office@elop.ro, +40723242145

D

Automotive

Space science

Aviation

Ships

Mechanics

Stefan cel Mare University of Suceava

Faculty of Electrical Engineering and Computer Science

DYNAMICALLY ADJUSTABLE SUNSHADE SYSTEM FOR VEHICLE WINDSHIELDS

D

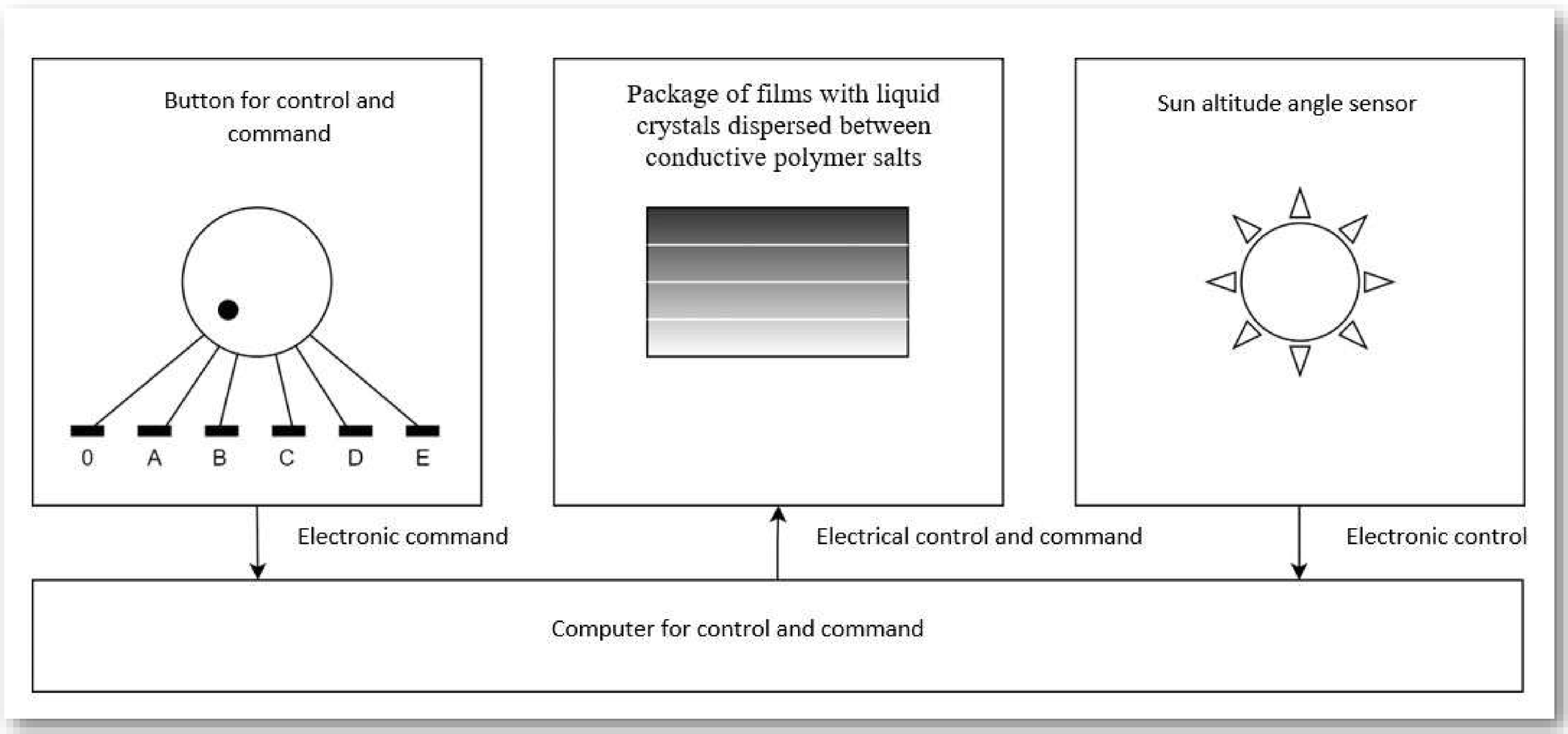
Patent Application No. A 2024 00274

Ciprian BEJENAR, Alexandru LEONTE, Laurențiu Dan MILICI, Andrei Emanuel PASCAN, Mihai DIMIAN, Daniela IRIMIA, Constantin UNGUREANU, Ciprian AFANASOV

The sunshade system with dynamic adjustment for vehicle windshields involves gradually controlled shading, in the vertical plane of the windshield, by progressively powering the elements arranged in layers in a package of films, transparent when not powered and opaque when powered, both manually, depending on the user's wishes, and automatically, depending on the elevation angle of the sun and the vehicle relative to the horizontal plane, so as to provide a distinct alternative for creating sunshades next to the vehicle windshield.

Advantages:

- The system introduces new possibilities for the creation of sunshades with dynamic and progressive adjustment for vehicle windshields;
- The system preserves the chromatic range of colors perceived in the transparent state;
- The system produces a zonal shading effect in overlapping steps;
- The system can be adjusted effortlessly, depending on the elevation angle of the sun and the vehicle;
- The system increases road safety by being able to be applied to any windshield of a vehicle, train, flight system or watercraft with passengers;
- The system does not lose its properties due to wear and tear and does not require maintenance.



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TERRITORIAL AEROCLUB "Constantin Manolache" DEVA

D

Author: ***Gheorghe ȚINEGHE & Team***

Founded in 1975, the Deva Aeroclub is located east-southeast of the municipality of Deva, at a distance of 7 km. Its entire length is between the Simeria - Deva railway and the shore of Mureș. At the beginning of its operation, it was called the "Dacia" Deva Aeroclub, then the name changed, becoming the "Constantin Manolache" Deva Aeroclub, and then the Deva Territorial Aeroclub.

The Săuleşti field, which later became an airfield, not too far from the one in Bintiți where Aurel Vlaicu had flown with his "beetle" in 1909, is a place that has become an important airfield among the "airfields" in our country . On October 1, 1935, the decision was made to establish a flying school without a motor in the field of Săuleşti, and within the school of arts and crafts in Deva, a section to build gliders.

In 1975, the decision was made to reorganize the Deva aeroclub, using the former airport base and the AVIASAN station. in the latter part of 1975, preparations began and the Central Aeroclub established the personnel that will serve this aeroclub.

The Aeroclub organizes theoretical and practical courses for obtaining the licenses of parachutist, glider pilot, ultralight pilot and PPL(A) pilot.

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CNC MAŠINA / CNC MACHINE

Autors: Sara Stajić, Ognjen Ikonić Đorđe Tadić / JU TŠ „Mihajlo Pupin" Bijeljina / Savez inovatora Republike Srpske
Republic of Srpska - Bosnia and Herzegovina
Mentor: Milan Bobar

D

SR/ CNC mašina je precizan uređaj za automatsko crtanje i pozicioniranje alata, zasnovan na mikrokontrolerskom upravljanju. Sistem je konstruisan kao edukativna i funkcionalna platforma koja omogućava razumijevanje principa numeričkog upravljanja (CNC tehnologije) kroz praktičnu primjenu. Na osnovu zadatog G-koda, mašina automatski izvršava precizno definisane pokrete, omogućavajući crtanje različitih oblika, tehničkih skica i grafičkih rješenja. Ovakav način upravljanja identičan je principima koji se koriste u industrijskim CNC sistemima.

Tehničke karakteristike:
- **Arduino Uno koristi se kao glavni kontroler sistema**
- **CNC Shield v3 omogućava jednostavno povezivanje i upravljanje komponentama**
- **A4988 driveri upravljaju kretanjem step motora po X i Y osi**
- **Servo motor kontroliše pomjeranje po Z osi (podizanje i spuštanje alata)**
- **Mikroprekidači (limit switch) služe kao graničnici radi detekcije krajnjih pozicija**
- **Sistem interpretiše G-kod, koji definiše putanju i pokrete mašine**

Primjena:
- **edukacija iz oblasti automatike I mehatronike**
- **demonstracija CNC tehnologije u nastavi**
- **izrada tehničkih crteža I grafike**
- **razvoj „uradi-sam" (DIY) inženjerskih projekata**
- **povezivanje programiranja, elektronike I mašinstva**

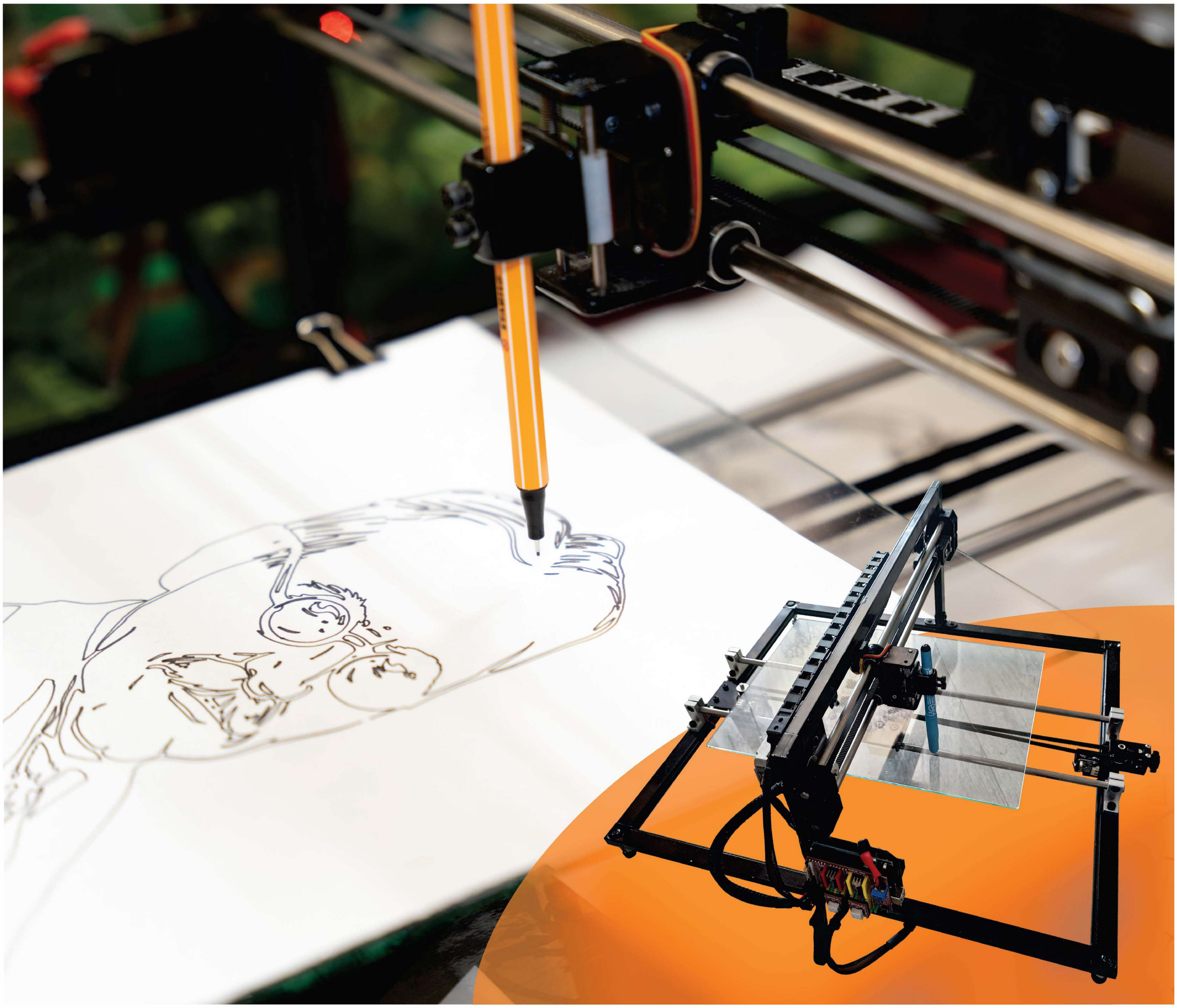
Projekat omogućava učenicima da kroz praktičan rad steknu znanja iz: mikrokontrolerskog upravljanja, CNC programiranja, mehaničkog pozicioniranja, integracije hardvera I softvera. Na taj način razvija se inženjerski pristup rješavanju problema i razumijevanje savremenih proizvodnih tehnologija.

EN/ CNC machine is a precise device for automatic drawing and tool positioning, based on microcontroller control. The system is constructed as an educational and functional platform that enables understanding of the principles of numerical control (CNC technology) through practical application. Based on the given G-code, the machine automatically executes precisely defined movements, enabling the drawing of various shapes, technical sketches, and graphic solutions. This method of control is identical to the principles used in industrial CNC systems.

Technical characteristics:
- **Arduino Uno is used as the main system controller**
- **CNC Shield v3 enables simple connection and control of components**
- **A4988 drivers control the movement of stepper motors along the X and Y axes**
- **Servo motor controls movement along the Z axis (raising and lowering the tool)**
- **Micro switches (limit switch) serve as end stops for detecting final positions**
- **The system interprets G-code, which defines the machine's path and movements**

Application:
- **education in the field of automation and mechatronics**
- **demonstration of CNC technology in teaching**
- **production of technical drawings and graphics**
- **development of do-it-yourself (DIY) engineering projects**
- **integration of programming, electronics, and mechanical engineering**

The project enables students to acquire knowledge through practical work in: microcontroller control, CNC programming, mechanical positioning, and hardware and software integration. In this way, an engineering approach to problem solving is developed, as well as an understanding of modern manufacturing technologies.



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Automatska kontrola kapije
AUTOMATIC GATE CONTROL

Autors: Gajić Nemanja, Vrućinić Marko / JU Elektrotehnička škola Prijedor / Savez inovatora Republike Srpske
Republic of Srpska - Bosnia and Herzegovina
Mentor: Zlatko Porić, el.eng.

D

SR/ Automatska kontrola kapije predstavlja sistem za upravljanje otvaranjem i zatvaranjem kapije pomoću PLC uređaja. Eksponat demonstrira primjenu industrijske automatike u svakodnevnoj upotrebi, sa ciljem olakšavanja rada korisnika i povećanja sigurnosti. Upravljanje sistemom ostvareno je pomoću programabilnog logičkog kontrolera PLC APB–12 MRAC, koji omogućava: automatizovano upravljanje procesompouzdan rad sistemajednostavno programiranje I nadzor

Princip rada:
- Pritiskom na taster aktivira se otvaranje kapije
- Drugi taster vrši reset signalizacije
- Treći taster pokreće zatvaranje kapijeT
- okom kretanja kapije signalna sijalica treperi kao indikator rada

Ugrađena oprema:
- **PLC APB–12 MRAC**
- **Automatski prekidači 10 A (2 kom.)**
- **Releji 12 VDC (2 kom.)**
- **Tasteri za upravljanje (3 kom.)**
- **Signalna sijalica 230 V**
- **Montažna ploča sa instalacionim elementima**

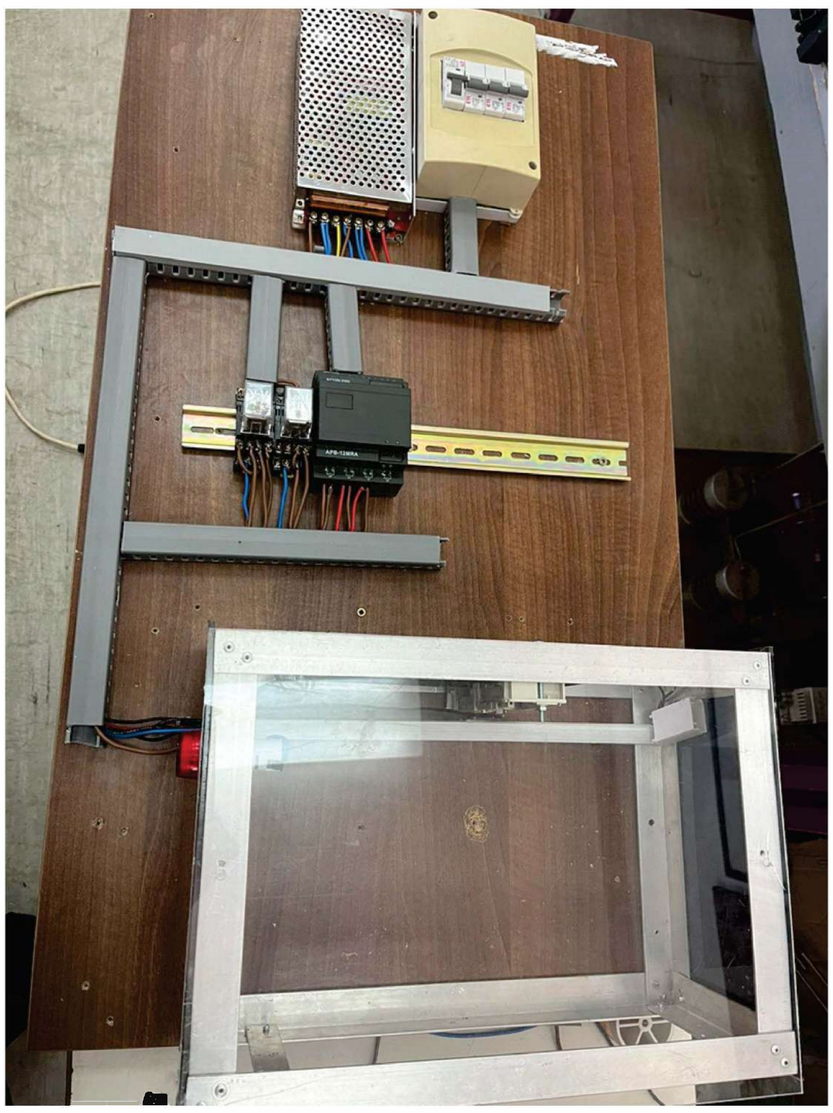
Projekat prikazuje praktičnu primjenu iz:
- ✔ **industrijske automatike**
- ✔ **PLC upravljanja**
- ✔ **elektroinstalacionih sistema**
- ✔ **povezivanja teorijskog znanja i praktične realizacije**

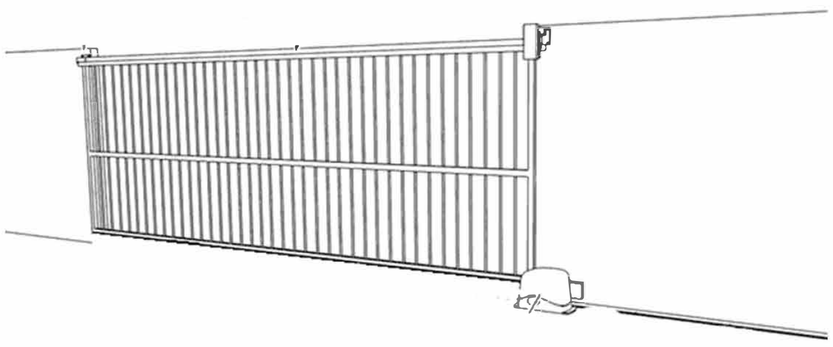
EN/ Automatic Gate Control represents a system for controlling the opening and closing of a gate using a PLC device. The exhibit demonstrates the application of industrial automation in everyday use, with the aim of making users' work easier and increasing safety. Management of the system is achieved using the programmable logic controller PLC APB–12 MRAC, which enables: automated process control, reliable system operation, simple programming and monitoring.

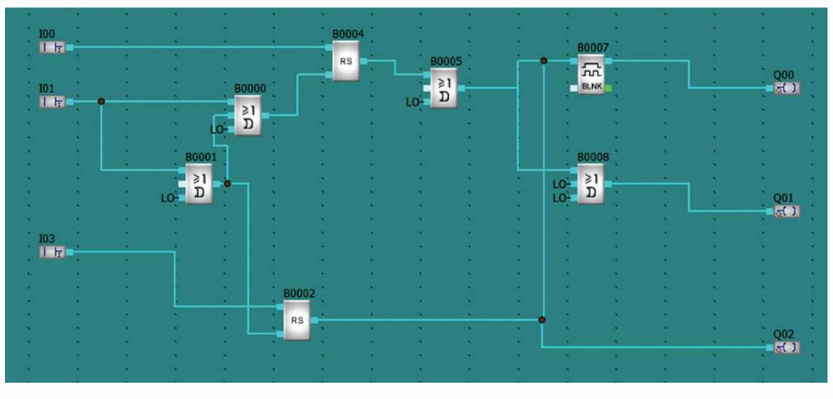
Operating Principle:
- Pressing a button activates the opening of the gate
- The second button performs a reset of the signaling
- The third button initiates the closing of the gate
- While the gate is moving, the signal lamp blinks as an indicator of operation

Installed Equipment:
- **PLC APB–12 MRAC**
- **Automatic circuit breakers 10 A (2 pcs.)**
- **Relays 12 VDC (2 pcs.)**
- **Control buttons (3 pcs.)**
- **Signal lamp 230 V**
- **Mounting board with installation elements**

The project demonstrates the practical application of:
- ✔ **industrial automation**
- ✔ **PLC control**
- ✔ **electrical installation systems**
- ✔ **linking theoretical knowledge and practical implementation**







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EVALUATION OF THE FLANK WEAR OF CUTTING TOOLS WITH A CUTTING EDGE

Project number: Student Project
Author: PINCA-BRETOTEAN ALEXANDRU MIHAI

D

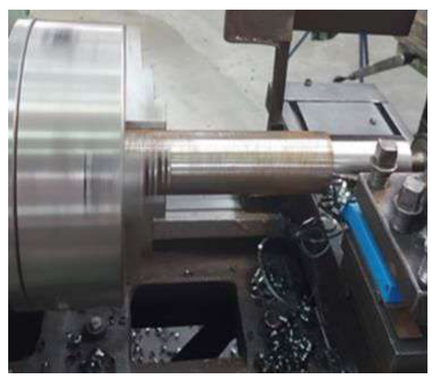
In the course of machining processes, a significant segment of time is dedicated to interrupting the activity for changing or reconditioning the cutting tool. The main reason for these interruptions is their wear. The criterion used to determine the right time to stop the machining process is the cutting tool life, which represents the actual cutting time until allowable wear occurs. The main objective of the project is to determine flank wear for a single-edged cutting tool performing longitudinal roughing turns on the surface of a workpiece using different cutting regime parameters. The experimental strategy consists of performing four roughing turns performed on the same machine tool, with the same type of cutting tool and under the same cutting conditions (without cooling), maintaining the same feed rate and the same depth of cut for four different cutting speeds. The experiments were carried out on a SNB 400 x 2000 mm universal lathe, with a power of 7.5 KW, and the semi-finished product subjected to processing is made of steel, grade 40 Cr10, with a diameter of Ø50 and a length of 300 mm. Each machining was performed with a new lathe knife, made of high-speed steel, with dimensions of 20x20 mm and a P30 insert, with each machining, the turned length being 150 mm. The four turnings were performed successively on the same blank using different speeds, the peripheral cutting speed being determined with the relationship:

$$v = \frac{\pi \cdot d \cdot n}{1000}$$

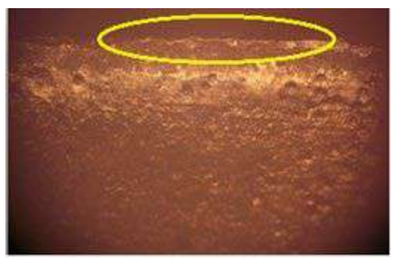
In order to determine the flank wear, the methodology presented in the specialized literature was adopted, which proposes an incremental measurement of it on the seating face of the cutting edge. The wear profile was drawn based on the measurement results.

Cutting parameters

No. crt.	Cutting depth t [mm]	Feed rate [mm/rot]	Spindle speed [rot/min]	Machined diameter d [mm]	Cutting speed v [mm/min]
Lathe tool 1	3,5	0,075	31,5	50	4,948
Lathe tool 2			63	43,98	8,704
Lathe tool 3			125	37,01	14,533
Lathe tool 4			250	30,11	23,648



Flank wear

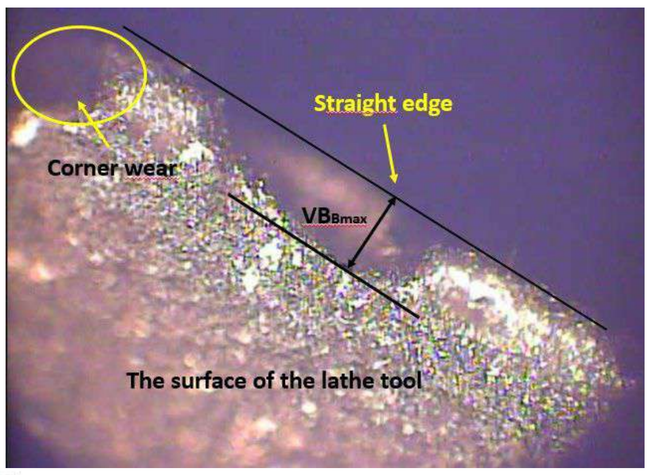


Lathe tool 1

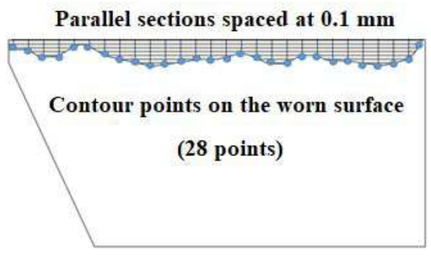
Lathe tool 2

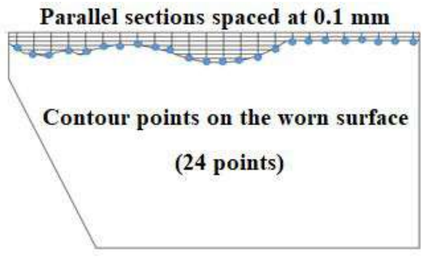
Lathe tool 3

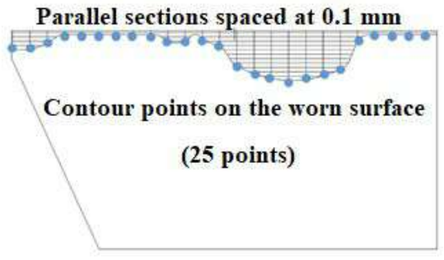
Lathe tool 4

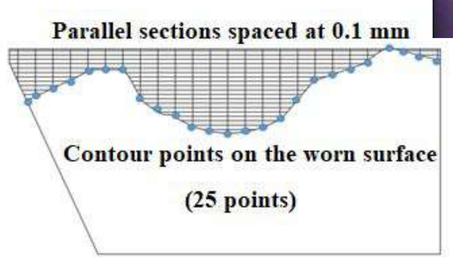


Flank wear characteristics for lathe tool 3









Flank wear values measured

No. crt.	Measured wear values [mm]	Maximum wear VB_{BMAX} [mm]	Average wear VB_B [mm]
Lathe tool 1	0,15; 0,17; 0,14; 0,13; 0,17; 0,18; 0,20; 0,25; 0,23; 0,21; 0,19; 0,16; 0,12; 0,11;0,14; 0,16; 0,11; 0,13; 0,15; 0,15; 0,14; 0,15; 0,15; 0,19; 0,18; 0,17; 0,18; 0,15	0,25	0,1628
Lathe tool 2	0,17; 0,25; 0,26; 0,18; 0,15; 0,13; 0,12; 0,16, 0,17; 0,18; 0,25; 0,35; 0,33; 0,32; 0,28; 0,22; 0,13; 0,12; 0,11; 0,12; 0,11; 0,12; 0,10; 0,11	0,35	0,1841
Lathe tool 3	0,33; 0,33; 0,30; 0,12; 0,11; 0,13; 0,12; 0,12; 0,12; 0,26, 0,27; 0,25; 0,30; 0,50; 0,55; 0,57; 0,59; 0,57; 0,55; 0,54; 0,26; 0,15; 0,16; 0,15; 0,13	0,59	0,2992
Lathe tool 4	0,49; 0,47, 0,45; 0,43; 0,40; 0,39; 0,40; 0,51; 0,53; 0,55; 0,61; 0,63; 0,65; 0,63; 0,61; 0,58; 0,50; 0,33; 0,40; 0,35; 0,25; 0,20; 0,23; 0,25; 0,27	0,65	0,4444

Conclusions:

- Flank wear was present for all cutting speeds analyzed, even at low speeds, and increases as the speed increases.
- For lathe tools 1 and 2 the maximum and average wear values are much lower than the admissible values which means that they can be resharpened for further use.
- For lathe tool 3 both wear values are at the limit of the admissible values.
- The highest wear value was obtained at the highest cutting speed, where the maximum and average wear values exceed the permissible values (VBMax > 0.6 mm and VBB > 0.3 mm). In this case, the lathe tool cannot be resharpened, so it has exceeded its service life.

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MILLING TOOL HOLDER WITH INTEGRATED MECHANICAL WEAR INDICATOR

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Coordinator: Professor Aurel Mihail TITU

Scientific Research Project

D

DESCRIPTION

The invention consists of a mechanical diagnostic system designed for industrial CNC machining, created with the purpose of reducing the negative economic effects and the technical risks associated with cutting tool wear during prolonged automated processes. Based on its facilities, the system allows the real-time monitoring of tool degradation, eliminating the uncertainty of manual inspections and preventing current damage to both the workpiece and the machine spindle due to tool failure or excessive axial stress.

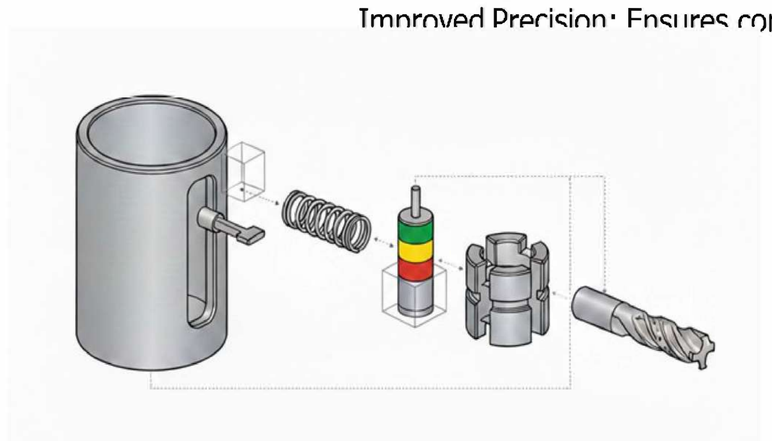
The diagnostic system consists, as shown in the technical assembly, of an ergonomic housing unit integrated into the tool holder with a layout for clear observation, additionally equipped with an internal signaling sub-assembly featuring a tri-stage color-coded cylinder (Green, Yellow, Red) that serves as the visual interface; a mechanical transmission assembly with a specialized lever designed to translate the axial pressure exerted by the tool into vertical movement; a high-precision compression spring calibrated to provide resistance and ensure the automatic return of the indicator to its resting position; a protection system including an industrial-grade sealing O-ring created to shield the internal mechanism from coolants and metallic debris; a secure fixation assembly composed of a locking washer to maintain the structural integrity of the components during high-speed rotation.

The system functions by converting the physical force exerted on the cutting tool into a direct visual signal. When the tool is in an optimal state, the indicator remains in the Green zone. As wear progresses and the axial pressure increases, the transmission assembly lowers the colored cylinder against the spring, moving the indicator into the Yellow (Warning) or Red (Critical) zones.

This is the active and intended phase of action which allows the operator to perform a voluntary interruption of the machining process at the optimal time. After the worn tool is replaced, the internal spring brings the indicator back to the upper resting position, effectively resetting the system for a new working sequence. This mechanical feedback loop compensates for the lack of expensive electronic sensors, providing a highly reliable and maintenance-free solution for predictive diagnostics

ADVANTAGES

Instant Visual Feedback: Identify tool status at a glance without checking complex control screens;
Mechanical Reliability: Robust physical design (spring/lever) resistant to software glitches or electronic noise;
Universal Compatibility: Can be retrofitted onto older machines lacking integrated digital sensors;
Human Error Reduction: Universal color coding (Green/Yellow/Red) eliminates misinterpretation of wear levels;
Local Predictive Maintenance: Streamlines tool changes directly at the workstation, saving diagnostic time;
Cost Efficiency: Lowers maintenance costs through predictive replacement rather than reactive repair;
Risk Mitigation: Prevents workpiece damage and tool breakage via the clear "RED" critical alert;
Increased Tool Life: Maximizes usage by identifying the exact point of wear;
Reduced Downtime: Prevents unplanned stops and machine failure;
Improved Precision: Ensures consistent part quality and dimensional accuracy.



APPLICATIONS

The Smart Tool Monitoring system is a versatile solution for modern and traditional manufacturing. In High-Precision sectors like Aerospace and Automotive, it acts as a vital fail-safe, preventing tool breakage and protecting high-value workpieces.

Another application is Legacy Machine Retrofitting, where it adds "smart" monitoring capabilities to older CNC or manual machines without the need for expensive digital sensors or software. In High-Volume Production Lines, the system's visual feedback allows floor supervisors to monitor multiple workstations simultaneously at a glance. For Manual Machining Centers, it provides operators of non-automated lathes and mills with a precise, reliable indicator for tool replacement.

Furthermore, it is suited for Harsh Environment Machining, where electronic sensors often fail due to extreme vibration or heavy coolant use. Finally, it serves as an Emergency Standby System, acting as a robust mechanical fail-safe and a critical backup for digital monitoring in high-stakes manufacturing environments.

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UNIVERSITATEA LUCIAN BLAGA DIN SIBIU

MOBILE INTELLIGENT SYSTEM FOR RAPID REDESIGN AND MANUFACTURING OF INDUSTRIAL MECHANICAL COMPONENTS

D

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Coordinator: Professor Aurel Mihail TITU

Scientific Research Project

DESCRIPTION

The invention consists of a mobile intelligent system designed for the rapid redesign and on-site manufacturing of critical mechanical components used in industrial production systems. Its purpose is to reduce production downtime caused by sudden failures of essential parts such as gears, bushings, shafts, or structural connectors.

Unlike conventional maintenance methods that rely on external suppliers and long delivery times, the system enables immediate digital reconstruction and fabrication of replacement components directly at the industrial site.

The system includes a compact mobile manufacturing unit equipped with high-resolution 3D scanning technology, AI-assisted design software, and a modular fabrication module capable of producing metallic parts through additive manufacturing or powder metallurgy processes. When a component fails, the damaged part is scanned to capture its geometry and structural characteristics. The data is then processed by an intelligent design module that reconstructs the digital model, corrects wear or deformation, and optimizes the geometry based on operational stresses and material properties.

The manufacturing module produces high-precision replacement components using controlled metal powder deposition and sintering technologies. The system automatically selects suitable materials according to mechanical loads, thermal conditions, friction, and fatigue requirements. An integrated quality-verification subsystem checks dimensional accuracy and structural integrity before the component is approved for installation.

By integrating scanning, automated digital redesign, and rapid on-site fabrication into a single mobile platform, the system significantly reduces industrial downtime, improves maintenance efficiency, and increases operational reliability across sectors such as manufacturing, energy production, heavy machinery, and automated production lines.

ADVANTAGES

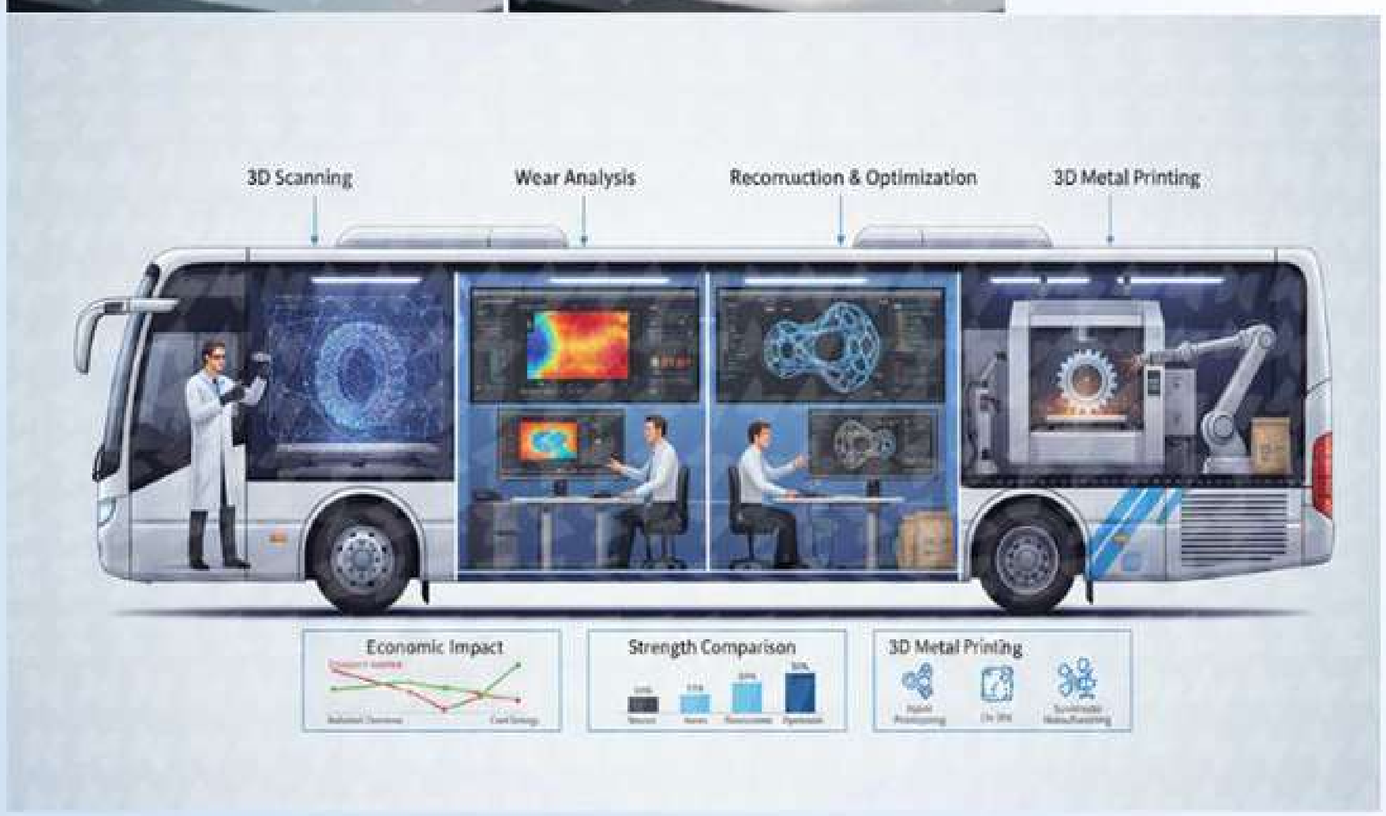
Rapid Downtime Reduction: The system enables immediate on-site reproduction of failed mechanical components, significantly reducing production interruptions and eliminating delays caused by external spare-part supply.

Integrated On-Site Manufacturing: By combining high-resolution scanning, AI-assisted digital redesign, and metal-based fabrication in a single mobile platform, the system allows components to be reconstructed and manufactured directly within the industrial environment.

Intelligent Reconstruction and Precision Fabrication: The AI module analyzes damaged parts, reconstructs optimized digital models, and the manufacturing unit produces high-precision replacement components using advanced metal powder technologies.

Operational Efficiency and Flexibility: The mobile system can be deployed across various industrial sectors, reducing maintenance costs, minimizing downtime, and supporting continuous production.

Digital Storage and Sustainability: Reconstructed components can be stored in a digital library for future use, while the system also reduces material waste and transportation requirements.



APPLICATIONS

Automotive Industry: Enables rapid on-site reproduction of critical components like gears, bushings, brackets, and transmission elements, preventing costly assembly line interruptions.

Aerospace Maintenance: Allows fast fabrication of non-structural parts, specialized fittings, and tools, reducing aircraft downtime.

Industrial Manufacturing: Provides emergency replacement of machine components such as shafts, couplings, and gears, ensuring continuous operation of automated production lines.

Energy Facilities: Supports quick fabrication of replacement parts for power plants, wind turbines, and hydroelectric systems.

Heavy Machinery & Construction: Enables rapid reconstruction of damaged components in construction, mining, and large mechanical systems, even in remote sites.

Remote Installations: Valuable for offshore platforms and isolated facilities where spare parts delivery is slow.

Research & Prototyping: Accelerates redesign and manufacturing of experimental components for product development and testing.

Maritime Engineering: Facilitates fast production of mechanical parts for ship engines, onboard machinery, and port equipment, reducing operational delays.

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SMART TORQUE WRENCH WITH AUTOMATED AI-BASED TIGHTENING SYSTEM

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Coordinator: Professor Aurel Mihail TITU

Scientific Research Project

D

DESCRIPTION

The invention consists of a high-precision manual torque wrench integrated with an AI-assisted control system designed to eliminate human error in mechanical assemblies. Unlike standard tools, this smart system allows the operator to perform the tightening manually while the device acts as an "intelligent supervisor." The device utilizes an advanced energy-efficient microcontroller architecture to ensure long-term operational autonomy in demanding industrial environments, featuring a dual-layer protection circuit for electronic stability.

The system features a Material Resistance Sensor that analyzes the initial feedback during the first degrees of rotation through a high-frequency sampling rate of the torque curve. Using an AI-assisted microcontroller and an internal database, the wrench identifies the fastener type and the material's properties to determine the optimal tightening torque automatically. Furthermore, the algorithm compensates for thermal expansion variables, surface friction coefficients, and micro-imperfections in the thread geometry that often compromise standard torque measurements in non-ideal conditions.

The core innovation is the Automated Tightening Control: the operator applies force manually, but once the calculated optimal value is reached, the microcontroller triggers an instantaneous mechanical lock via a high-response electromagnetic actuator. This physical override prevents any further rotation, ensuring the fastener is never over-tightened, regardless of the operator's continued effort or lack of attention. This hybrid approach combines the ergonomic flexibility of a manual tool with the absolute precision of digital automation, creating a new standard for manual fastening reliability and structural longevity.

Fig. 1

Fig. 2

ADVANTAGES

Active Over-tightening Prevention: The automatic mechanical lock physically prevents the operator from exceeding the torque limit, acting as a foolproof safety barrier.

Intelligent Material Detection: Eliminates the need for manual torque lookup by identifying material resistance in real-time, reducing the risk of using outdated or incorrect technical sheets.

Elimination of Human Error: Removes the risk of incorrect manual settings or "overshooting" the target value caused by physical fatigue or lack of focus.

Haptic and Visual Feedback: Provides clear, multi-sensory alerts through vibration and an OLED display (Nm confirmation) when the process is complete, ensuring high precision even in noisy environments.

High Portability & Durability: Offers the precision of a laboratory instrument in a rugged, manual format suitable for field use, remote construction sites, or emergency repairs.

Data Traceability: Capability to log every tightening operation for industrial quality audits.

Extended Fastener Lifespan: By applying the exact required tension, the system prevents material fatigue and permanent deformation of high-cost components, reducing waste.

Reduced Training Time: The intuitive interface allows even less experienced technicians to perform complex assemblies with expert-level precision, lowering operational costs.

Eco-friendly Maintenance: Minimizes the need for replacement parts by preventing thread stripping and joint failure, contributing to more sustainable industrial practices.

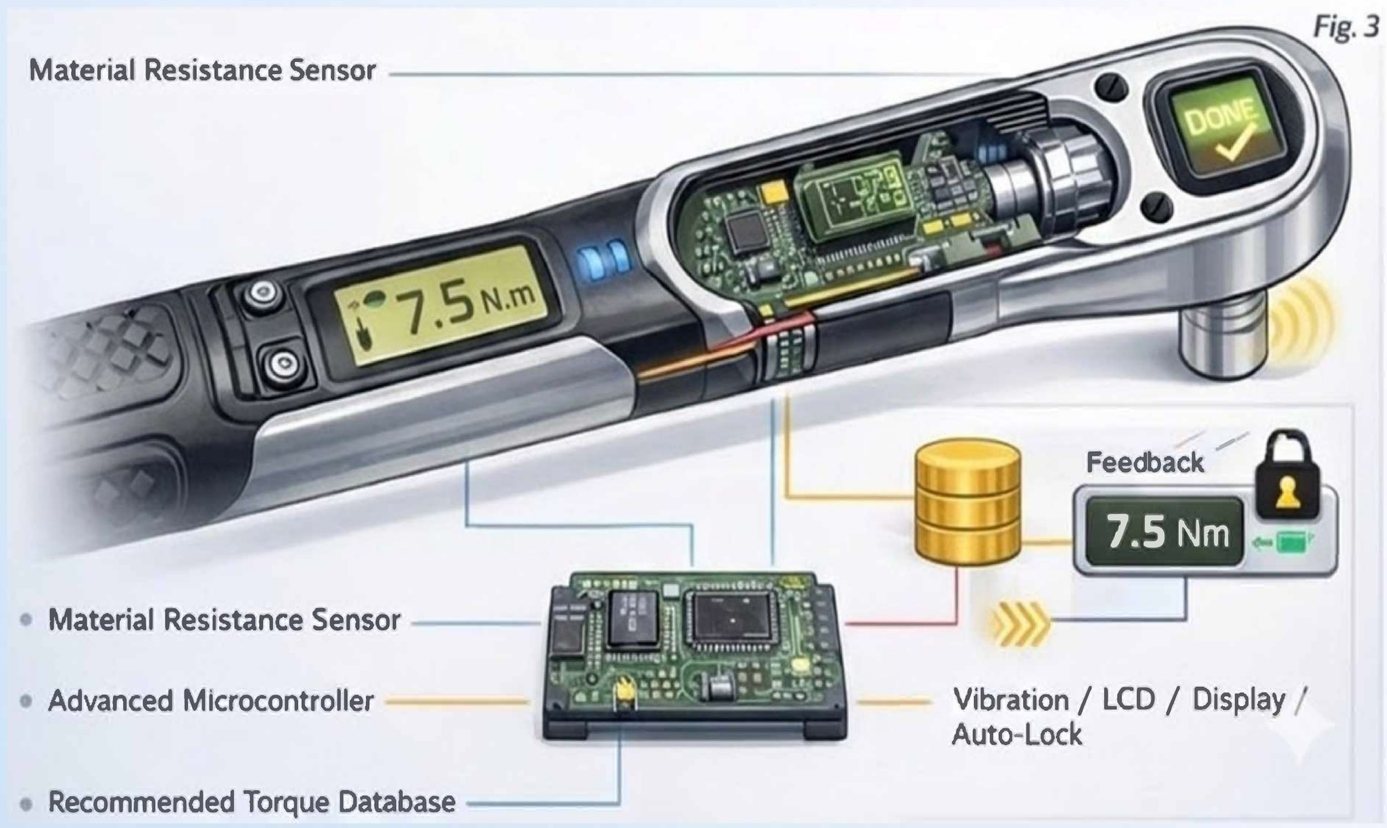

Fig. 3

APPLICATIONS

Automotive Industry: Critical for assembling safety-sensitive components like braking systems, engine cylinder heads, and suspension links where precise torque is vital for passenger safety.

Aerospace Maintenance: Ensuring structural integrity in aircraft components where over-tightening can lead to catastrophic fatigue cracks and failure under pressure.

Industrial Assembly Lines: Used as a semi-automated solution in environments that require human dexterity but zero-defect quality standards for mass production.

High-End Electronics & Carbon Composites: Perfect for fragile materials (like carbon fiber or aluminum alloys) that can be easily crushed or delaminated by manual error.

Infrastructure & Energy: Maintenance of wind turbines, telecommunication towers, and solar panel arrays where reliability and ease of transport are essential for field technicians.

Medical Equipment Assembly: Facilitates the precise calibration of robotic surgical arms and diagnostic hardware where mechanical tolerances are measured in microns.

Maritime Engineering: Ideal for ship engine maintenance in high-vibration environments where fasteners must be secured against specific resonant frequencies to prevent loosening.

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UNIVERSITATEA LUCIAN BLAGA DIN SIBIU

SINGLE CYLINDER MODULAR ENGINE

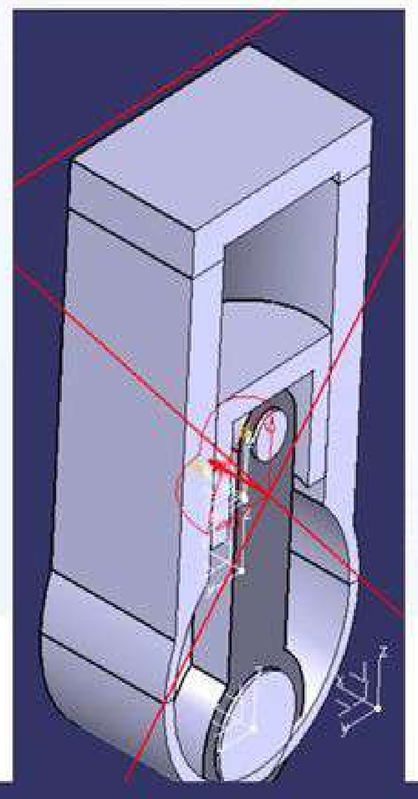
Author: Barsan Adrian, Costeiu Darius Alexandru
Coordinator: Professor Aurel Mihail TITU

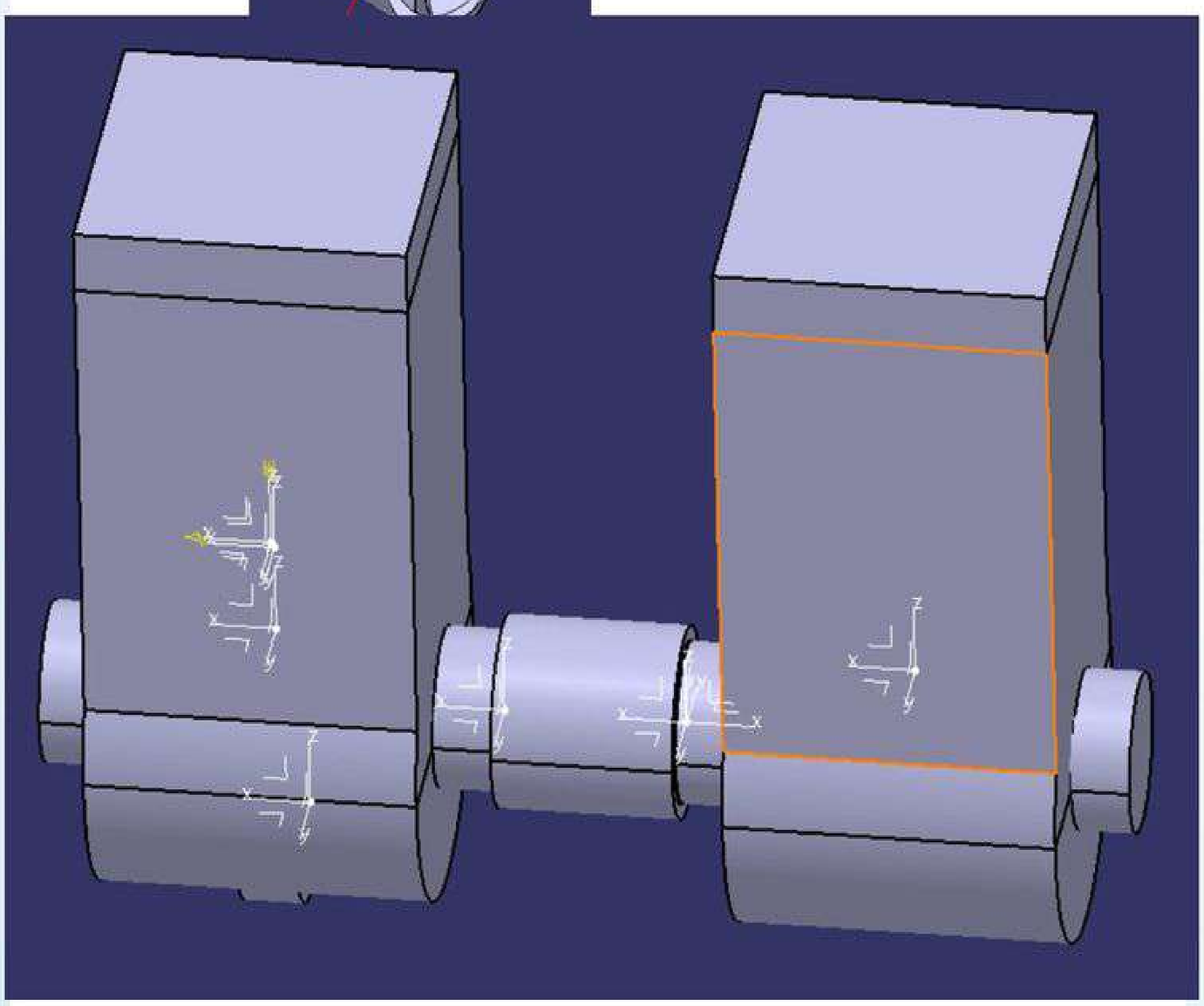
D

Scientific Research Project

DESCRIPTION:

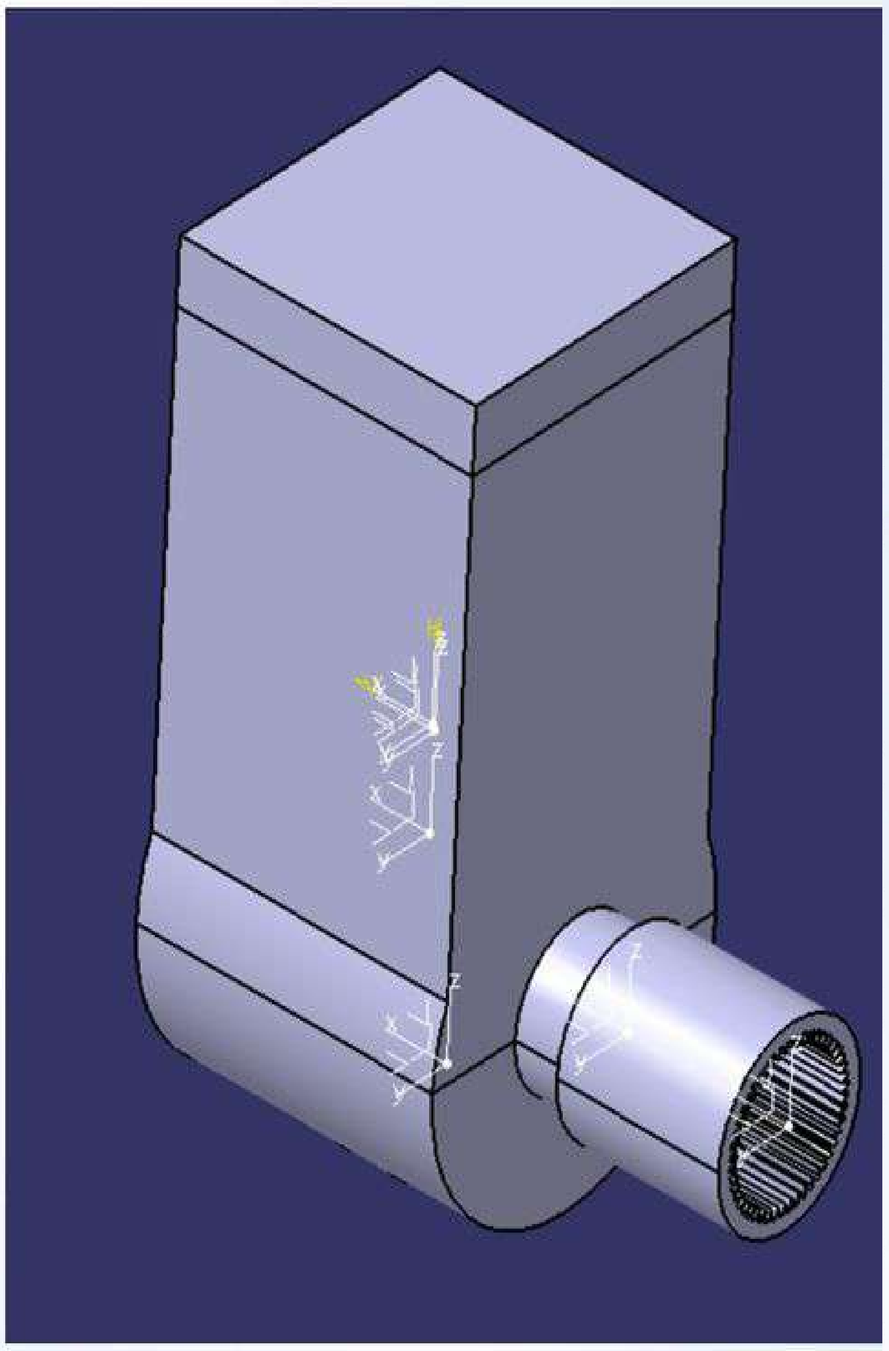
The invention has the possibility to be constructed like Lego, from a single cylinder engine or more. The engine is air-cooled, carburated with a chain driven distribution. Th pistons are interconnected by a cranckshaft with multiple teeth and coupling devices that allow multiple angles to be chosen based on the desired amount of pistons used. Th engine blocks are connected one to another by multiple bolts to keep the engine in a upright position. This engine can be used in a large variety of uses being so versatile.





ADVANTAGES:

- Having an heavy and durable cranckshaft, it eliminates the need for a heavy fly-wheel.
-It can be used in generators, mopeds, motocycles, karts, automobiles, performance or racing automobiles, pumps, teaching aid or DIY.
- Each piston having an oil sump, any of the piston used in the assembly, can be taken out in case of an emergency, or in the case of a malfunction of a piston, the others don't risk severe damage.



APPLICATIONS:

- Generators
- mopeds/motorcycles
- teaching aid/DIY
- go-kart
- automobile (inline 3-6)
- performance automobiles or racing
- ATV/UTV

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UNIVERSITATEA LUCIAN BLAGA DIN SIBIU

ENHANCING MACHINING PROCESSES USING BLACK PHOSPHORUS NANOPARTICLES

Authors: Dumitru BUSILA, Roberto CISMAS, Alisia ENACHE, Iuliana FIRTONEA
Coordinator: Professor Aurel Mihail TITU

D

Scientific Research Project

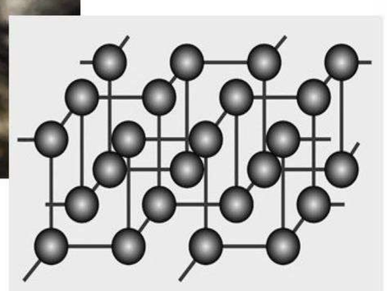
DESCRIPTION:

The purpose of this research is to outline the benefits of using Black Phosphorus nanoparticles, herein reffered to as BP nanoparticles, in cutting processes. The enhancement consists of a cutting fluid composition comprising a base fluid and BP nanocapsules dispersed therein which can be used in machining processes. BP is a two-dimensional single crystal layered material being an allotrope of phosphorus whose structure consists of atomic chains stacked together through weak van der Waals forces making exfoliation feasibile. The main properties of BP are mechanical flexibility, good surface adherence, rolling effect, tribofilm formation, mending effect, polishing effect and heat transfer capacity, dissipating high temperatures in the less active areas of the process. Moreover, BP is the most chemically stable allotropic form of phosphorus.

BP is encapsulated in polyamide (Nylon 6) capsules exhibiting a high melting point required for thermal activation during semi-finishing operations for stainless steel and refractory steel. Polyamide is obtained by interfacial polymerisation in an emulsion by reacting diamines with acid chlorides in order to form stable microcapsule coatings. The nanocapsules are to be used strictly with group 3 oil-in-water emulsions, group 4 activated emulsions and group 5 mineral oils.

The nanocapsules allow gradual release of active agents (BP) only at elevated temperatures of 200-250°C, generated during machining. Once the critical temperature is reached, nanocapsules dissolve in the cutting fluid thereby permitting BP to reduce friction between the detached chip and rake face of the tool and between the undetached chip and tool edge by forming an atomic nanosheet called phosphorene. Not only do BP nanoparticles create a tribofilm, but they also ameliorate tool wear and energy loss.

Based on the aforementioned considerations, black phosphorus encapsulated in polyamide nanocapsules in cutting fluid exhibits distinctive properties that substantially enhance tribological performance in machining processes.



ADVANTAGES:

- Favorable tribological conditions aid evacuation of detached chip;
- Improved surface quality by means of a continous nanometric layer;
- Reduced roughness;
- Prevention of scratching and work hardening during machining;
- Reduced energy loss;
- Improved heat transfer: BP reduces mechanical work requiered with chip-tool friction, workpiece-tool friction in the elements of the technological system;
- Prevention of build-up edge formation, creating a thin lubricating film
- Mitigated vibrations;
- Protection of the surfaces to be machined and protection of the tool through a physical and chemical anticorrosive and antioxidant barrier;
- Chip and debris removal effect, preventing adhesion of microchips and metallic dust on cutting tool.

APPLICATIONS:

BP nanocapsules are intended for machining operations involving stainless steel and refractory steel, materials characterised by low thermal conductivity, a high coefficient of friction and a pronounced tendency for chip adhesion to the cutting edge of the tool. Given the circumstances, the tool–chip contact zone heats rapidly, which may lead to work hardening, build-up edge formation and accelerated tool wear. In this regard, the use of nanocapsules can alleviate the process stability and can protect the machined surface.

The field of application is particularly relevant in semifinishing operations such as precision turning, grinding, and boring, wherein surface quality and roughness are critical parameters. BP nanocapsules dispersed in oil–water emulsions (Group 3) or activated emulsions (Group 4) form a thin tribofilm that reduces friction and prevents chip adhesion. Furthermore, the high thermal conductivity of BP facilitates local heat dissipation, complementing the role of high-flow coolant, which transports heat away from the contact zone.

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Electromagnetic Sensor for Detecting Rim Ovalization

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Coordinator: Professor Aurel Mihail TITU

D

Scientific Research Project

DESCRIPTION

The invention relates to the field of vehicle running system diagnostics and proposes a device capable of detecting rim ovalization or deformation by analyzing variations in an electromagnetic field. The system uses an electromagnetic sensor mounted near the rim, which generates a stable electromagnetic field. During wheel rotation, the metal rim interacts with this field. If the rim has a correct circular shape, the distance between the sensor and the rim surface remains constant, and the electromagnetic signal shows minimal variations.

If the rim is deformed, the distance from the sensor varies periodically, producing detectable changes in the electromagnetic signal. These variations are analyzed by an electronic processing unit that identifies deviations from reference values.

To avoid false alarms caused by potholes or road irregularities, the algorithm analyzes the periodicity of the deviations. Real rim deformations generate repetitive signals with each wheel rotation, while vibrations caused by road surfaces occur randomly and are filtered out.

The system also includes a customizable calibration function that allows new reference values to be recorded when different rims are installed. Calibration can be performed automatically during driving or through the vehicle's electronic system or a mobile application.

By using electromagnetic detection, filtering external vibrations, and adaptive calibration, the invention enables real-time identification of rim deformations, contributing to improved vehicle safety.

ADVANTAGES

Improved vehicle safety: Early detection of rim deformation helps prevent stability problems or loss of vehicle control.

Real-time fault detection: The system continuously monitors the condition of the rims during driving and alerts the driver as soon as a deformation appears.

Reduced tire and suspension wear: Detecting rim deformation early prevents uneven tire wear and reduces stress on suspension components.

Lower maintenance and repair costs: Early identification of rim defects allows timely intervention before the issue affects other vehicle components.

Continuous automatic monitoring: The sensor operates automatically while the vehicle is in motion, enabling constant supervision of rim condition.

Compatibility with different rim types: The customizable calibration function allows the system to adapt to different rim sizes, models, or materials.

Easy integration with vehicle electronics: The system can transmit information to the vehicle dashboard or to a mobile application for easy monitoring.

Early detection of wheel imbalance: The sensor can identify small rim deformations before they become noticeable through strong vibrations during driving.

Improved driving comfort: By detecting rim deformation early, the system helps reduce vibrations and noise caused by irregular wheel rotation.

Support for predictive maintenance: Continuous monitoring allows drivers or maintenance systems to identify potential problems in advance and schedule maintenance before serious damage occurs.

APPLICATIONS

Automotive safety systems: The sensor can be integrated into vehicle safety systems to monitor rim condition and warn the driver if a deformation is detected.

Vehicle maintenance and diagnostics: It can be used in service centers to quickly identify rim deformation without removing the wheel.

Fleet management systems: Transport companies can use the sensor to monitor the condition of vehicle wheels and prevent failures during operation.

Electric and autonomous vehicles: The sensor can be integrated into smart vehicle monitoring systems to improve reliability and safety.

Smart vehicle monitoring applications: The sensor can transmit data to mobile or onboard applications that track wheel condition and notify the user when maintenance is needed.

Railway industry: Detecting wear or deformation of train and tram wheels in real time.

Mechanical industry / rotating machinery: Monitoring shafts and wheels of machinery to detect wear, ovalization, or imbalance.

Robotics and automation: Monitoring robot wheels or joints for predictive maintenance and optimal performance.

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MECHANICAL DEVICE FOR THE CONTROLLED EXTRACTION OF BEARINGS EMBEDDED IN THE MOTOR HOUSING

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Patent request in progress

D

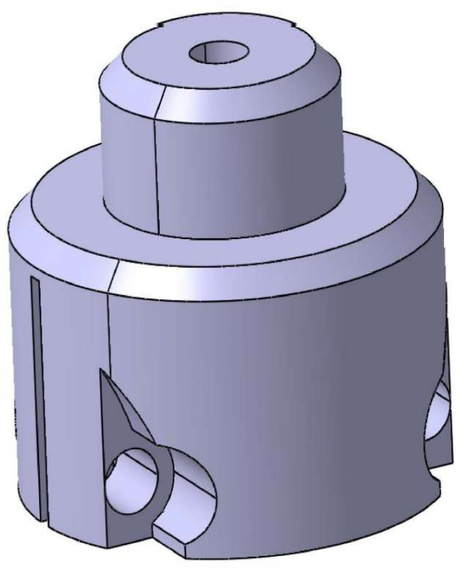
DESCRIPTION

The invention refers to a mechanical assembly designed as a compact extraction device intended for removing bearings embedded in motor housings. The assembly is configured to operate in such a way as to allow the extraction of the bearing without damaging the housing or any adjacent components.

The device is engineered to apply controlled, evenly distributed forces that act directly on the outer ring of the bearing, ensuring secure fixation of the bearing within the extractor. The mechanical movements and actions applied are precise, progressive, and repeatable, providing a constant force necessary for extracting the bearing from its seat, even in situations where tolerances are very tight or corrosion is present.

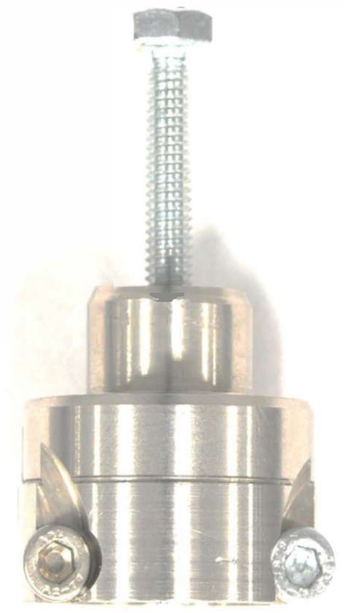
The forces generated by the assembly are calibrated to prevent deformation of the engine housing and to eliminate the need for additional impacts or heating. Its use significantly reduces the risk of material cracking as well as the time required for maintenance operations.

The primary purpose of this invention is to facilitate efficient engine maintenance by enabling the safe extraction of bearings with minimal operator effort and high precision, regardless of the housing profile or the degree of bearing wear.



ADVANTAGES

The device ensures a uniform distribution of forces on the bearing and allows controlled, repeatable, and progressive movements, eliminating the need for mechanical shocks or component heating. Through this approach, the risk of cracking, deformation, or damage to the motor housing is significantly reduced. Operationally, the time required to extract the bearing decreases considerably, and the compact design provides superior maneuverability, enabling use even in housings with complex geometry or limited space, while requiring minimal effort from the operator.



APPLICATION

Tests performed on motor housings with embedded bearings have shown:

- Up to 60% reduction in total extraction time compared to traditional methods.

- Zero housing damage in all tested scenarios.

- Consistent performance even in the presence of:

> moderate corrosion;

> seized bearings;

> tolerances below 0.05 mm.

Analysis shows that the device enables safe bearing extraction while providing much greater control over the process. Additionally, eliminating hammer impacts and heating significantly reduces the risk of microcracks, extending the service life of the motor housing.

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SMART SENSOR FOR GLASS DETECTION

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"Lucian Blaga" University of Sibiu

Patent request in progress

D

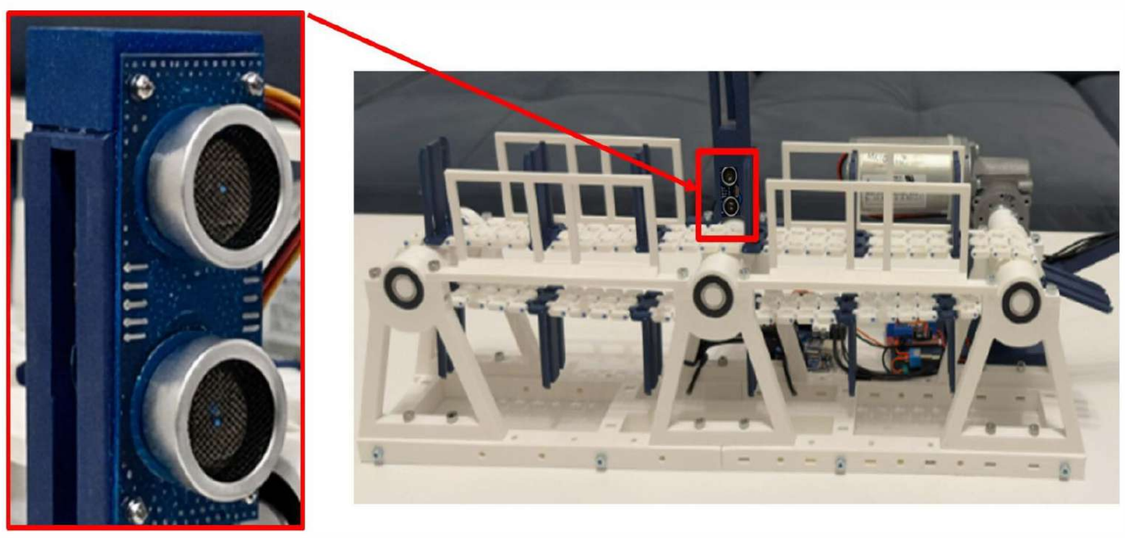
DESCRIPTION

The invention relates to an autonomous sensory device, configured as a compact module, designed for identifying materials based on the physical properties specific to glass. The device is intended to determine, in real time, whether the analyzed material is glass, without requiring direct contact or invasive procedures.

The sensory assembly uses a measurement principle based on ultrasound, measuring the response time of the sound reflected from the piece under analysis, in order to differentiate glass from plastic, composite, or metallic materials.

The system is designed to operate autonomously, performing discrete measurements depending on the application. Its operation is stable, repeatable, and calibrated so that it is not influenced by moderate variations in temperature or lighting. The compact form allows integration of the sensor into industrial lines, portable devices, or automatic sorting systems.

The purpose of this invention is to enable fast and reliable detection of glass materials in industrial, recycling, automated inspection, or safety applications. The use of this sensor reduces material classification errors, optimizes processing workflows, and improves the reliability of systems that require accurate identification of glass.

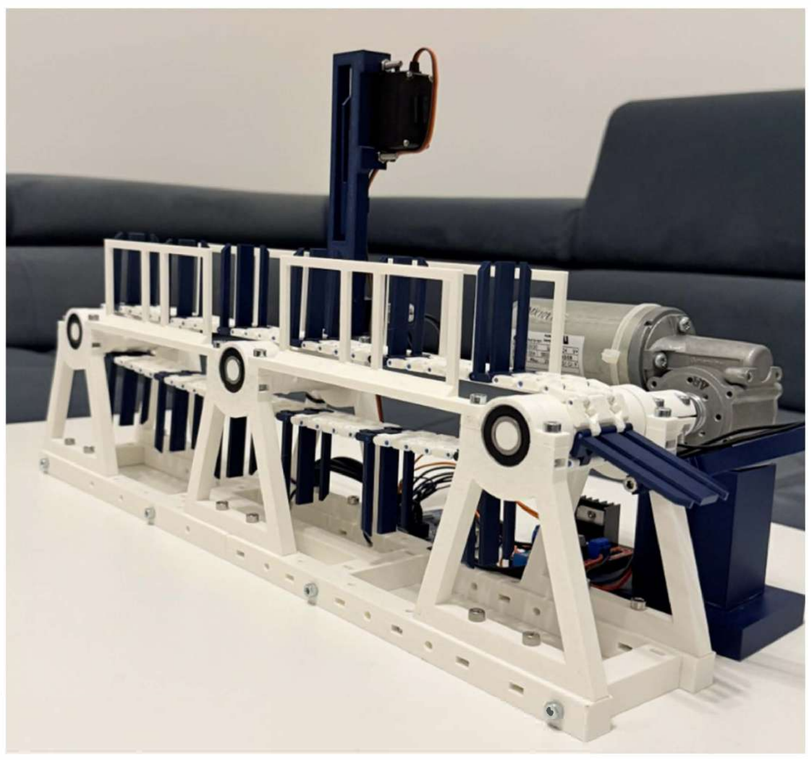


ADVANTAGES

The device enables rapid and accurate identification of glass without direct contact, reducing the risk of material damage.

Its autonomous and stable operation increases industrial process efficiency and minimizes the need for human intervention.

Its easy integration into production lines or automated systems supports advanced automation and reduces classification errors.



APPLICATION

The device introduces a non-contact method of identifying glass, eliminating the risk of damaging fragile components during inspection.

By using ultrasonic response time analysis, the system provides a reliable way to distinguish glass from plastics, metals, and composite materials.Its autonomous operation reduces dependency on human supervision, contributing to higher process stability and repeatability.

The compact module design allows integration into various environments, from industrial production lines to portable field equipment.

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ADAPTIVE TRACK SYSTEM WITH VARIABLE CONFIGURATION FOR DIFFERENT TYPES OF TERRAIN

Daniel BALC, Aurel Mihail TITU, Emanuel BALC, Stefan TITU

"Lucian Blaga" University of Sibiu

Patent request in progress

D

DESCRIPTION

The invention relates to an adaptive track assembly designed for autonomous or user-operated ground vehicles, intended to enable efficient movement across terrains with varying properties. The device is engineered to adjust in real time the configuration, stiffness, and shape of the track's contact elements, thereby optimizing traction, stability, and energy consumption regardless of the surface type.

The track assembly consists of a series of interconnected flexible modules equipped with internal mechanisms that control the tension and position of each segment. These mechanisms can be electrically actuated, allowing for modifications to ground pressure distribution, adjustments to the contour of the exterior shape, and adaptation to obstacles, uneven surfaces, or slippery terrain. Sensors integrated into the track structure continuously monitor grip, vibrations, and local deformations, transmitting data to the central processor.

The control unit processes this information and coordinates the necessary adjustments so that the track maintains optimal ground contact, minimizes traction loss, and ensures smooth movement. The system enables the vehicle to efficiently adapt to sand, gravel, mud, snow, hard surfaces, or rough terrain without manual intervention and without changing any physical components.

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ADVANTAGES

The adaptive track assembly offers the major advantage of superior mobility on terrains with variable properties, thanks to its ability to adjust its stiffness, shape, and ground pressure distribution in real time. By using interconnected flexible modules and internally electric-actuated mechanisms, the track continuously maintains optimal contact with the running surface, reducing traction losses and improving vehicle stability even in challenging conditions such as sand, mud, or snow.

APPLICATION

The adaptive track assembly involves numerous technical aspects, such as the efficient integration of flexible modules and the internal tension-control mechanisms required for the continuous adjustment of shape and rigidity depending on the terrain. The sensor system must monitor traction, vibrations, and local deformations in real time, enabling the central unit to make rapid and precise decisions.It is also essential to analyze how the control algorithms manage ground-pressure distribution to optimize traction and stability in extreme conditions such as sand, mud, or ice. The durability of the flexible components, wear resistance, and the impact of environmental factors are also important elements, along with the energy consumption of the electric drive system.Additionally, it is worth discussing the possibilities of automatic calibration, compatibility with different platforms for ground vehicles, and industrial, military, or utility applications, which can highlight the versatility and competitive advantages of this technology.

ROBOTIC DEVICE FOR SAFETY TRANSPORT UNTIL SCHOOL

Daniel BALC, Aurel Mihail TITU, Emanuel BALC, Stefan TITU

"Lucian Blaga" University of Sibiu

Patent request in progress

D

DESCRIPTION

The invention relates to an autonomous robot designed specifically for school environments, conceived as a compact mobile module that fully replaces the traditional backpack. The robot is engineered to safely transport textbooks, notebooks, sports equipment, and other personal items belonging to the student, moving automatically in close proximity to them without requiring physical effort or manual operation.

The device uses a set of optical sensors, ultrasound, lidar, and 3D cameras to identify and track the student, maintaining a safe and optimal distance during movement. Internal processing algorithms calculate safe routes, avoid obstacles, and ensure stable trajectories in crowded environments such as during recess or class transitions.For social safety, the robot includes an AI-based anti-bullying system capable of detecting potentially aggressive situations such as hostile following, abnormal proximity, raised voices, or threatening gestures. In such cases, the robot can alert the student, send a notification to teachers, or record the incident anonymously in accordance with school policies.

The storage compartment is stabilized with internal damping systems that protect the student's belongings from shocks, vibrations, or rough handling.

ADVANTAGES

The robot carries the full weight of textbooks and equipment, eliminating strain on the student's back and preventing posture problems associated with carrying heavy loads.

The internal AI can detect tense situations, aggressive behaviors, or unauthorized proximity, offering students an additional level of protection and enabling quick intervention from school staff.

The adaptive mechanical system allows the robot to climb and descend stairs, overcoming the limitations of standard robots and ensuring access to all floors within the school.

APPLICATIONS

- The robot eliminates the need to carry a backpack, making it easier for students to move between classrooms located on different floors.

- Ideal for schools with multiple buildings or campuses where students must cover long distances or climb many stairs.

- The AI system can serve as a proactive safety tool, integrated into the school's policy for preventing aggressive behaviors.

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Internal

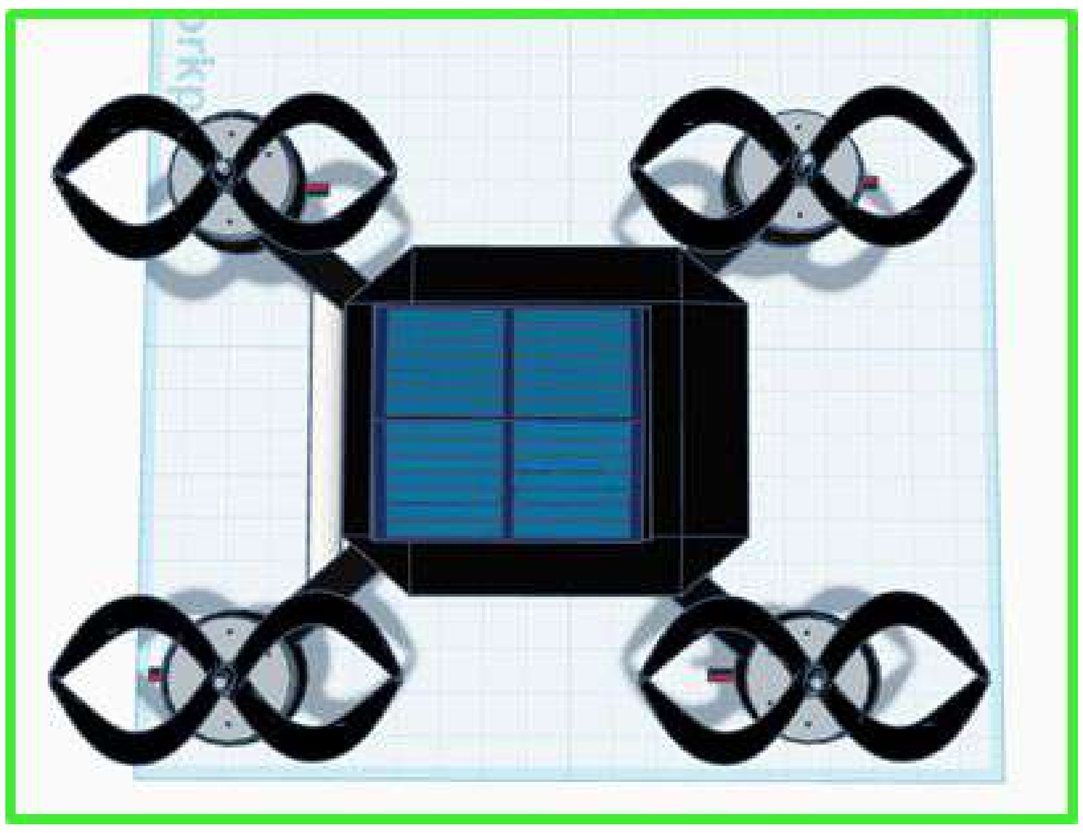
HIGH-SPEED LIFE SUPPORT: INTEGRATING FLEXIBLE SOLAR TECHNOLOGY INTO RAPID MEDICAL DEPLOYMENT DRONES

D

Author: Eduard Sebastian LUCA

My project aligns with the global vision for renewable energy. By integrating natural, self-replenishing sources—specifically through flexible solar panels—this drone not only saves lives but also protects the environment.

Unlike traditional fossil-fuel-powered emergency vehicles, it significantly reduces carbon emissions and contributes to energy independence, creating a cleaner future for the communities it serves.



This drone is not just a transport vehicle; it is a mobile first-aid unit. Designed to reach inaccessible areas during the 'Golden Hour' of survival, it transports essential medical modules such as:

- **Automated External Defibrillators (AED);**
- **Hemorrhage control kits and resuscitation supplies;**
- **Advanced 4K Visuals & Two-Way Audio: This allows doctors to assess patients remotely and provide live instructions to bystanders before the human crew arrives.**

Bridging the gap between crisis and care!

Contact: eduardluca26@gmail.com

Presentation link: https://www.youtube.com/watch?v=F8YkngqQpkg&t=5s

VIDEO

SCAN ME

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TITLE

MODULAR DEVICE FOR THERMAL WEED DESTRUCTION

D

INVENTOR/S - CONTACT

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PATENT/PROJECT

Patent OSIM no.: ROA00287/07.07.2025

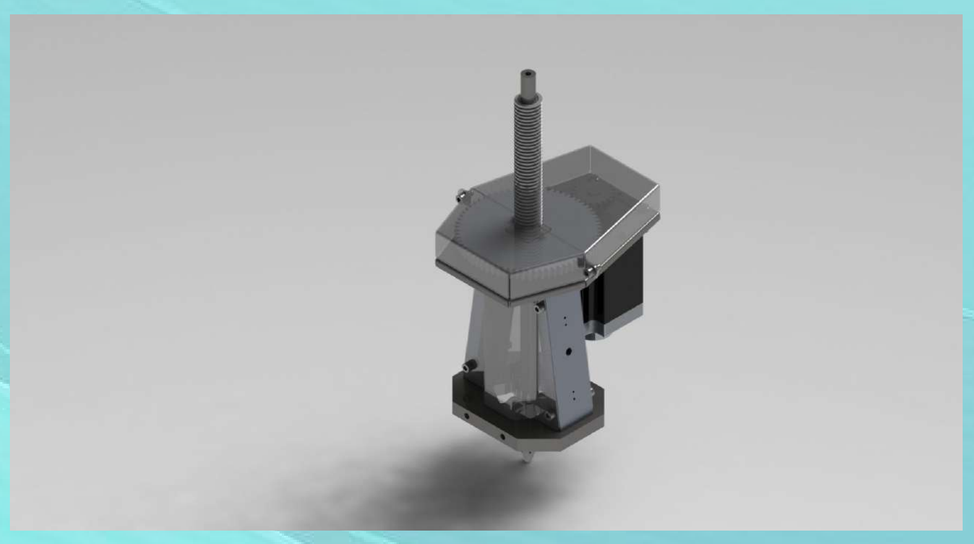
SHORT PRESENTATION

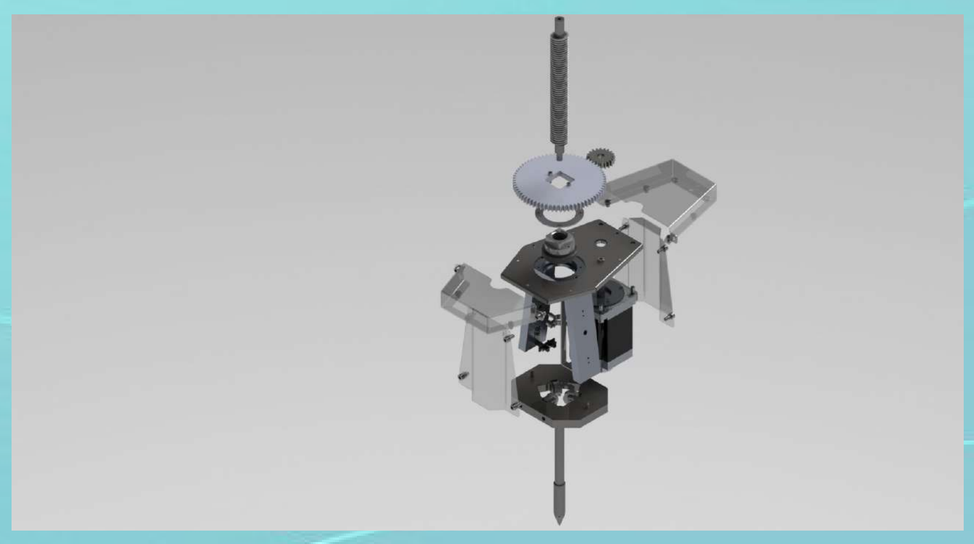
The invention relates to a modular device for the thermal destruction of weeds, intended for integration on an autonomous or semi-autonomous mobile platform. The device injects steam directly into the root zone of weeds, ensuring their complete elimination. The active assembly, consisting of a high-pressure pipe and a detachable nozzle, is vertically actuated by a screw–nut mechanism driven by an electric motor. A roller guiding system and slotted optical switches ensure precise vertical movement. The modular architecture and compact dimensions allow easy integration on autonomous platforms and enable adaptation to different soil types and weed conditions.

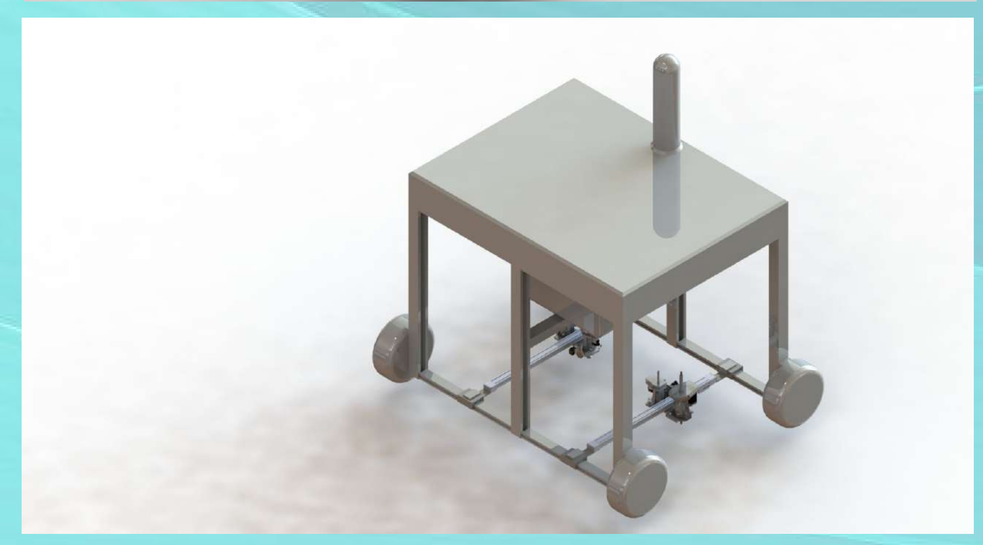
APPLICABILITY

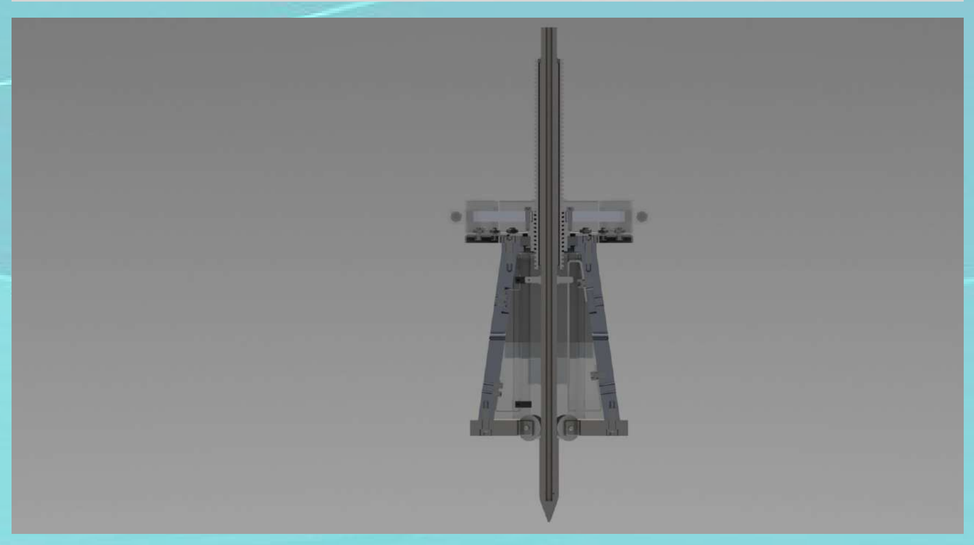
The invention can be applied in agriculture for the ecological control of weeds in field crops, orchards, vineyards, and greenhouse environments. The modular steam injection device is suitable for integration on autonomous or semi-autonomous robotic platforms used in precision farming, enabling targeted treatment directly at the root zone without affecting surrounding crops. Its compact design and interchangeable components allow adaptation to different soil conditions, crop layouts, and weed types. By eliminating the need for chemical herbicides and reducing manual intervention, the device supports sustainable agricultural practices, improves operational efficiency, and contributes to the development of automated weed management technologies.

IMAGES









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TITLE

TEST BENCH FOR ASSESSING THE ACCURACY AND SYNCHRONIZATION OF CNC AXES

D

INVENTOR/S - CONTACT

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PATENT/PROJECT

Patent application OSIM no.: A/00187/11.08.2025

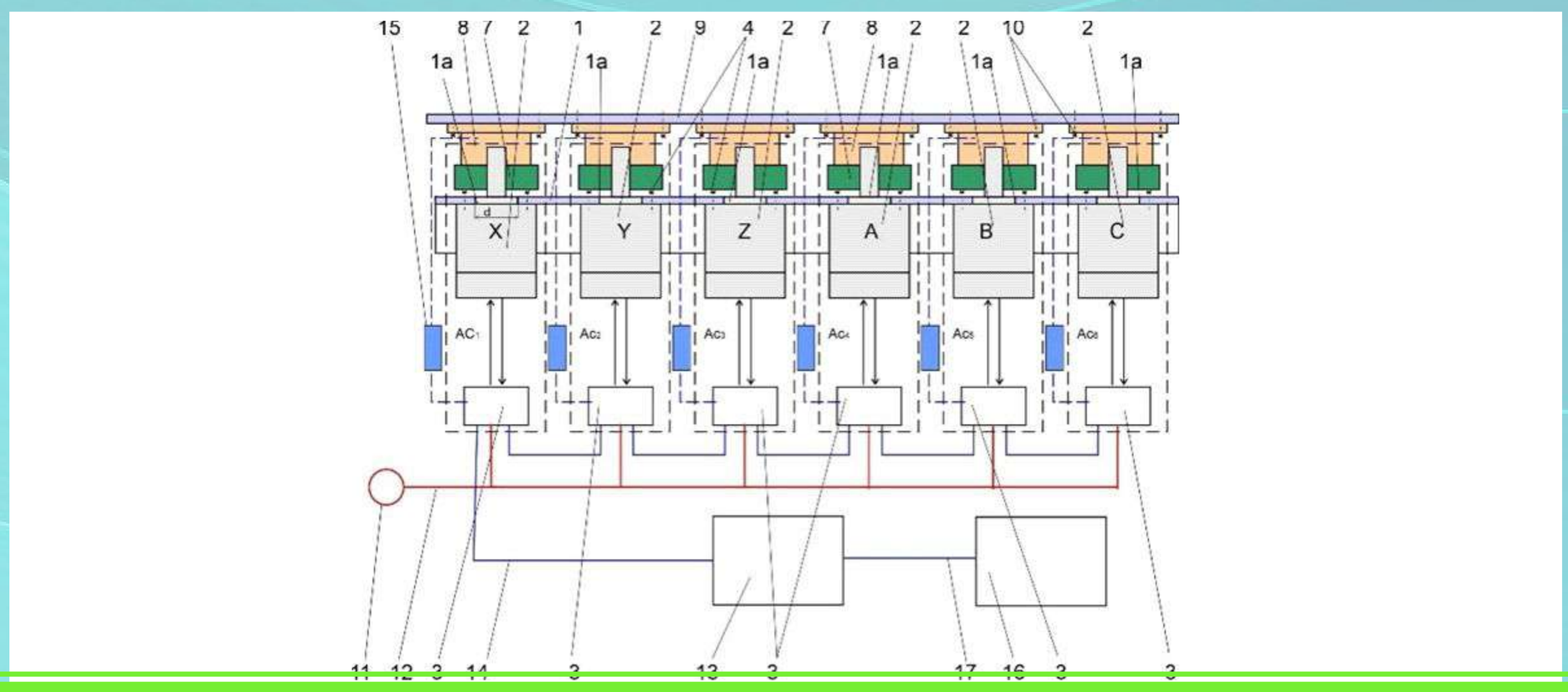
SHORT PRESENTATION

The bench consists of a support 1 provided with n slots in which all the n kinematic axes AC1, AC2, ..., ACn that are part of a CNC machine tool, a robot or another automation system are mounted.
Each kinematic axis ACi consists of an electric motor 2 and a drive 3, with the role of moving and controlling the axis in order to achieve an elementary movement of the machine tool (X, Y, Z, etc.). The bench in figure 1 has six kinematic axes ACi, i=1...6, three axes for linear movements (X, Y, Z) and three axes for rotational movements (A, B, C). The bench can be designed for any number of kinematic axes.
To test the ACi axes as close as possible to their operation while mounted on the machine, the bench is equipped with a loading system consisting of discs 7 and electromagnetic brakes 8, which are mounted on the axis 2b of the motors 2.
The electromagnetic brake 8 has a movable part 8a, which is coupled to shaft 2b of motor 2 and a fixed part 8b which is fixed to support 9 using screws 10.
The discs 7 are sized for each kinematic axis ACi (i=1...n) so as to ensure a moment of inertia Ii (i=1...n) which produces a torque equivalent to that produced by the forces and moments of inertia that occur in the operation of the axis in the machine assembly.
The electromagnetic brakes 8 are chosen so as to ensure the maximum load for each kinematic axis. The braking force achieved by the electromagnetic brakes 5 can be modified by supplying them with a variable current. The command and control of the axes AC1, ..., ACn is done using the CNC controller 13 which communicates with drives 3 through a bus 14, using the EtherCAT protocol.
The machine is controlled from a PC 16 connected to CNC controller 13 through a network cable 17. The communication between the computer 16 and the CNC controller 13 is done through the Ethernet (LAN) protocol.

APPLICABILITY

Machine tools and robots

IMAGES



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TITLE

SEALED-CONTAINER AIR FRESHENER WITH ADJUSTABLE SCENT DIFFUSION

D

INVENTOR/S - CONTACT

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PATENT/PROJECT

Patent OSIM no.: ROA/00211/02.06.2025

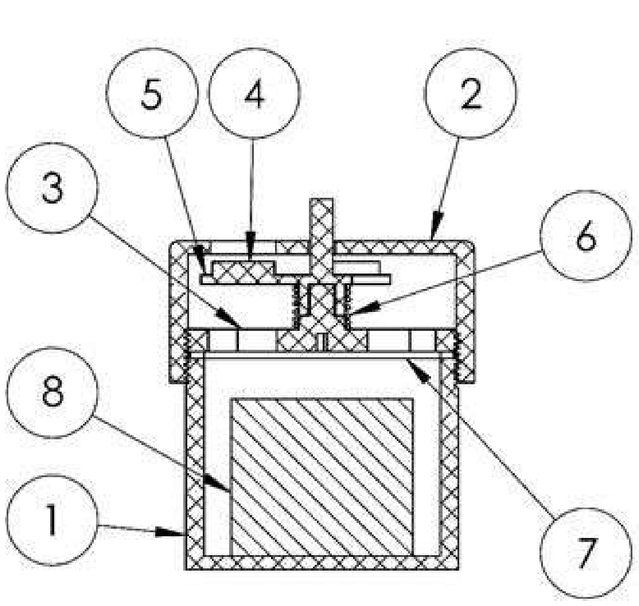
SHORT PRESENTATION

The invention relates to a sealed-container air freshener provided with adjustable openings for controlling the amount of perfume released, with a constructive form as simple as possible, which allows the reuse of the container by quickly changing the gel, the material soaked with perfume by dismantling a single component, a container that allows an adjustable dispersion of the perfume by gradually covering the perfume outlet openings according to the user's preferences, and which, in addition, requires the smallest possible number of movements when using the air freshener.

APPLICABILITY

Sanitary - Ventilation: Neutralization of odors in offices, cars, public toilets, hotels, ventilated spaces.
Health - Medicine - Cosmetics: If it involves antiseptic formulas or perfumes for clinics/personal care.
Most air fresheners on the market do not allow you to adjust the amount of perfume released, and those that do achieve this goal fail to hermetically seal the perfume when it is not in use, when the situation requires it. Among the advantages of a sealed-container air freshener that has the possibility of regulating the amount of perfume released, can be mentioned: increased safety by limiting exposure to aerosols of children, pets or people with chronic respiratory diseases, protection of the contents against external contamination with dust or humidity, controlling the intensity of the perfume is an essential aspect for personalizing the olfactory experience according to individual preferences or the context in which the air freshener is used, persistence of the perfume by maintaining the aroma for a longer period of time.

IMAGES



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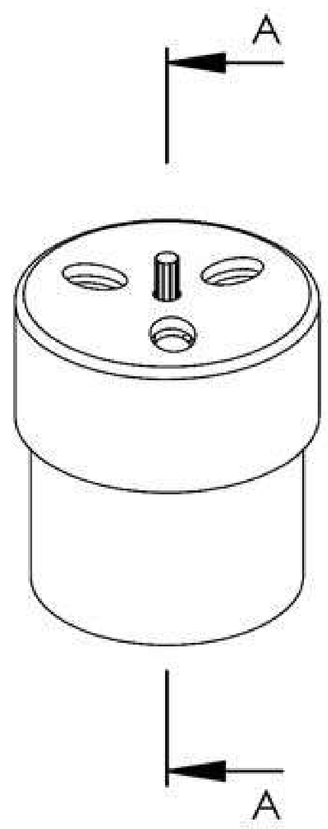

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TITLE

LATHE WITH CONSTANT SPEED USED FOR THE ECONOMICAL PROCESSING OF A BATCH OF PARTS WITH DIFFERENT DIAMETERS

D

INVENTOR/S - CONTACT

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PATENT/PROJECT

Patent OSIM no.: ROA/00212/02.06.2025

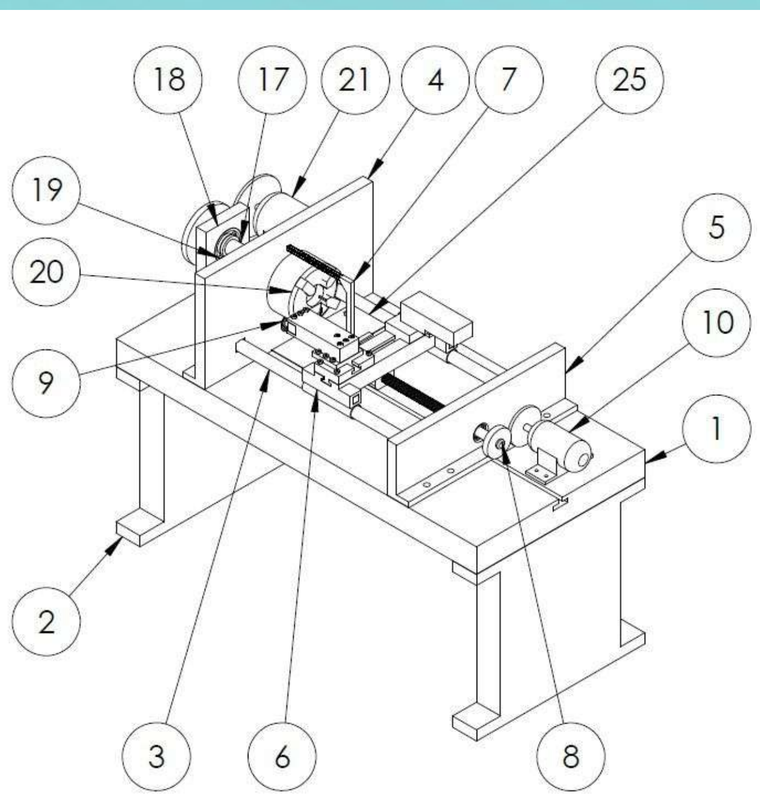
SHORT PRESENTATION

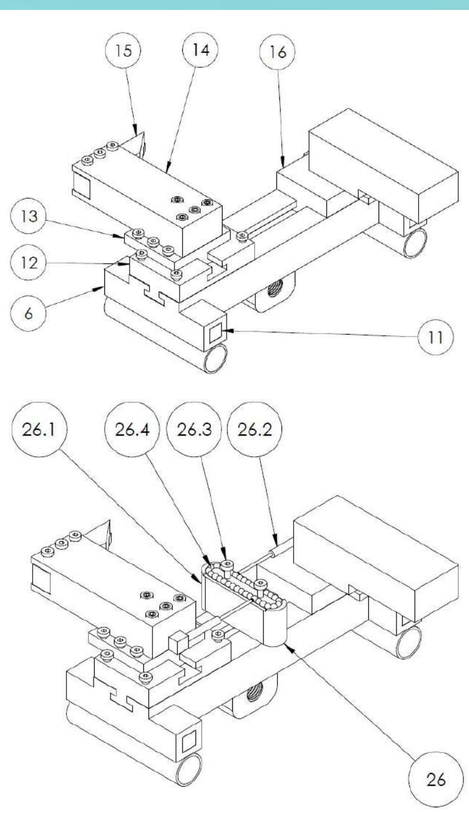
The lathe is characterized by the fact that the main motor used for processing the batch of parts is at constant speed, without a gearbox within the lathe, speed determined in advance according to the diameters of the parts in the batch to be processed, by a process also proposed by this invention. The fixing of the parts to be processed in the lathe is carried out by a universal chuck and the replacement of the movable tailstock, the lathe not having a movable tailstock, the movement of the carriage on the two guide bars, mounted above the frame, will be achieved without friction, or with reduced friction, due to the strong permanent magnets inside the carriage and the inside of the guide bars, but also due to the component acting as a counterweight (the counterweight is proposed in 3 variants of realization) necessary for the uniform distribution of the weight of the carriage on the two guide bars.

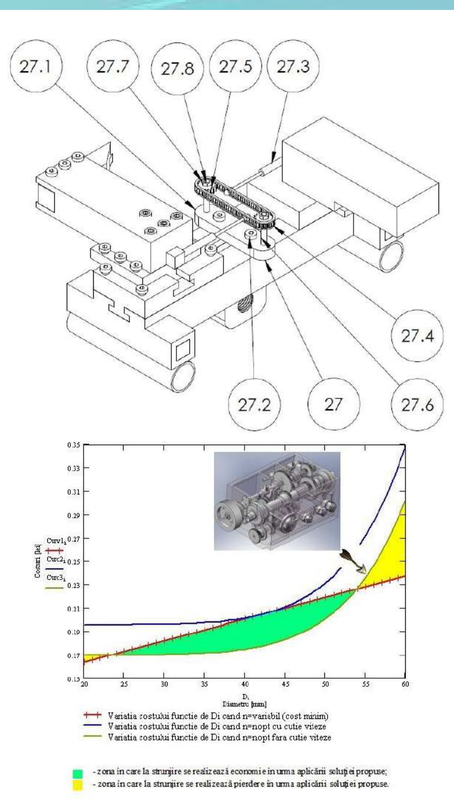
APPLICABILITY

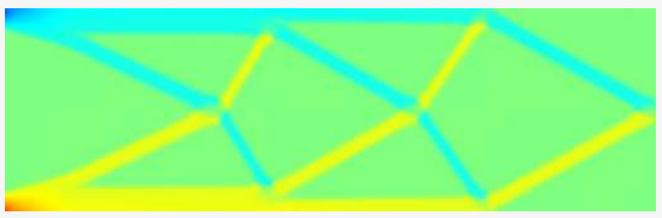
Applicability in enterprises that turn cylindrical metal parts and seek affordable, easy-to-maintain lathe equipment, both for initial machine outfitting and for replacing worn-out existing machinery.
Practical Application Possibilities
The proposed solution can be applied in:
1). Automotive industry: For machining bushings (outer bushings, inner bushings) used in flexiblocs (silent bushings) through turning operations.
2). Enterprises producing rollers or roller sets for conveyor belts, where various components are found: the shell, parts making up the axle assembly.
3). Enterprises manufacturing bearings, for machining the inner and outer rings that comprise the bearing.
4). Other enterprises with medium- to large-series production of parts with diameters falling within a specific range.

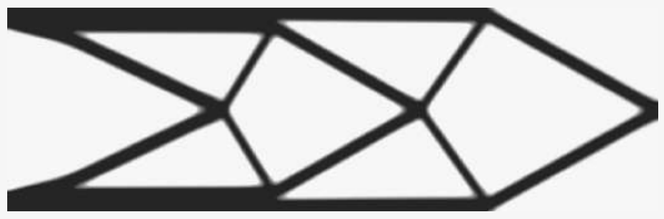
IMAGES











Analysis and comparison of stress fields in beam-like and Michell structures

Authors: Larson Schütze, Prof. Dr.-Ing. Klaus Mecking

D

Introduction

Michell-Prager trusses (or structures) were first introduced in 1904 [M.C04]. Since then, extensive research has focused on enhancing algorithms to address the resulting topology optimization problem [Ben95]. However, limited investigations have compared the stress fields of Michell trusses created using a SIMP (Solid Isotropic Material with Penalization) based algorithm with filtering to those of beam-like structures. By analyzing stresses in both Michell trusses and beam-like structures, we can deepen the understanding of optimally stiff structures and loaded beams. This insight inspires designers to incorporate similar structures into their designs.

Methods

By utilizing a topology optimization program that follows the SIMP algorithm and incorporates a filtering technique, Michell-like trusses were created. 2D-Finite element analysis was conducted to compare these structures to beam-like structures under load. By examining the invariants of the stress tensor invariants and principal stress directions, we aim to identify and clarify the differences and similarities between Michell-like trusses and beam-like structures.

The topology optimization algorithm

To find Michell-like trusses, a topology optimization algorithm is employed. For simplicity and to manage computational resources, we will focus solely on a 2D problem. Using a SIMP-based algorithm, the objective is to identify an optimal density function for a specified volume. This optimal density function determines the shape of an object that achieves maximum stiffness under the given load and boundary conditions.

SIMP

The SIMP, or "Solid Isotropic Material with Penalization", method was developed by M. P. Bendsøe and O. Sigmund [Sig99]. It utilizes a hypothetical material with a density that can vary continuously between zero and one. By applying a penalty to all densities using an exponent, lower values are effectively eliminated. This optimizsation algorithm shows good convergence with SIMP. An example of bad convergence is presented below.

Figure 1: A non converged solution. Archived by setting the penelization exponent to one.

Filtering

While employing SIMP to enhance solution convergence, another issue arises: numerical instabilities can result in a phenomenon known as "checkerboarding". This occurs in areas where material densities fluctuate rapidly in a checkerboard pattern. Checkerboarding can be mitigated by 'smoothing out' the solution across an area of at least two elements [Sig94]. An example of the consequences of not applying this filter is shown below.

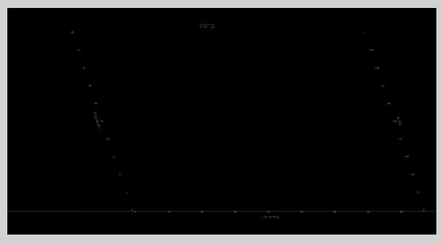


Figure 2: Checkerboarding in a solution. Archived by setting the "filter radius" to below two elements.

Optimality criteria

As previously mentioned, the aim is to create shapes with maximum stiffness, as these most accurately represent Michell structures. This can be achieved using various methods, such as the Method of Moving Asymptotes (MMA) or Sequential Linear Programming (SLP) [Sig01]. For simplicity, a standard Optimality Criteria (OC) model is employed. Convergence is achieved when the change of the objective function is below 0.1% in two consecutive iteration while the restrictions are being fulfilled.

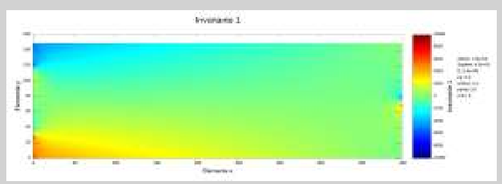
Results

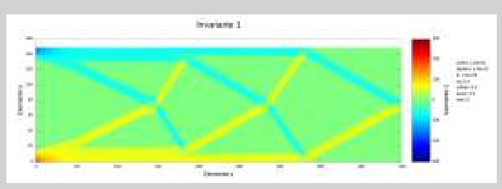
Load case

The following diagrams show the examined load case illustrated below. Two fixed supports secure both the cantilever beam and the Michell structure. A single upward force acts upon the figure. Only the most significant results will be presented in the forthcoming graphs.

Invariant 1

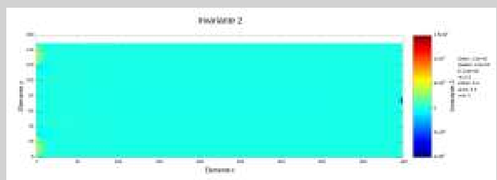
The first invariant is defined as $I_1 = \sigma_{xx} + \sigma_{yy}$, indicating whether an element is under hydrostatic compression or tension. The Michell truss demonstrates effective separation of tension and compression, whereas the beam exhibits a more transient transfer of these stresses.

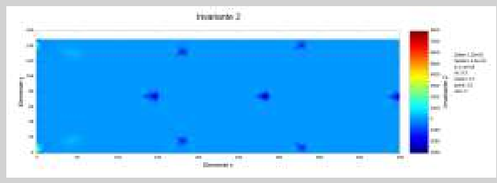




Invariant 2

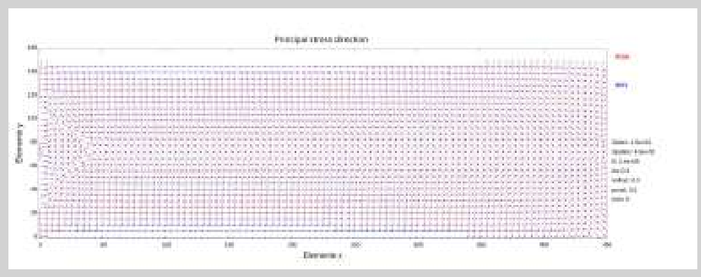
The second invariant is defined as $I_2 = \sigma_{xx}\sigma_{yy} - \tau_{xy}^2$. It analyzes the relationship between shear and normal stresses. By examining the second invariant, we can determine whether shear or normal stresses are dominant. Michell trusses exhibit effective separation of areas based on shear and normal stresses, whereas the beam-like structure predominantly displays high shear stresses near the fixed support points.

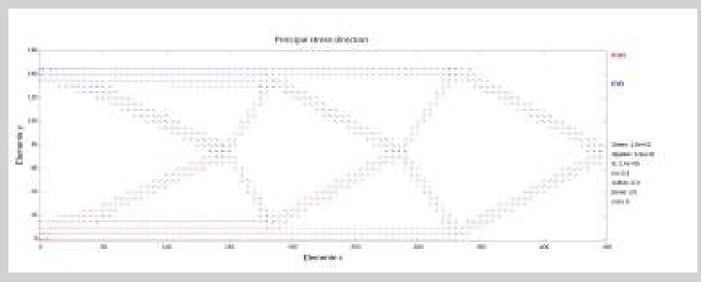




Direction of principal stresses

The principal stresses of an element can be calculated using the formula $\sigma_{1,2} = \frac{\sigma_x+\sigma_y}{2} \pm \sqrt{\left(\frac{\sigma_x-\sigma_y}{2}\right)^2 + \tau_{xy}^2}$, while their direction is given by $\tan(2\phi^*) = \frac{2\tau_{xy}}{\sigma_x-\sigma_y}$. The Michell structure exhibits a strong alignment of the principal stresses with its geometry, i.e. the typical load on a fibre. The non-optimised 2D beam-like structure only exhibits this behaviour at the edges. Towards the centre, the directions of the principal stresses increasingly rotate. Such rotating and intersecting principal stresses occur in both the Michell and the optimised structure only at the connection points of the bars and manifest themselves in increased shear stresses.





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Intelligent Mechanical-Hydraulic Adaptive Suspension System

Authors: Constantin Roberto DOARA, Petru Daniel CIORAN, Alexandru George MAMULARU
Coordinator: Professor Aurel Mihail TITU

Scientific Research Project

DESCRIPTION

This product is an adaptive suspension system designed to automatically adjust its stiffness and damping depending on road conditions, while avoiding complex electronics. Instead of using sensors and control units, the system relies mainly on mechanical and hydraulic components to react naturally to vibrations.

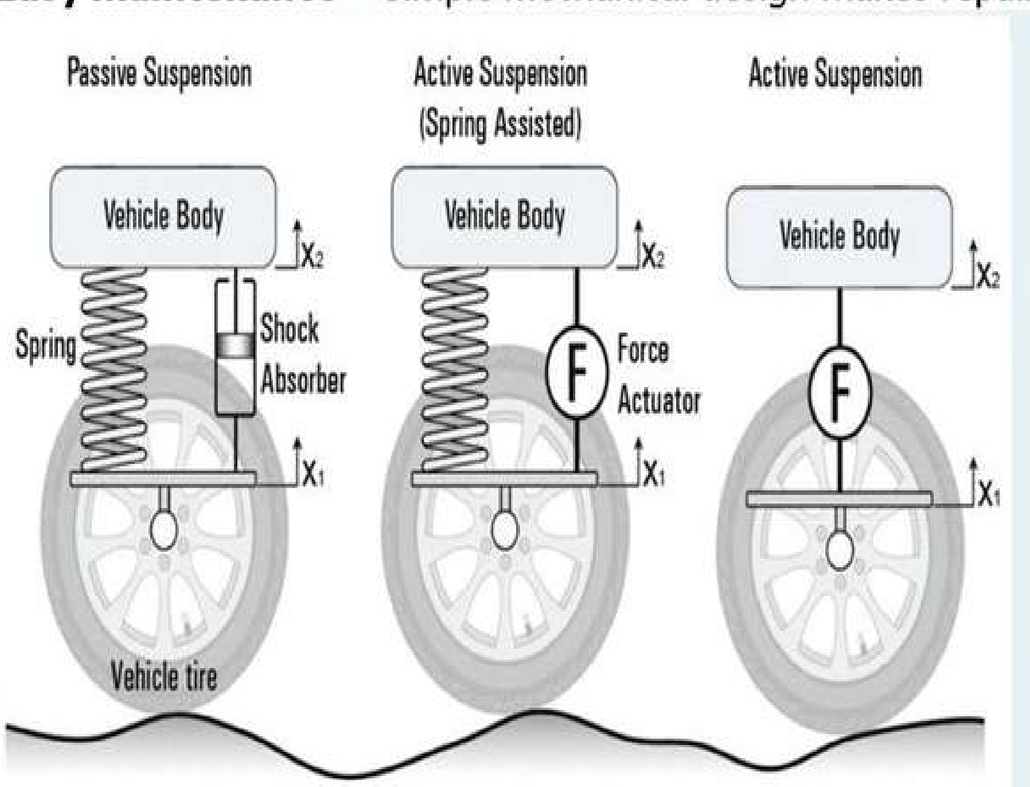
The suspension uses a hydraulic shock absorber with multiple chambers filled with oil and pressurized gas. Inside the damper, a specially designed mechanical valve controls the flow of hydraulic fluid. The key element is an inertial mechanism (a small moving mass combined with a spring) that reacts to the intensity of vibrations.

When the vehicle travels on relatively smooth roads, the valve stays more open, allowing the oil to flow easily and making the suspension softer for better comfort. When the suspension experiences strong impacts, such as large bumps or rough terrain, the inertial mass moves and partially restricts the fluid flow. This increases the damping force, making the suspension temporarily stiffer and improving stability.

A major advantage of this system is that it adapts in real time without needing electronics, which keeps the design simpler, cheaper, and more reliable. Because of this, the suspension could be useful for low-cost cars, ATVs, bicycles, electric scooters, or agricultural vehicles where durability and affordability are important.

ADVANTAGES

- **Lower cost** – No expensive electronics are required
- **High reliability** – Fewer electronic components means fewer possible failures
- **Automatic adaptation** – The suspension adjusts itself based on road vibrations
- **Better comfort** – Softer response on smooth roads reduces vibrations
- **Easy maintenance** – Simple mechanical design makes repairs



APPLICATIONS

This adaptive mechanical-hydraulic suspension system can be used in various types of vehicles where comfort, stability, and low cost are important. It is suitable for **low-cost passenger cars, ATVs, bicycles, electric scooters, and agricultural or off-road machinery**.

Because it does not rely on complex electronics, it is especially useful in environments where **durability, simplicity, and easy maintenance** are required.

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Transport Stress Index-Based Smart Monitoring Tag for Adaptive Incoming Inspection

Claudiu Alexandru COVACI , Aurel Mihail TITU

Scientific Research Project

D

DESCRIPTION

In practice, we encounter the following problems:

• Lack of correlation between transport conditions and incoming inspection intensity

Current incoming inspection processes in automotive supply chains are predominantly based on static sampling plans and historical supplier performance indicators. However, real transport conditions such as shock, vibration, temperature variation, or humidity exposure are not directly integrated into the inspection decision logic.

• Limited visibility of transport-induced degradation

Mechanical impacts and environmental stress during transportation may cause latent defects, especially in electronic components. These degradations are often undetected until later production stages, increasing the risk of line disruptions and warranty-related issues.

• Absence of objective transport evidence in supplier claims

Existing solutions such as impact indicators or temperature loggers are either passive, non-integrated, or not directly linked to quality decision systems. As a result, incoming inspection remains reactive rather than adaptive.

ADVANTAGES

The proposed smart monitoring tag integrates multi-parameter transport condition sensing with adaptive incoming inspection decision logic.

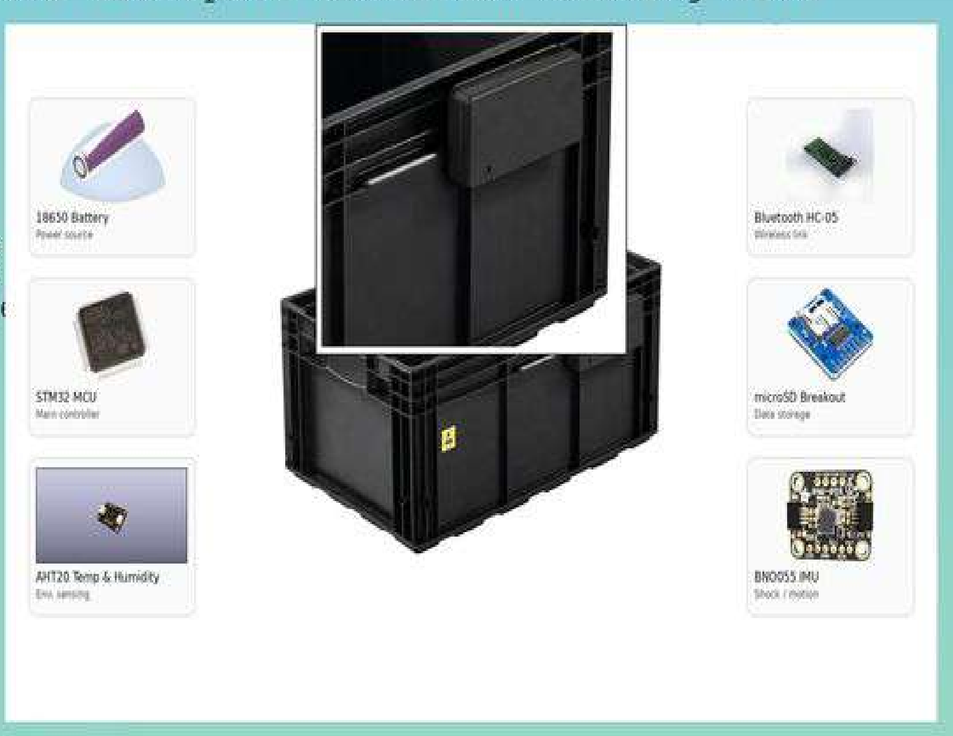
This system enables:

• Real-time recording of transport-induced stress events

• Computation of a Transport Stress Index (TSI)

• Dynamic adjustment of inspection intensity at receiving

• Improved traceability and objective evidence for supplie



APPLICATIONS

Workflow (high level):

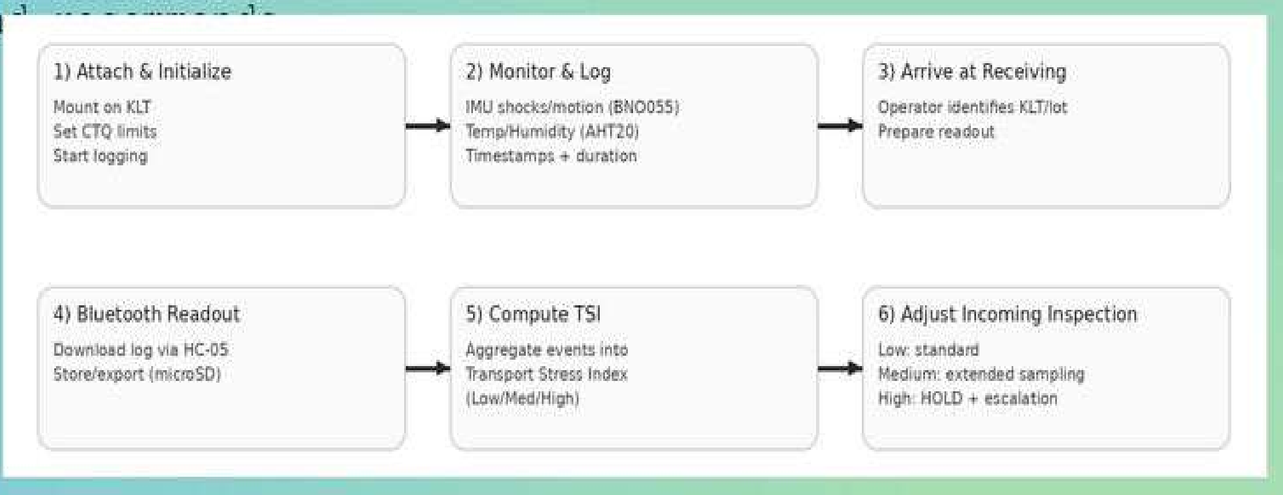
1) SMART TAG is mounted on the KLT and initialized at dispatch

2) During transport/storage it logs: motion/impact (BNO055), temperature & humidity (AHT20), time stamps

3) At goods receipt, operator reads the tag via Bluetooth (HC-05) and downloads the log to microSD

4) System flags excursions vs CTQ limits and recommends inspection depth

Target applications: ECO-plastics, pin reels, sensitive electromechanical parts, ESD-critical materials.



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Multifunctional support module for materials to be joined and processed by friction stir

Patent application No. RO 139104 A2 (A/00819/08.12.2023)

Authors: Lia-Nicoleta Boțilă, Ion-Aurel Perianu

D

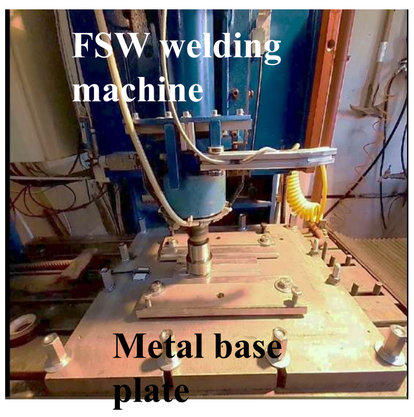
Friction stir welding and processing (FSW and FSP) are advanced and environmentally friendly techniques for joining or processing materials in the solid state, based on the heat generated by friction and plastic deformation. These effects are generated by a rotating, non-consumable tool that interacts with the surfaces to be joined or processed. The process is carried out below the melting point of the materials involved.

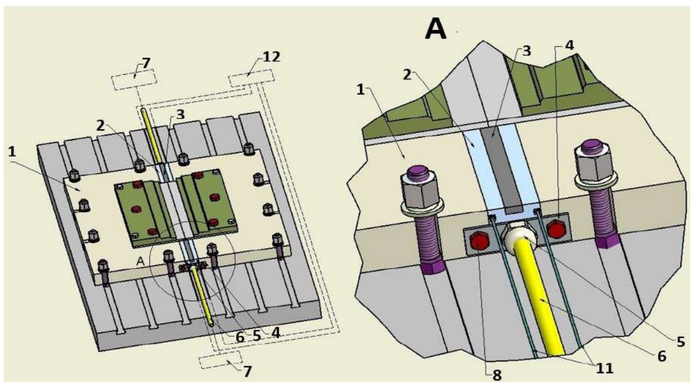
Object of the invention:
Development of a multifunctional support module for FSW welding / FSP processing of materials, equipped with a multifunctional element and an interchangeable element, with the possibility to apply a thermal effect (cooling / heating / preheating) at a certain distance below the materials to be joined/processed, along the working direction, which would contribute to improve the performance of innovative FSW/FSP processes in various working mediums (air, inert gas, water) and to increase the service life of the base plate.

Current technical situation:
FSW machines use a metal base plate (usually made of steel, 20-30 mm thickness) having various simple/complex machining for mounting on machine table and for positioning/fixing the materials to be welded/processed by using various systems (manual, pneumatic, hydraulic, depending on the complexity of the machine). During the FSW/FSP process, adhesions may occur between the material to be joined/processed and the base plate, requiring grinding and checking its flatness. In time, these can lead to damage / replacement of the plate, involving additional costs. Also, different methods and techniques are known to preheat the materials to be joined/processed (e.g. with TIG electric arc, plasma, induction, laser, etc.) generating hybrid processes. Some methods involves the materials to be joined/processed and the work tools as elements/parts of the preheating circuits

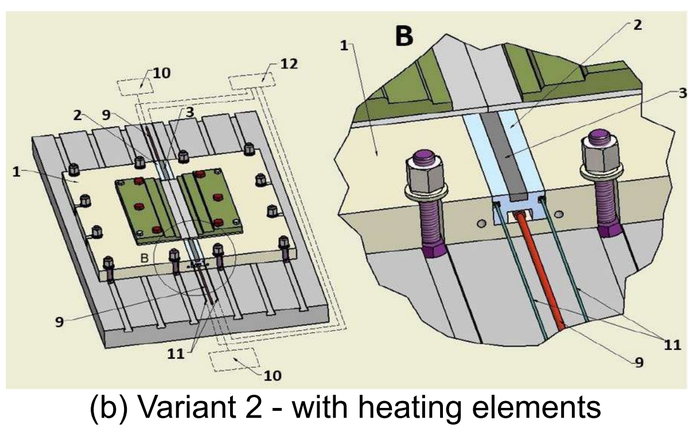
The technical problem solved by invention:
The multifunctional support module for FSW welding/FSP processing solves several technical and economic problems.
By transforming the base metal plate into a modular system, its service life is extended and the costs associated with reconditioning (materials, time, labor) are reduced. This module includes an interchangeable element that can be easily replaced in the event of adhesions with the materials to be joined/processed, preventing damage to the contact surface. In addition, the module allows the application, monitoring and control of a thermal effect adapted to the application, along the joint line, under the processed materials.
The role of the thermal effect:
- cooling, to avoid overheating of materials/tools;
- local heating, to reduce rapid heat loss in the case of materials with high thermal conductivity;
- preheating of support module, to reduce temperature differences and ensure efficient plasticization of materials with high melting points (e.g. copper, steels).

The steel construction and functional design of the module contribute to the optimal performance of FSW/FSP processes, with technical and economic benefits.





(a) Variant 1 - with air flow/water jet



(b) Variant 2 - with heating elements

Description
1. metal base plate
2. multifunctional element
3. interchangeable element
4. end elements
5. nozzle
6. connection hose
7. air/water intake/exhaust system
8. screw-type fasteners
9. heating elements
10. electrical power supply system
11. thermocouples
12. digital electronic thermoregulator.

The base metal plate (1) is protected from wear by replacing only the interchangeable element (3) in case of damage/wear. This eliminates the disadvantages related to the costs associated with the reconditioning or repeated replacement of this base plate, bringing thermal benefits to the area under the materials to be joined/processed, for good performance of FSW welding and FSP processing processes of a wide range of similar and dissimilar metal materials (light alloys, steels, copper alloys, etc.), in different working mediums.

Advantages:
- possibility of easy integration on specialized FSW welding machines;
- increase the service life of the base plate mounted on the FSW machine, by reducing its wear and the possibility to replace only the interchangeable element in case of damage or wear;
- reduction of material, time and labor costs compared to those involved in the repeated reconditioning of the upper surface of the base plate or even its replacement;
- possibility to apply an additional thermal effect along the joint/processing line under the materials to be joined / processed, depending on the application:
  - cooling effect with air flow or cold water jet to avoid overheating in welding area;
  - local heating effect with hot air flow / water jet to reduce rapid heat dissipation for materials with very high thermal conductivity (to maintain a certain temperature in the welding area);
  - a preheating effect in the support module, with heating elements along the joint / processing line, which contributes to ensure / maintain level of plasticization necessary for welding/ processing materials with high melting temperatures (e.g. copper, steels);
- possibility to use in two constructive variants for achieving the thermal effect in the multifunctional support module, under the materials to be joined / processed:
  - with thermal cooling / heating effect achieved with air flow or water jet;
  - with a thermal preheating effect achieved with heating elements;
- possibility to monitorize and control the temperature inside the multifunctional support module, using thermocouples connected to a digital thermoregulator
- can be used as a support for placing a wide range of couples of similar and dissimilar metallic materials (light alloys, steels, copper alloys, etc.), with dimensions correlated with those of the multifunctional support module, in order to position and fix them for welding/processing in different working mediums (air, inert gas, water).

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Adaptive thermal monitoring and control system for fricton stir welding and processing

Patent application No. RO 138992 A2 (A/00873/27.12.2023)

Authors: Lia-Nicoleta Boțilă, Alin-Constantin Murariu

D

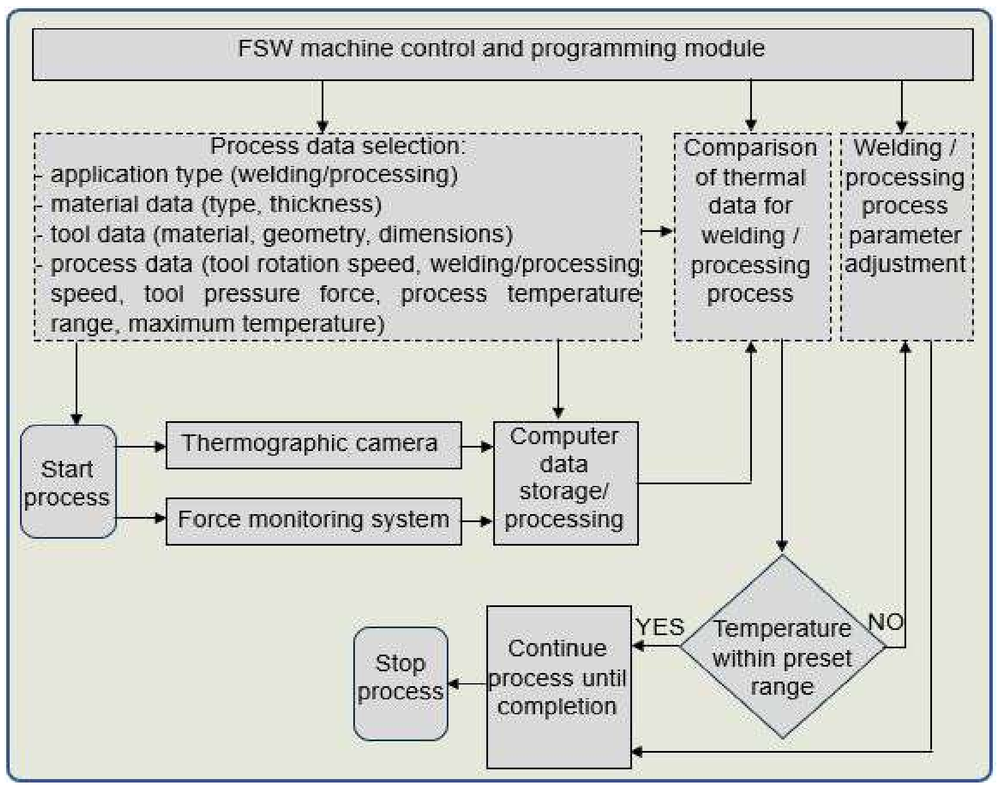
Friction stir welding and processing (FSW) / (FSP) are innovative and environmentally friendly solid state joining/processing processes based on frictional heating and plastic deformation of materials in the welding/processing zone, generated by the action of a rotating tool on the materials to be joined/processed. The process is carried out below the melting temperature of the materials to be welded/processed.

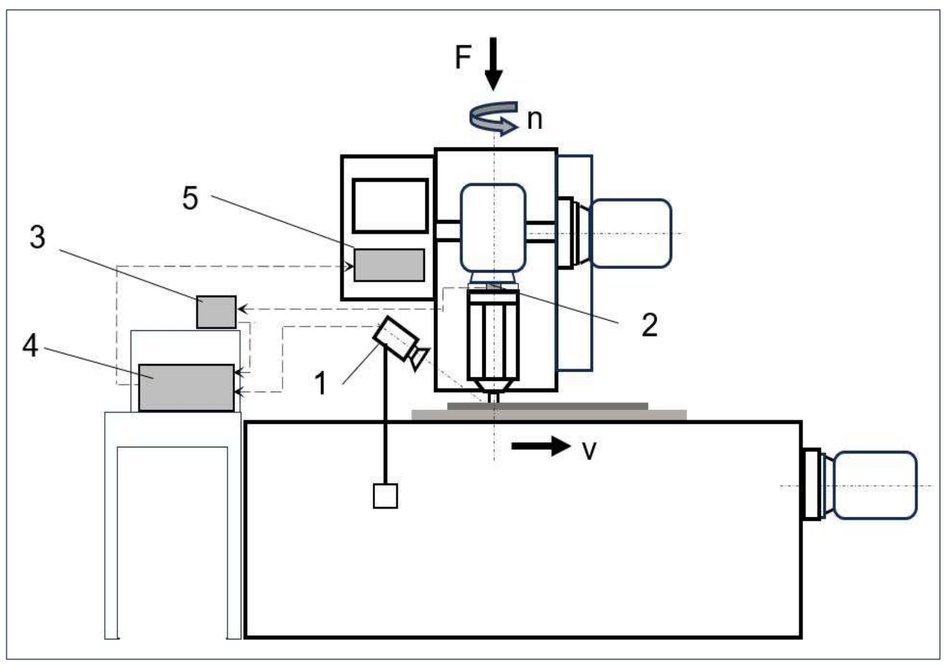
Object of the invention:
Adaptive computerized thermal monitoring and control system for friction stir welding and processing processes. It is an advanced technological solution that uses infrared thermography for continuous and real-time thermal monitoring and control of welding and processing processes, as well as for the evaluation and optimization of technological parameters.

Current technical situation:
There is the possibility of manual/automatic monitoring of the technological parameters of the FSW/FSP processes. However, the possibility of automatic monitoring and control of these processes with a computerized monitoring and control system using infrared thermography is new in the state of the art, has an inventive character and industrial applicability, and was not known prior to the filing date of the patent application.

The technical problem solved by invention:

- the adaptive computerized thermal monitoring and control system of welding/processing processes will contribute to their stability and to the improvement of the quality of welded/processed materials,
- the use of infrared thermography to provide thermal data for the evaluation/optimization of technological parameters and rapid identification of process deviations/non-conformities,
- the possibility of automatic intervention (through feedback connections) to eliminate process deviations/non-conformities, to optimize the values of process parameters (tool rotation speed, welding/processing speed, tool pressing force on the surface of the materials to be joined/processed), to ensure the stability of the process and process parameters.
- offers solutions for real-time thermal analysis of FSW/FSP processes by providing thermal data to a computer interconnected with the control and programming module of the FSW machine, the data being automatically analyzed/compared with the reference data (by types and thicknesses of materials) stored/memorized by this module. In case of deviations, parameter correction is automatically performed to achieve thermal stability of processes.





Description of the adaptive monitoring and control system:

1. infrared thermographic camera (with specialized software for data acquisition, processing and analyzing thermal images), mounted on a support on the FSW machine, focuses the image from behind the tool, in the welding/processing direction
2. force monitoring system using a force cell integrated on the main axis of the FSW machine in the motor drive area that ensures the rotation of the welding/processing tool
3. datalogger for data acquisition from the force cell (2)
4. computer connected with (1) and (3), allows the storage and processing of data regarding the temperature from the work processes and the pressing force of the tool on the surface of the materials to be joined/processed,
5. control and programming module of the FSW machine (where the reference data is stored), interconnected with (4).

Advantages compared to other thermal monitoring and control systems:

- uses infrared thermography to capture thermal data, providing precise and detailed information about the temperature distribution in the work area;
- allows automatic evaluation/optimization of the technological parameters, ensuring thermally stable processes and the quality of welded/processed materials;
- easily integrates into specialized FSW welding/FSP processing machines, being compatible with different types and sizes of machines;
- is easy to use and does not require specialized operator training.

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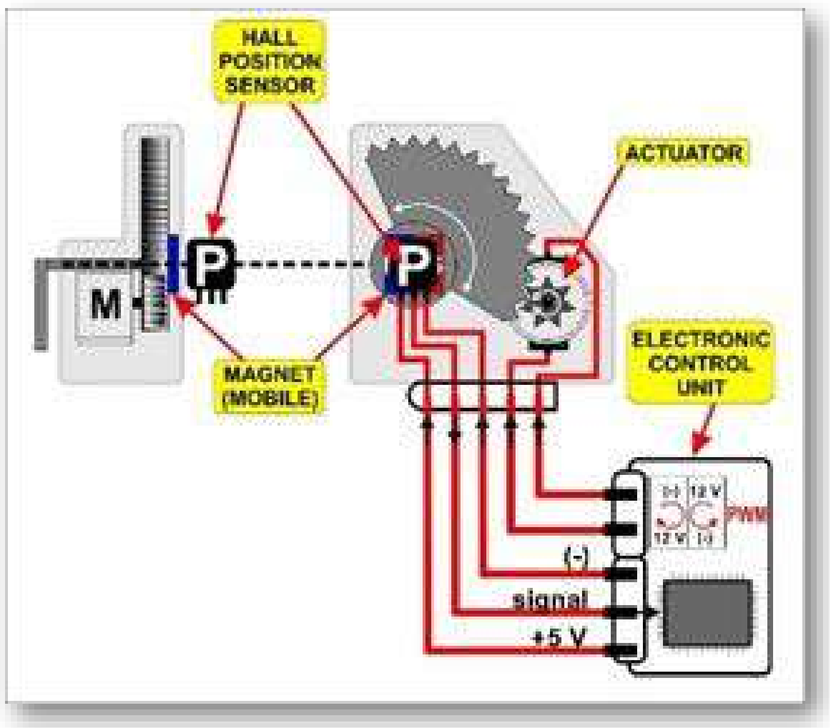
The influence of the exhaust gas recirculation (EGR) system on the quality of fuel combustion in diesel engines

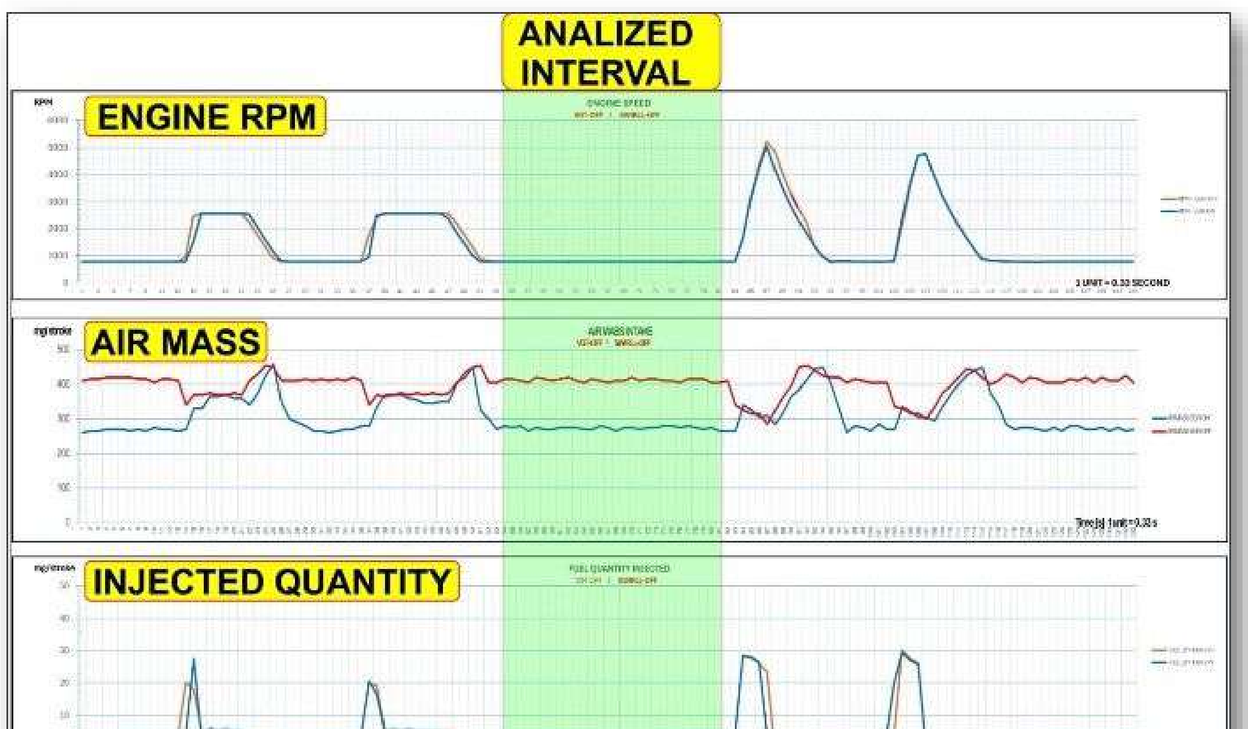
D

Scientific paper/PhD

Authors: Sorin Aurel Rațiu, Adrian Gidali, Diana Miruna Armioni

The study aims to establish the real influence and the complementary role of the exhaust gas recirculation system on the quality of hydrocarbon combustion in diesel engines. For this purpose, the practical determination of the influence of the EGR system on the combustion quality of the injected fuel was proposed, by directly measuring the emissions of particles (PM) resulting from the combustion, in different speed regimes of the diesel engine. The successive use of the opacimeter and the indication from the oxygen sensor, read digitally from the Electronic Control Unit of the injection system, will significantly reduce the margin of error for the measured values. In order to establish the direct relationship between the quality of fuel combustion and the operation of the EGR system, the air swirl system in the intake manifold was canceled (without the activation of the breakdown mode triggered by the electronic engine control unit (engine-ECU). The combustion gas samples for analysis were taken upstream of the specialized combustion gas treatment systems: the catalytic ceramic element (DOC – diesel oxidation catalyst), the diesel particle filter (DPF – diesel particle filter) and the selective catalytic reduction system (SCR – selective catalytic reduction).





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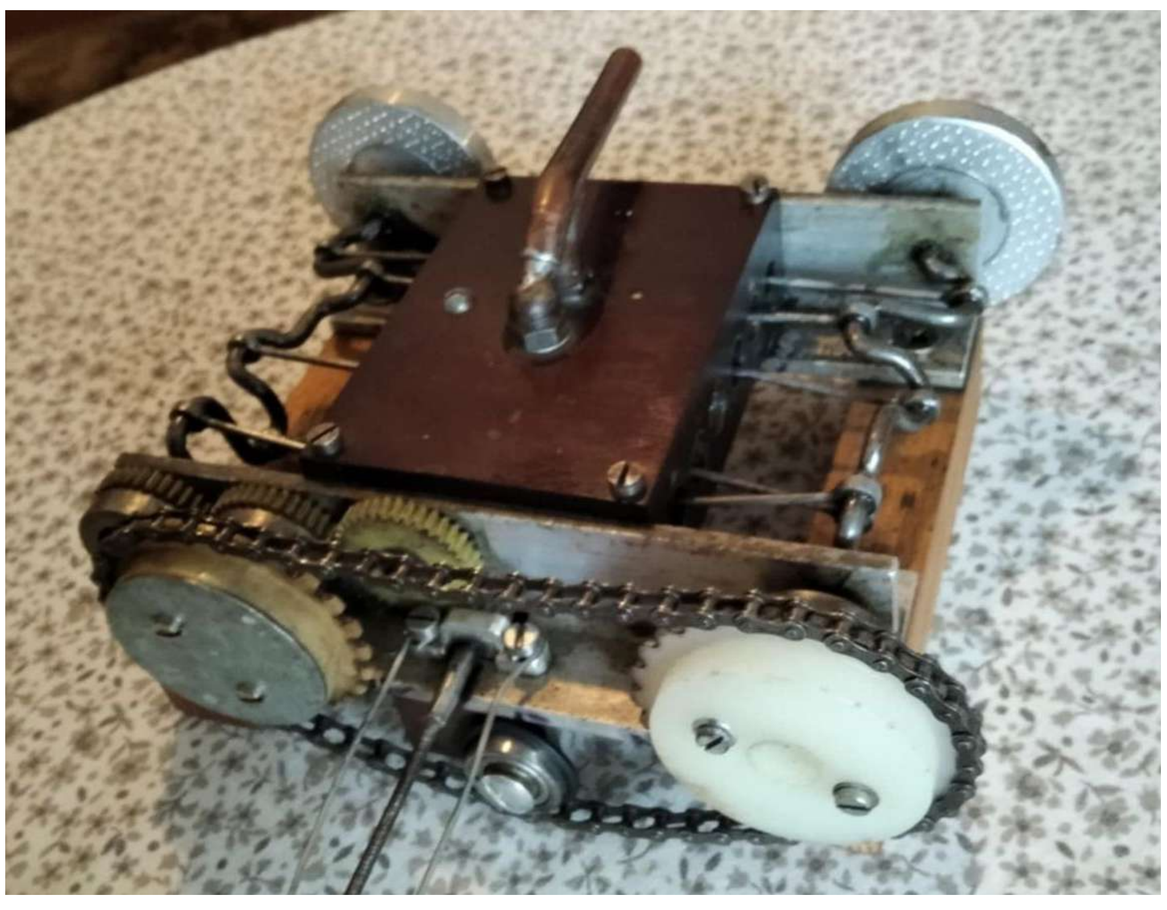
WORKING STEAM ENGINE

Author: Gyula Török (Hódmezővásárhely)

Model ship powered by a steam engine. A steamship, often referred to as a steamer, is a type of steam-powered vessel, typically ocean-faring and seaworthy, that is propelled by one or more steam engines that typically move (turn) propellers or paddlewheels. The first steamships came into practical usage during the early 19th century; however, there were exceptions that came before. Steamships usually use the prefix designations of "PS" for paddle steamer or "SS" for screw steamer (using a propeller or screw). As paddle steamers became less common, "SS" is incorrectly assumed by many to stand for "steamship". Ships powered by internal combustion engines use a prefix such as "MV" for motor vessel, so it is not correct to use "SS" for most modern vessels.



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Presentation link: https://otletclub.5mp.eu/web.php?a=otletclub

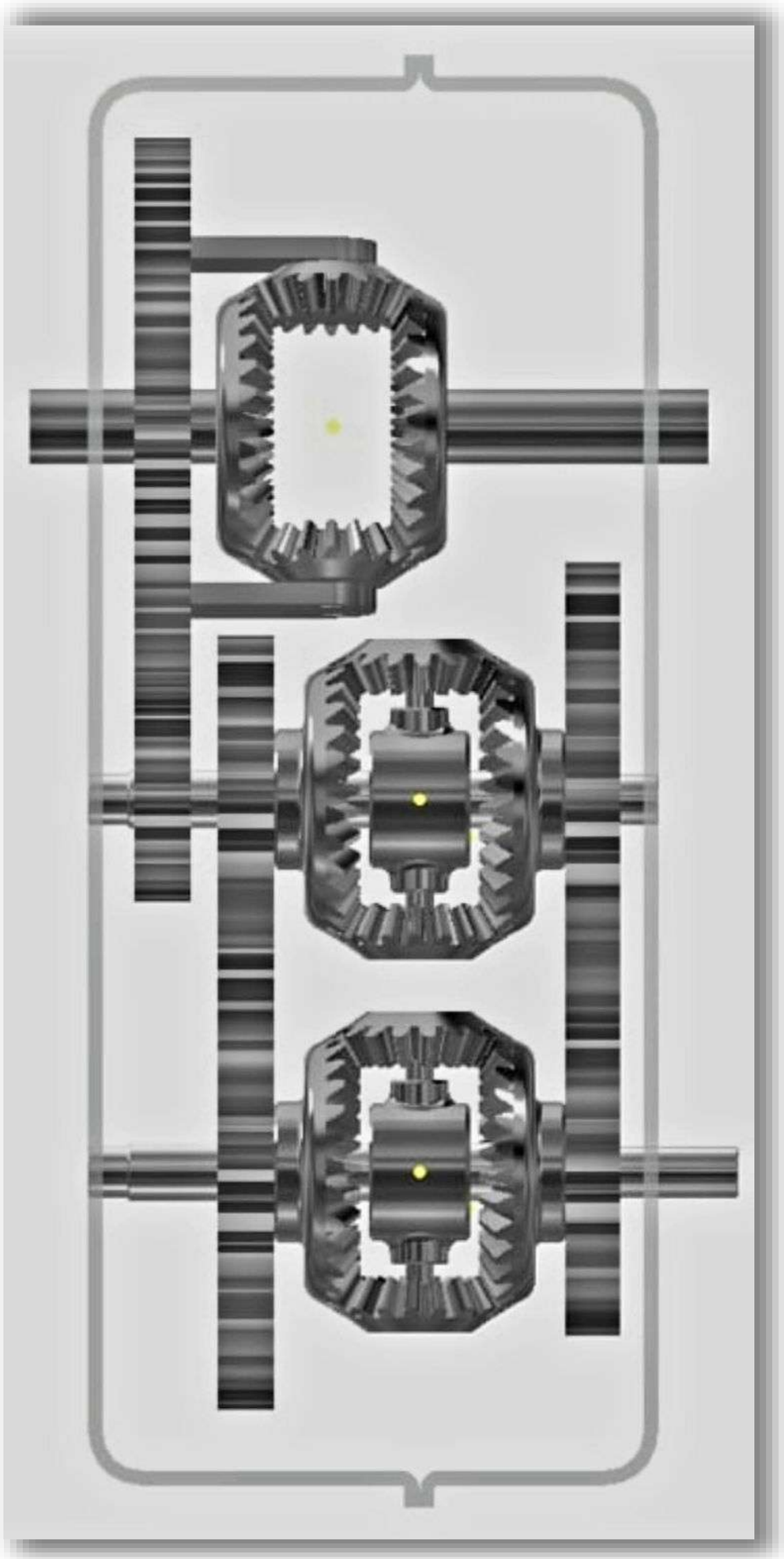
GEARBOX FOR ELECTRIC CAR

Patent RO134406 / 30.03.2023

Authors: ROMEO CĂTĂLINOIU, SORIN AUREL RAȚIU, IMRE ZSOLT MIKLOS

The invention is an application of Patent RO134406 dated 30.03.2023 and refers to a gearbox intended to ensure the transmission of electrically powered automobiles with the aim of reducing energy consumption and increasing energy autonomy.

The gearbox is characterized by the fact that it continuously varies the value of the transmission ratio, by varying the revolutions of the two electric motors, which can work individually or in tandem.



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The gearbox is a mechanical reducer characterized by the fact that it provides assistance when pedaling through an electric motor, assistance that can be achieved in three modes: low, medium and high, self-adaptive depending on the value of the load torque that must be overcome.

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Title

MONO-BLOCK BODY FOR LOW-MASS VEHICLES

Inventor/s - Contact

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Patent/ Application number

Patent OSIM no.: RO133971- B1/30.12.2024

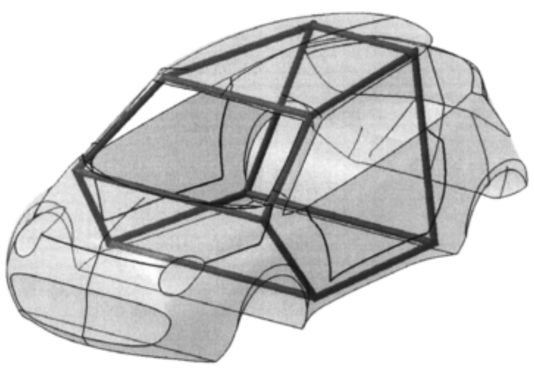
Short presentation

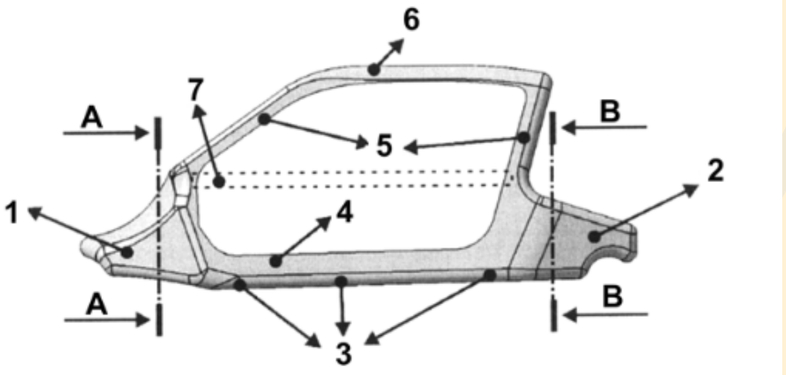
The invention relates to a monoblock body for motor vehicles and to a sandwich-type fiber-reinforced composite material for making the body, the composite structure exhibiting high mechanical resistance and low mass. According to the invention, the body is made of a sandwich-type composite structure consisting of a honeycomb-like aluminium core (10) placed between an exterior layer (9) and an interior layer (11) made of a glass-fiber-, carbon-fiber- or Kevlar-reinforced composite material, the body consisting of two cones (1 and 2), a front one and a back one, for impact, continued with a floor (3) provided, on the edges, with two sills (4) made of composite material, onto which four pillars (5) supporting the ceiling (6), are connected, on the edge they having a resistance structure (19), with a reinforcing element (7) placed inside the door with the role of protecting the passengers in case of lateral impact, all the mentioned elements being obtained in a mould with multiple separation planes inter-connected during the process of composite lamination, the operation being performed simultaneously, to finally result in a complete monoblock body.

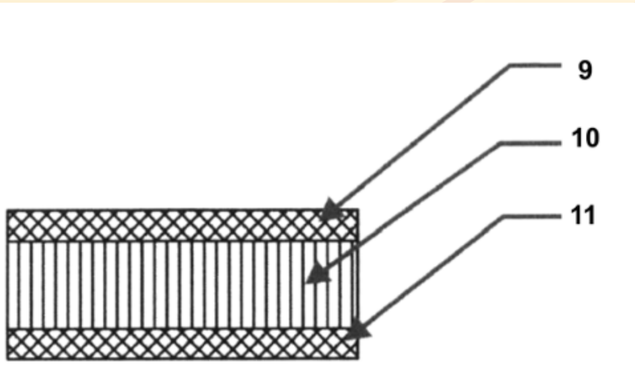
Applicability

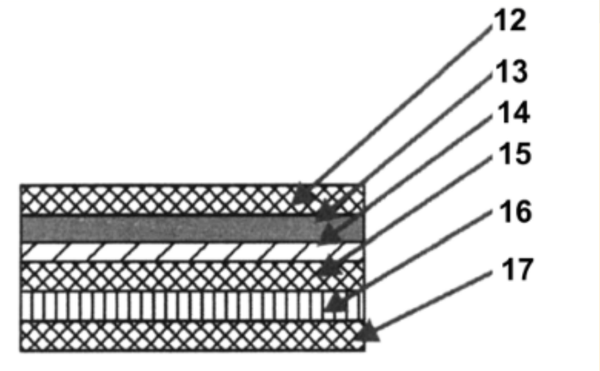
The patent applies to a body in white composite structure for automotive industry

Images









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Title

BRAKING MECHANISM WITH S CAM

Inventor/s - Contact

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Patent/ Application number

Patent OSIM no.: RO133631- B1/29.11.2024

Short presentation

The invention relates to an "S" cam braking mechanism having an actuating system (1) consisting of a body (8) supporting a shaft (10), and an axial movable assembly formed by the pusher shaft (14) and the spindle (15) with balls (16) sliding in the grooves (10c) and causing the cam (2) to rotate. Wear compensation and holding of the shoes (4) in the immediate vicinity of the drum (5) is made with a mechanical reaction loop formed by the sawtooth coupling (10a / 11a) and the threaded assembly (14c / 15c). Figure 1.

Applicability

The camshaft brake mechanism S is applicable to the wheel brake mechanism with drums and inner shoes.

Images

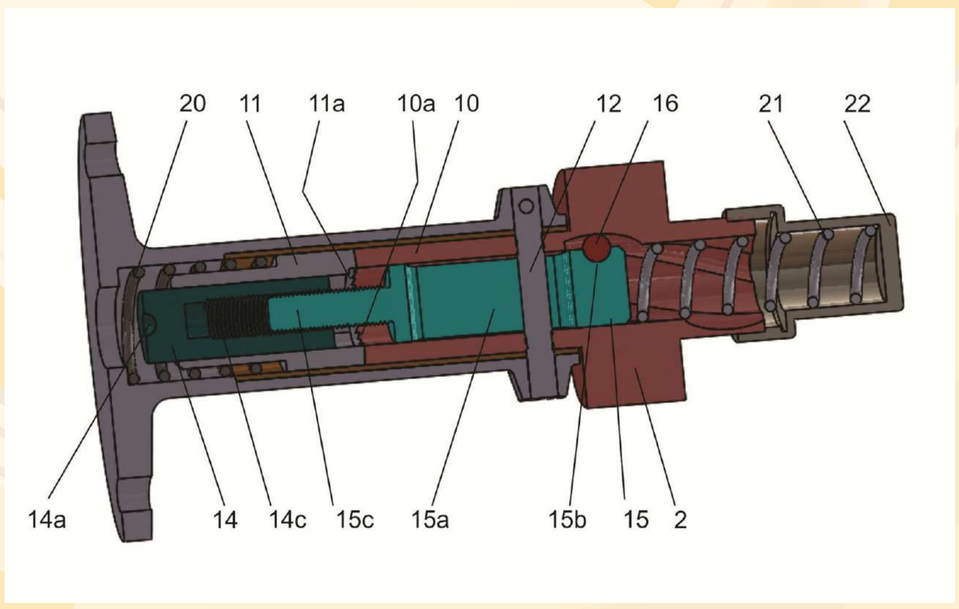


Fig.1

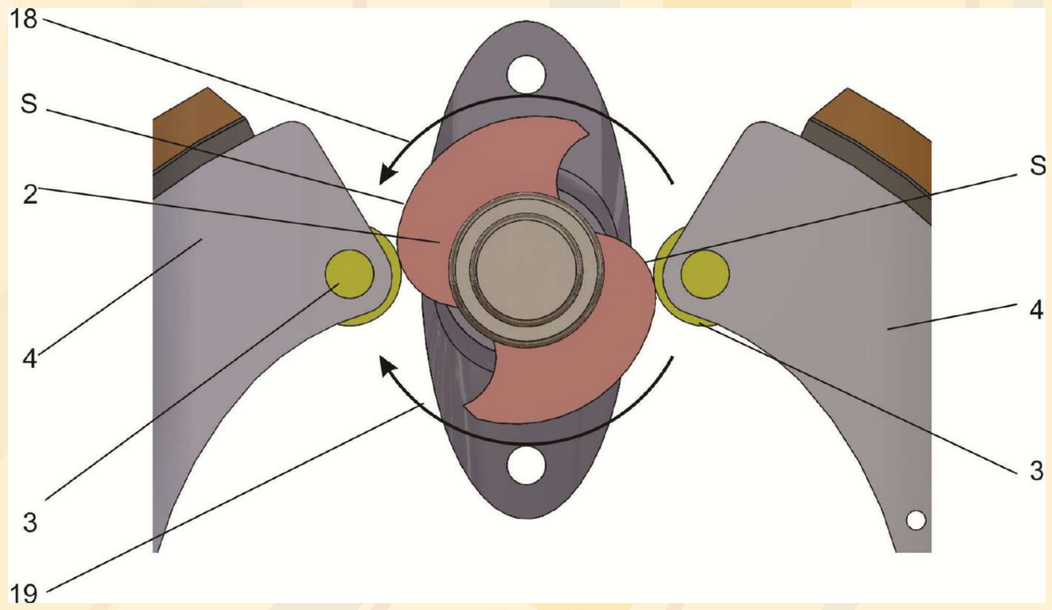


Fig.2

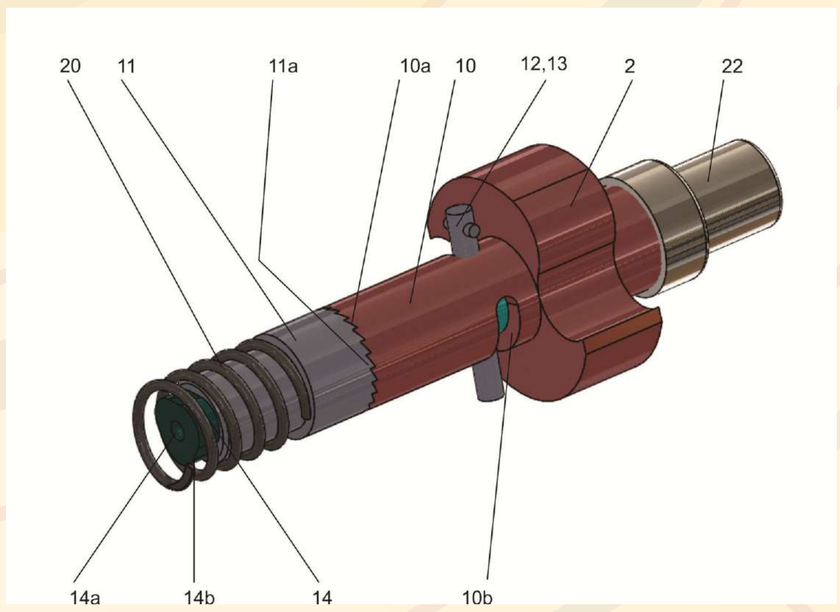


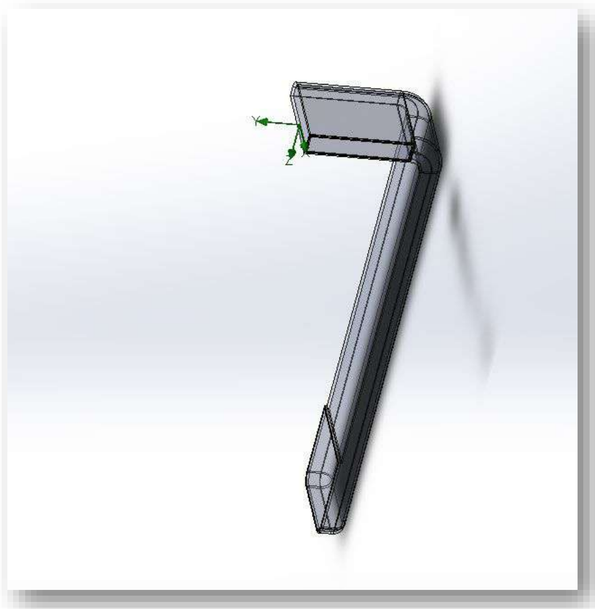
Fig.3

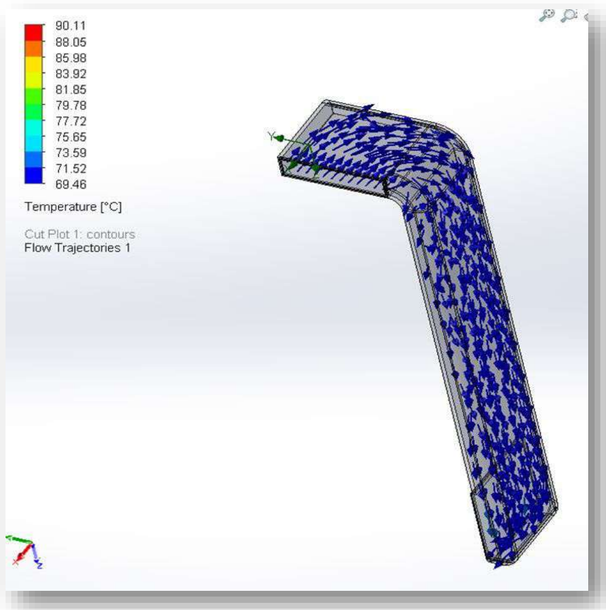
SIMULATION OF THE DYNAMIC AIR TRANSFER SYSTEM FOR SETRA BUS

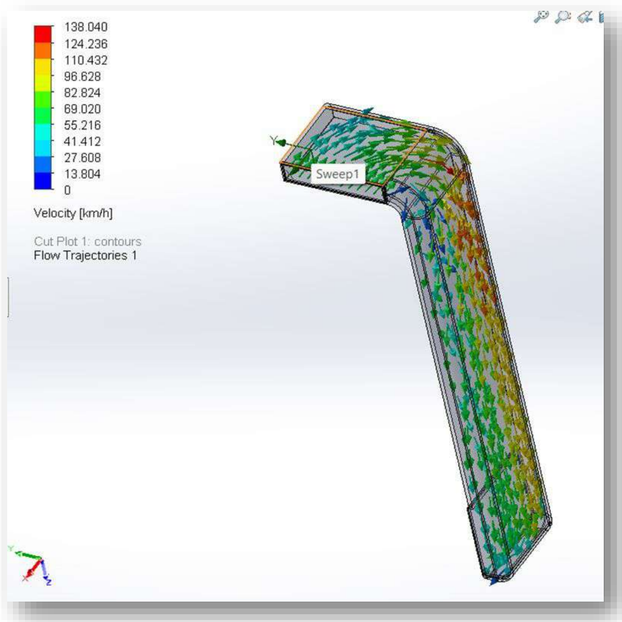
Research Project
Author: Flavius Bucur
Metors: Corneliu Birtok Baneasa, Ana Socalici

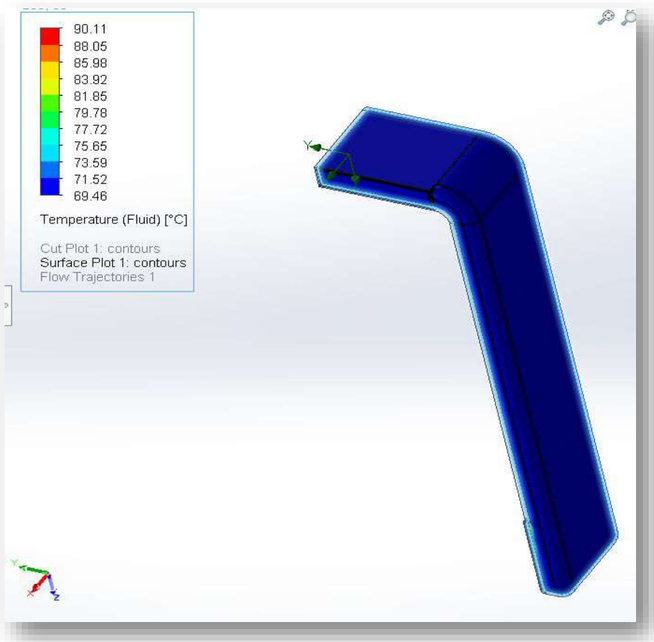
D

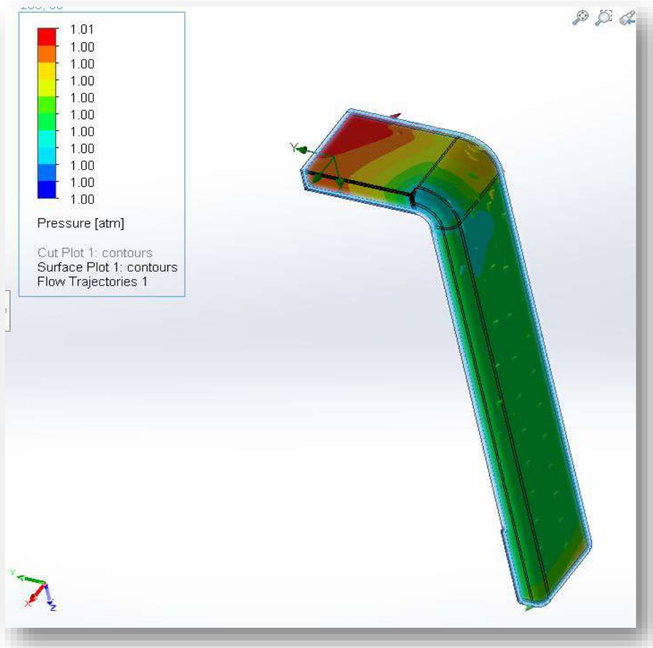
This study is carried out in order to optimize the intake route in the case of buses. In this regard, a new external route was modeled and designed with the role of capturing and directing the air flow towards the intake route and towards the suction area of the air filter. This route is located on the outside of the bus in the region of the propulsion group.











The efficiency of the collector consists of modeling and simulating the external collection region by implementing a diffuser shape customized according to the body architecture but taking into account the manufacturer's regulations regarding the bus's overall dimensions.

The experiments and tests were conducted in the laboratories of the Faculty of Engineering in Hunedoara.

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TIMIȘOARA

National Research & Development Institute for Welding and Material Testing - ISIM Timișoara

Friction stir welding device with air cooling of the welding tool and the materials to be joined

Patent application No. RO 137552 A2 (A/00028/27.01.2022)

Authors: Radu Cojocaru and Lia-Nicoleta Boțilă

D

Friction stir welding (FSW) is an innovative and environmentally friendly solid-state joining process, based on frictional heating and plastic deformation of the materials to be welded, produced by the interaction of a non-consumable rotating welding tool with the surfaces to be joined. The process temperature is lower than the melting temperature of the materials to be welded.

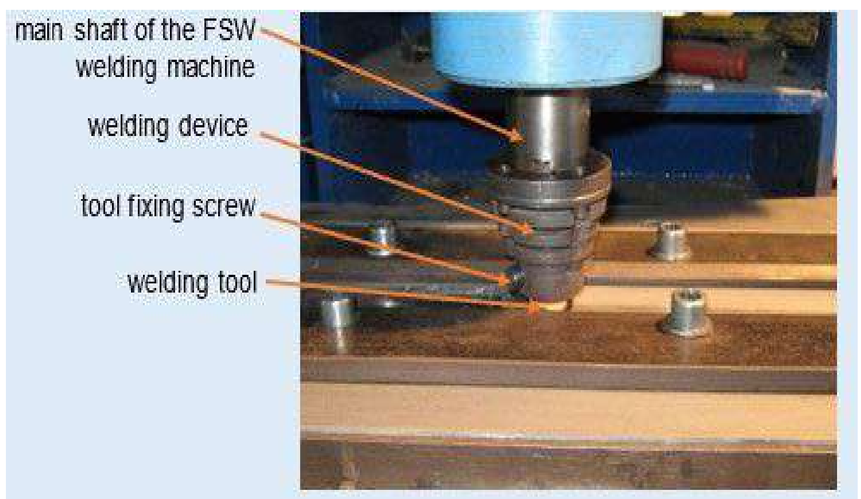
Object of the invention:

The development of a specialized welding device for friction stir welding FSW, whose constructive solution ensures an additional air-controlled cooling of the FSW tool and the materials to be joined, in the welding area and in adjacent areas.

FSW air-cooled device

Current technical situation:

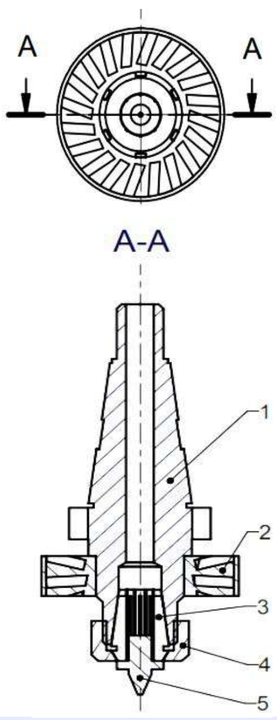
The welding device currently used on the FSW welding machine has a constructive form that does not provide effective cooling of the welding tool, and (depending on the welding application) excessive overheating of the tool may occur, which may lead to its damage.



Initial welding device integrated on the FSW machine

The technical problem solved by invention:

- propose a welding device with a constructive solution that allows integration on a specialized FSW welding machine (by Morse taper clamping, on the main shaft of the welding machine) and allows the welding tool to be fixed in the device body;
- ensure the technical conditions to protect the FSW welding tool and the materials to be joined from overheating, in the welding tool action area during the actual welding process, by additionally cooling them with an additional air flow;
- possibility to use FSW welding for couples of ferrous and non-ferrous metallic materials with high plasticizing temperature.



Description of the new device :

The device body (1) - allows clamping on the main shaft of the welding machine by means of a Morse taper, in correlation with the type of FSW welding machine;

The air-cooling module (2) – is fixed on the device body, being equipped with inclined slots that constantly directs a flow of air in the welding area, ensuring the local reduction of the temperatures of the welding tool and the materials to be joined;

The elastic bushing (3) - has the role of positioning, fast and secure fix of the FSW tool in the optimal working position;

Clamping element (4) - is a threaded bushing with the role of controlled tightening of the welding tool by means of the elastic bushing;

The welding tool (5) - is a one-piece construction, made of steel (heat treated to 45-55HRC) or of sintered tungsten carbides, stable at high temperatures (>1200^0 C).

Advantages:

- the possibility of easy integration on the specialized welding machines;
- the constructive solution of the device reduces the effect of the welding tool overheating, ensuring an increase of its service life and protecting the bearings of the main shaft of the FSW welding machine;
- the overheating effect of the materials to be joined by welding is reduced;
- allows FSW welding of a wide range of couples of similar and dissimilar materials (2-10 mm thickness): e.g. metallic materials with high plasticizing temperatures, light alloys, steels, copper and copper alloys.

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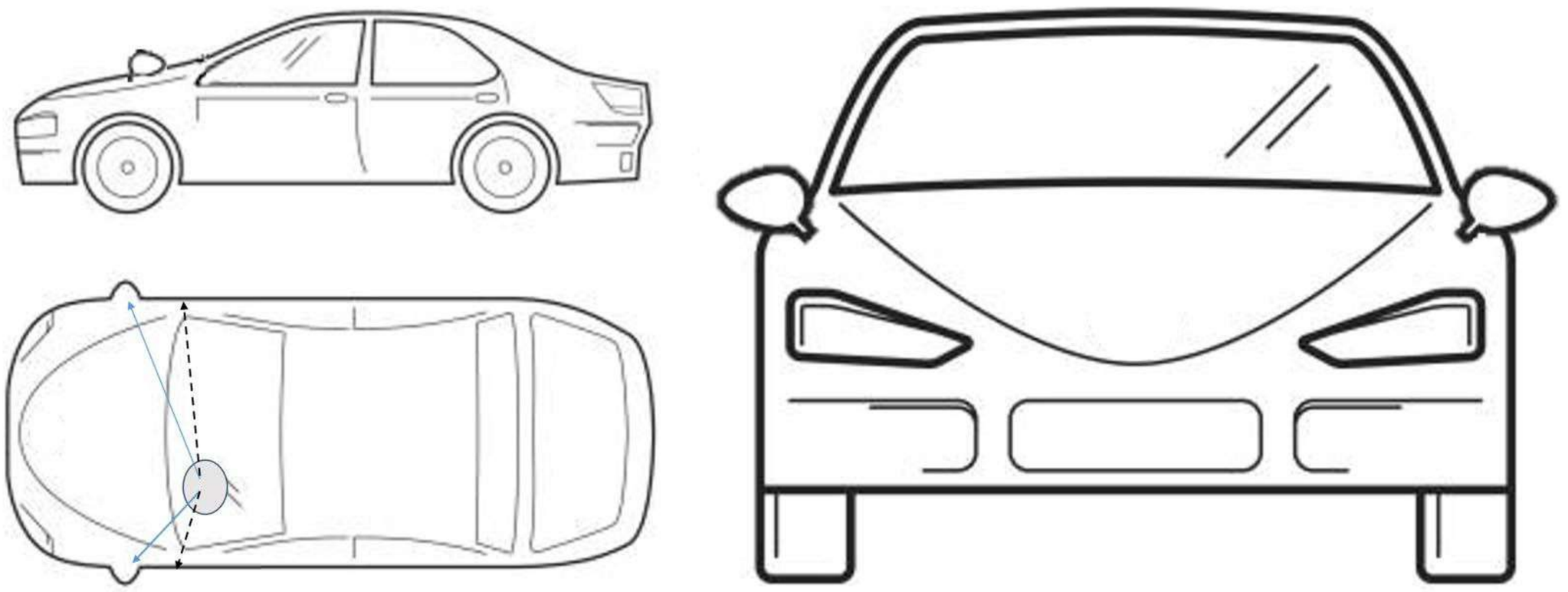
TIMIȘOARA
National Research & Development Institute for Welding and Material Testing - ISIM Timișoara

RETRACTABLE AND PIVOTING CAR REARVIEW MIRROR

D

Patent application **No. A2024 00484 / 21.08.2024**
Authors: **Nicușor-Alin SÎRBU and Gabriela-Victoria MNERIE**

At present, cars are fitted with two exterior rear-view mirrors, left-right, in most cases arranged sideways on the front doors. This arrangement ensures that traffic behind or in the immediate vicinity of the car can be seen quickly enough, even if the driver has to turn his head and briefly loses the field of vision in front of the car, and the instantaneous view ahead is often interrupted. Putting rear-view mirrors on the front doors has not always been the only option. In the past, in particular, there have been cars that have had rear-view mirrors mounted on the front wings of cars in the driver's normal field of vision. Refinements in the construction of rear-view mirrors nowadays include ergonomic mirror positioning mechanisms, folding and downsizing, and the adoption of shapes related to the general aesthetics of the bodywork.



Schematic diagram of the orientation of the view when rear-view mirrors are placed on the bonnet and doors

The technical problem solved by invention:

The technical problem of the invention consists in realizing a constructive and functional solution on which can be integrated a rear-view mirror of ordinary deconstruction which provides an immediate visibility of the traffic behind and immediate vicinity in the driver's instantaneous field of view while driving and which is retractable, and protectable inside the car body during parking.

Advantages:

- Improved ergonomics of visualizing traffic behind the car while driving without affecting the instant visibility ahead;
- Increased road safety;
- Elimination of the inconvenience of accidental or vandalized damage to the rear-view mirror while stationary.

Disadvantages:

- Positioning the rear-view mirror outside the driver's instantaneous field of vision while driving;
- Vulnerability to accidental impact;
- Vulnerability to vandalism.

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TELESCOPIC RETRACTABLE CAR REARVIEW MIRROR

D

Patent application **No. A2024 00485 / 21.08.2024**

Authors: **Nicușor-Alin SÎRBU and Gabriela-Victoria MNERIE**

The invention relates to a mandatory accessory related to traffic safety, namely side mirrors that provide visibility of traffic behind the automobile together with the main rearview mirror in the passenger compartment.

The telescopic retractable automobile rear-view mirror according to the invention is a construction-functional assembly mounted on the left-right front edges of the hood of an automobile incorporating a rear-view mirror of ordinary construction retracted under the hood during parking and expanded outwardly during running of the automobile. The construction-functional assembly consists of a protective body which:

- in the running state of the motor vehicle is raised so as to permit telescopic displacement outwards of the protective body of a support plate to which the rear-view mirror is attached. The displacement is provided by a mechanism, attached to the protective body, which operates a lead screw driving in translation a lead nut attached to a support plate and by which the support plate is translated in one direction or the other on two telescopic guide rods attached to the protective body;
- when the car is stationary, the protective body is withdrawn under the bonnet of the car, having inside it the rear-view mirror and an assembly of parts enabling it to be moved telescopically.

Scope:

The invention is based on the inventive concept according to which the rear-view mirrors of the automobile placed on the edges of the front bonnet provide a direct and quasi-permanent visibility being placed in the normal field of view of the driver (Fig. 1 and 2). As such they eliminate the need to turn the head to the left or to the right and therefore reduce the risk of a dangerous situation occurring without it being quickly detected (Fig. 2). Traffic safety is improved. On the other hand, this arrangement allows the rear-view mirror to be integrated into the vehicle's construction and function so that when stationary the rear-view mirror is completely retracted, hidden and protected under the bonnet, eliminating accidental knocking or damage through vandalism. Placing rear-view mirrors on the front wings of cars, next to the bonnet, is a technical solution which has been used before, except that it was not possible to retract and mask them, as they were fixed in position.

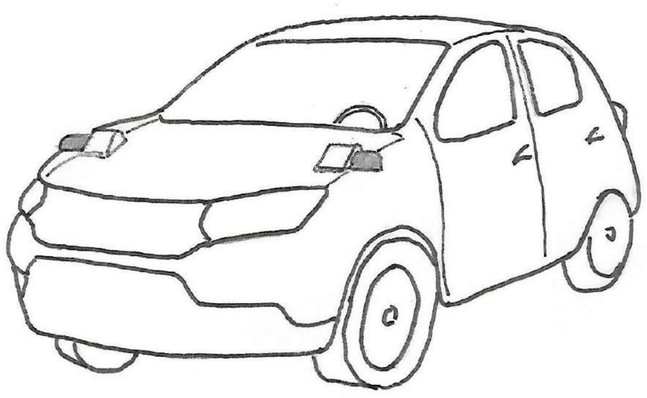

Figure 1

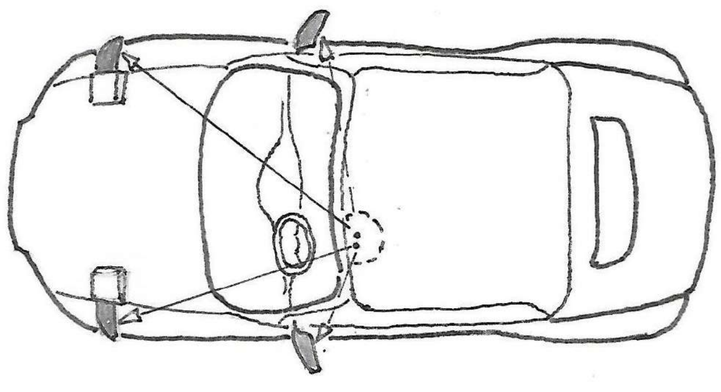

Figure 2

Advantages:

- improved ergonomics of the traffic view in front and behind the car while driving
- increased road safety;
- eliminating the inconvenience of accidental damage or vandalism to the rear-view mirror while stationary.

The technical problem solved by invention:

The technical problem of the invention consists in the realization of a constructive and functional structure on which a rear-view mirror of ordinary construction can be integrated, which provides an immediate view of the traffic behind and immediate vicinity in the driver's instantaneous field of view while driving and which is retractable, and protectable inside the car body while stationary.

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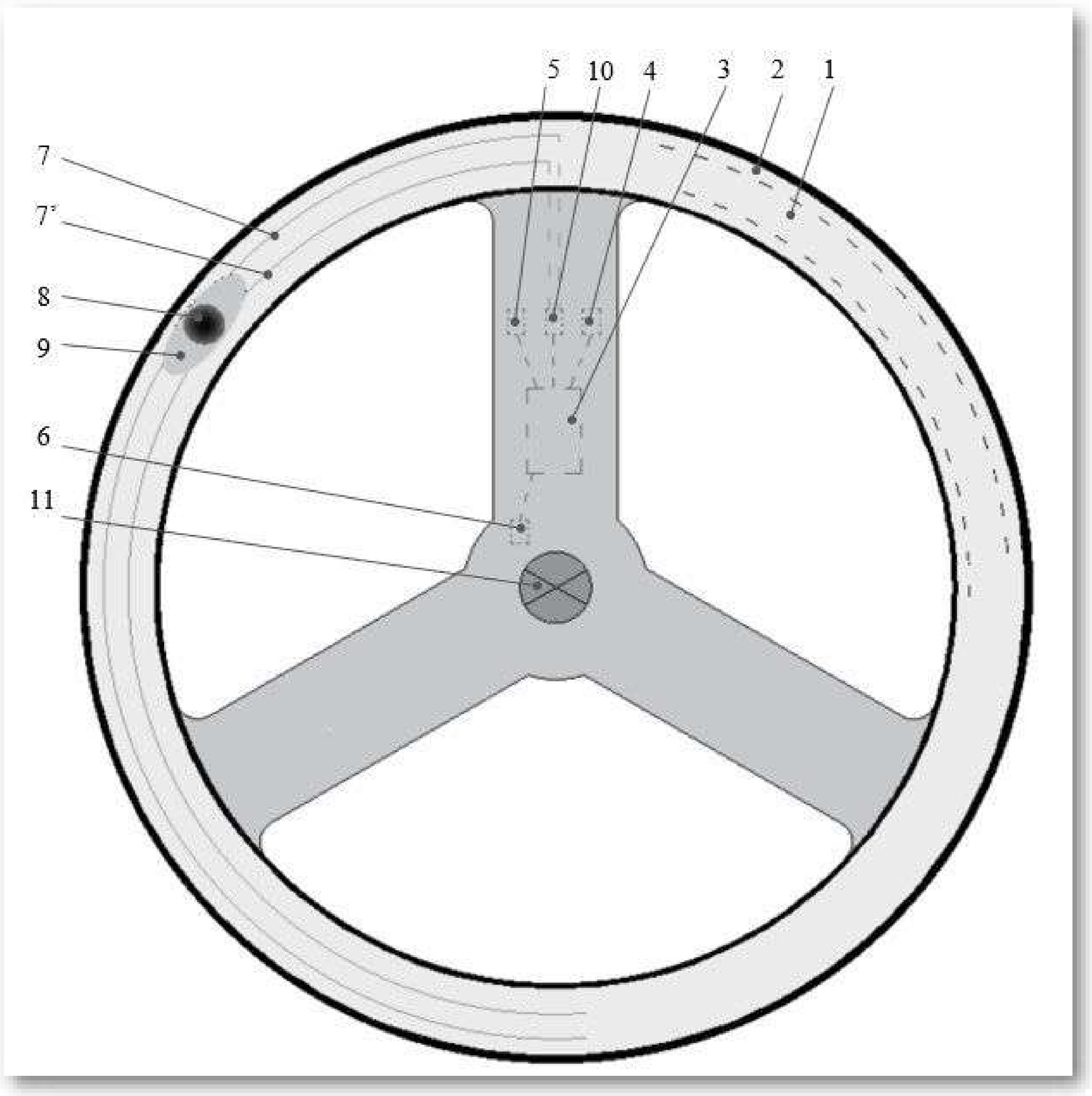
Automatic system for monitoring drivers' attention

Patent Application

Author/s: TOADER Eusebiu, PAVĂL Mihaela, MILICI Dan Laurenţiu, BOBRIC Crenguţa Elena, IRIMIA Daniela, VLAD Valentin, NIȚAN Ilie, GRAUR Adrian

D

The automatic system for monitoring the attention of drivers according to the invention consists of a system of two sensors for evaluating the electrodermal resistance (7) and (7 ') at the driver's hand, pulse (9), hand contact force and the steering wheel (8), the acceleration of the vehicle (4), the angular displacement of the steering wheel (5) and its vibrations (6), place on the steering wheel by means of a cover. The retrieved data is processed using a microcontroller procurement system that will determine if the position of the hands on the steering wheel is correct and if the driver's condition allows him to drive.



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Universitatea Ștefan cel Mare Suceava

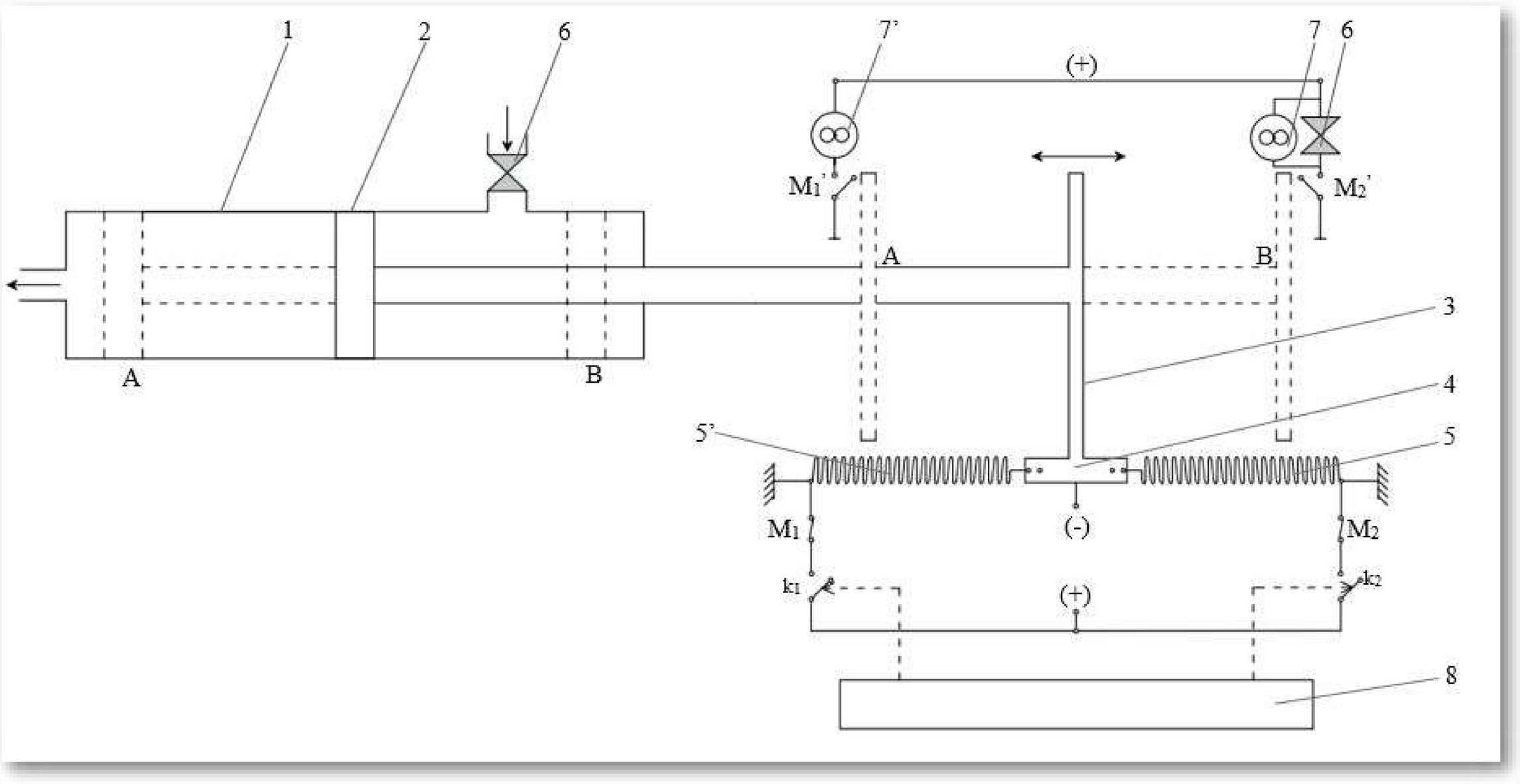
PUMPING SYSTEM

D

Patent Application

Author/s: TOADER Eusebiu, NIȚAN Ilie, PAVĂL Mihaela, MILICI Dan Laurenţiu, CERNUȘCĂ Dumitru, MILICI Mariana Rodica, GRAUR Adrian, DIMIAN Mihai, UNGUREANU Constantin

The pumping system according to the invention consists of a cylindrical container (1), provided with a piston (2) which is moved by means of a rod (3) terminated with a T-shaped profile, provided at the lower end with a support (4) fixing two nitinol springs (5) and (5 '), and the upper part of the rod profile (3) acts at the ends of the stroke the double microcontacts (M1), (M1') and (M2) respectively , (M2'), which controls the closing and opening of the electrovalve (6), the fans (7) and (7') and disconnects the heating circuits of the nitinol springs (5) and (5') controlled alternately by the relay contacts (k1) and (k2) by means of a microcontroller (8).



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WASTE PLASTIC RECYCLING PLANT

Patent/project number: 19215(1201800492)

Author/s: WAM ELVIS MBVIUGEH

D

This invention is aimed at cleaning the environment and the ecosystem for sustainable agriculture and used for the production of construction materials like tar oils, (asphalt and Bitumen) roofing tiles, insulators for floors and walls, damp proof course materials, electric poles, culverts, gutters, road sign posts and steam with Improvements of using the steam to generate electrical energy and to recover bio fuel.

The main aim is transforming waste plastics and metals into useful products and used as an apparatus for fast cooking and to facilitate the cracking of stones for masonry works. This creation will greatly help Africans for the protection of the environment for other generations, substantial agriculture and improve on soil fertility against famine. The author laid down some principles which richly increased the performance of the invention. The study of the thermodynamics, observation and experiments with the ancient style forging apparatus which in my mother's tongue is called ALAM.

*The study of electronic components and tele-mechanique control systems helped the Author to deign a **rectifier circuit** on the **control panel**, which is the magical power to cut down the consumption of the machine during operation; that is from 220v to 12v-24v and permits the plant to be able to operate with solar plant and less consumption.*

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ALEX's MOTORCYCLES

D

Author: Alex SZEKELY

Classic motorcycles are an exciting hobby for many enthusiasts, this activity involves the search, restoration and preservation of old and rare motorcycles, often for display in private collections or at specialist events. For enthusiasts, every motorcycle is a story and a piece of motoring history, and the restoration process is a way to bring those stories to life and preserve them for future generations.

Hunedoara Classic Car Club is a passionate and dedicated group of classic car collectors and enthusiasts from Hunedoara County, Romania. Founded with the aim of promoting and preserving the historic automotive heritage, this club gathers around it lovers of vintage cars from different eras and brands. Club members are actively involved in the restoration and maintenance of their cars, attending local, national and international events to share their passion with other enthusiasts and promote classic car culture. The club serves as a meeting place to exchange ideas, experiences and advice related to restoration and maintenance, and encourages socialization and friendship among its members, thereby strengthening the community of classic car enthusiasts in the region.

SCAN ME

Contact: *classiccarhunedoara@yahoo.com*

Motorsports my passion

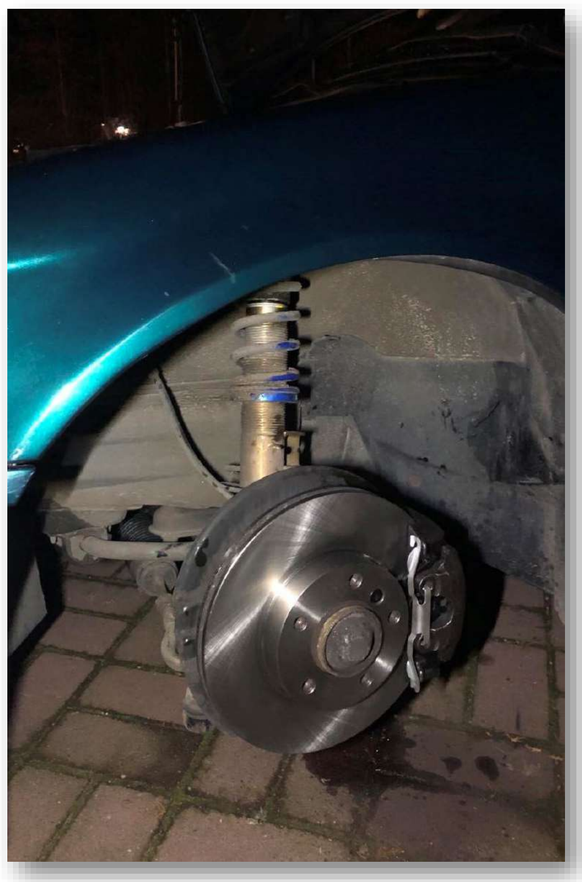
Student project

Author: Ovidiu Tudor Ioan OPREA

Mentor: Prof. Corneliu BIRTOK-BANEASA

D

This study presents the evolution of my racecar project, a 1997 Bmw 3 Series Saloon, that started its life as a basic 4 cylinder 1.6 sedan. I got this specific chassis thanks to its results in the Super Touring races back in 1993 to 1995 – Super Touring, Class II or Class 2 was a motor racing Touring Cars category defined by the Federation Internationale de l'Automobile (FIA) for national touring car racing in 1993. It was based on the "2 litre Touring Car Formula " created for the British Touring Car Championship (BTCC) in 1990. The FIA organised a World Cup for the category each year from 1993 to 1995,and adopted the term "Super Tourer" from 1995. The car in cause was running a stroked M42 2.0 that used to be a 1.8 from the factory , running 320 naturally aspirated horsepower on a 1250kg chassis.



My project is using the same suspension setup like the Super Touring E36, received a M42 swap, lighter flywheel , 286 mm braking setup from the 328i E36, lighter 17-inch Oz Racing Superturismo Rims , front and rear strut bars , 3 spoke RRS Racing Wheel, Sparco Bucket Seat and a Short Shifter.

Future plans with my project? As the title says, I want it to look like a Racing car that was used 30 years ago in the Super Touring races and perform like one.

How do I intend to use my project and where? Currently I have been to few open trackdays to learn my car better and learn to perform better as a driver, my latest and first competition was a local one named Cupa Caprioara II this autumn, where I was able to secure the first place on the podium, there is more competitions to come in the future!

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Octavian's MOTORCYCLES

Author: Orz Octavian

D

Classic motorcycles are an exciting hobby for many enthusiasts, this activity involves the search, restoration and preservation of old and rare motorcycles, often for display in private collections or at specialist events. For enthusiasts, every motorcycle is a story and a piece of motoring history, and the restoration process is a way to bring those stories to life and preserve them for future generations.

Hunedoara Classic Car Club is a passionate and dedicated group of classic car collectors and enthusiasts from Hunedoara County, Romania. Founded with the aim of promoting and preserving the historic automotive heritage, this club gathers around it lovers of vintage cars from different eras and brands. Club members are actively involved in the restoration and maintenance of their cars, attending local, national and international events to share their passion with other enthusiasts and promote classic car culture. The club serves as a meeting place to exchange ideas, experiences and advice related to restoration and maintenance, and encourages socialization and friendship among its members, thereby strengthening the community of classic car enthusiasts in the region.

SCAN ME

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HYBRID-ARCHITECTURE MECANUM WHEEL WITH INDEPENDENTLY ACTUATED ROLLERS

Category D

Scientific Research Project

Authors:

Student Emanuel BALC, Professor Aurel Mihail TITU, Ph.D Student Daniel BALC

DESCRIPTION

In practice, we encounter the following problems:

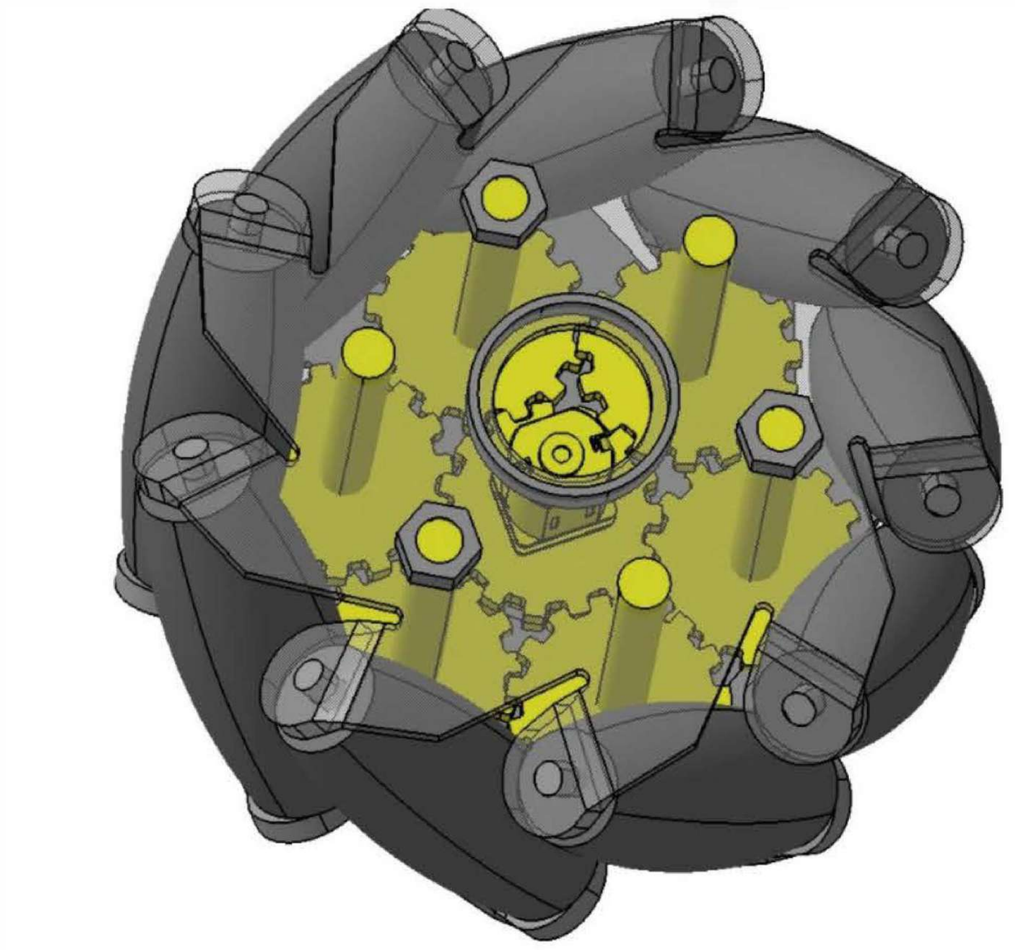
Lack of Active Traction Control at Roller Level
Conventional Mecanum wheels rely on passive rollers that rotate freely without any independent actuation. While this allows for omnidirectional movement, it also limits the ability to manage traction dynamically at each contact point with the ground. In environments with uneven grip — such as mixed surfaces (e.g., one wheel on asphalt, another on sand or wet tiles) — the inability to modulate traction per roller leads to inconsistent motion, slippage, or loss of directional control. Active control at the roller level would allow the system to respond more intelligently to such variations, improving overall traction and stability.

Limitations in Precision Maneuvers and Active Stabilization
Without active roller control, Mecanum wheels cannot perform complex maneuvers such as automatic slip compensation, platform stabilization, or dynamic adaptation to local obstacles.

Energy Inefficiency Under Variable Loads
Passive rollers only serve as intermediaries for movement; they do not actively contribute to propulsion. This puts the full burden on the main drive motors, especially when navigating terrain with resistance variations or when carrying uneven loads. As a result, the motors must exert more effort to maintain motion, leading to higher energy consumption and increased mechanical stress. Over time, this not only reduces operational efficiency but also accelerates wear on the drivetrain and decreases the overall lifespan of the system. Introducing actuated rollers would distribute effort more evenly and allow for energy optimization based on real-time load conditions.

THE PROPOSED SOLUTION

This Mecanum wheel represents a significant technological advancement by integrating an independent actuation system for the peripheral rollers. In traditional configurations, Mecanum wheel rollers are passive, rotating freely as the main wheel spins. In this hybrid wheel, each roller is equipped with its own actuation system, powered by a dedicated DC micro-motor capable of independently controlling the roller's speed and direction of rotation.



RESULTS AND DISCUSSIONS:

Active Traction Control at Each Roller
Enables real-time adjustment of traction force based on local surface conditions, improving stability and preventing slippage.

Advanced Maneuverability and Increased Precision
The platform can perform fine adjustments during motion, including active stabilization, slip compensation, and precise movements in complex environments.

Improved Energy Efficiency
Sharing the load between the actuated rollers and main drive motors reduces system strain, lowers energy consumption, and optimizes overall performance.

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Internal

MECANUM WHEEL WITH INDIVIDUAL FLEXRING-EQUIPPED ROLLERS FOR VIBRATION DAMPING AND ENHANCED STABILITY

Category D

Scientific Research Project

Authors:

Ph.D. Student Daniel BALC, Professor Aurel Mihail TITU, Student Emanuel BALC

DESCRIPTION

In practice, we encounter the following problems:

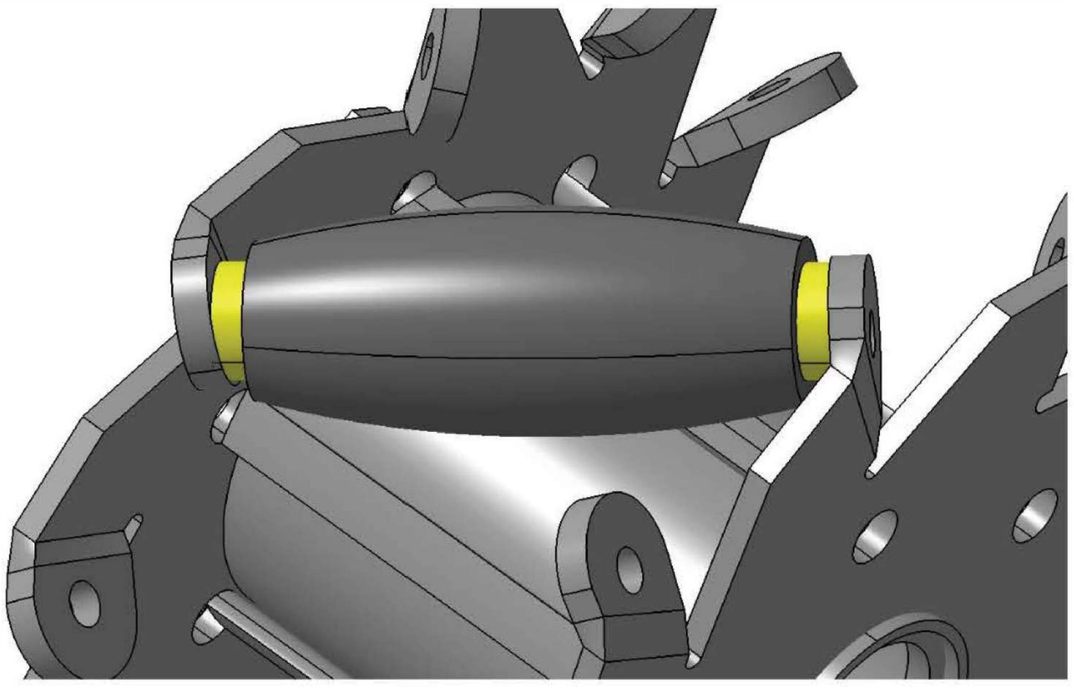
Excessive Vibrations During Movement
On hard surfaces (such as concrete or metal) and uneven terrain, Mecanum wheels make intermittent contact with the ground, as each roller touches the surface one at a time. This discontinuous interaction generates constant vibrations that propagate throughout the entire mobile platform. In applications that require smooth motion

Direct Transmission of Shocks to the Structure and Electronics
Without a damping system at the roller level, mechanical shocks and vibrations caused by ground contact are transmitted directly to the vehicle's supporting structure. This can negatively impact the lifespan of electronic components (such as motherboards, microcontrollers, or sensors) and may lead to malfunctions caused by high-frequency vibrations. In autonomous systems, these shocks can destabilize control and navigation algorithms.

Accelerated Wear of Components
Constant exposure to vibrations, shocks, and irregular dynamic loads has a cumulative effect on the mechanical components of the wheel. The rollers, bearings, and mounting points experience premature wear, especially when operating frequently on hard or uneven surfaces. This results in more frequent repairs or replacements, increased maintenance time, and higher operating costs. In industrial or commercial environments where reliability is critical, this becomes a major concern.

THE PROPOSED SOLUTION

This Mecanum wheel incorporates a damping component, based on the use of flexrings mounted on each individual roller. Flexrings are flexible structures that absorb vibrations generated by the rollers' contact with the rolling surface. This adaptation brings multiple benefits, especially for precision applications such as industrial robots or autonomous vehicles operating in vibration-prone environments or on uneven surfaces.



RESULTS AND DISCUSSIONS:

Significant Vibration Reduction
Rollers equipped with flexible rings (Flexring) absorb localized shocks upon ground contact, resulting in smoother and quieter movement.

Extended Lifespan of Wheels and Components
By reducing mechanical shocks, wear on rollers, bearings, and mounting systems is minimized, lowering the frequency of repairs.

Reduced Operational Noise
The more elastic contact with the ground leads to quieter operation — a key advantage in indoor environments, public spaces, or low-noise applications.

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Internal

MODULAR MECANUM WHEEL ASSEMBLY OPTIMIZED FOR TRACTION ON SANDY AND UNSTABLE SURFACES

Category D

Scientific Research Project

Authors:

Professor Aurel Mihail TITU, Ph.D. Student Daniel BALC, Student Emanuel BALC

DESCRIPTION

In practice, we encounter the following problems:

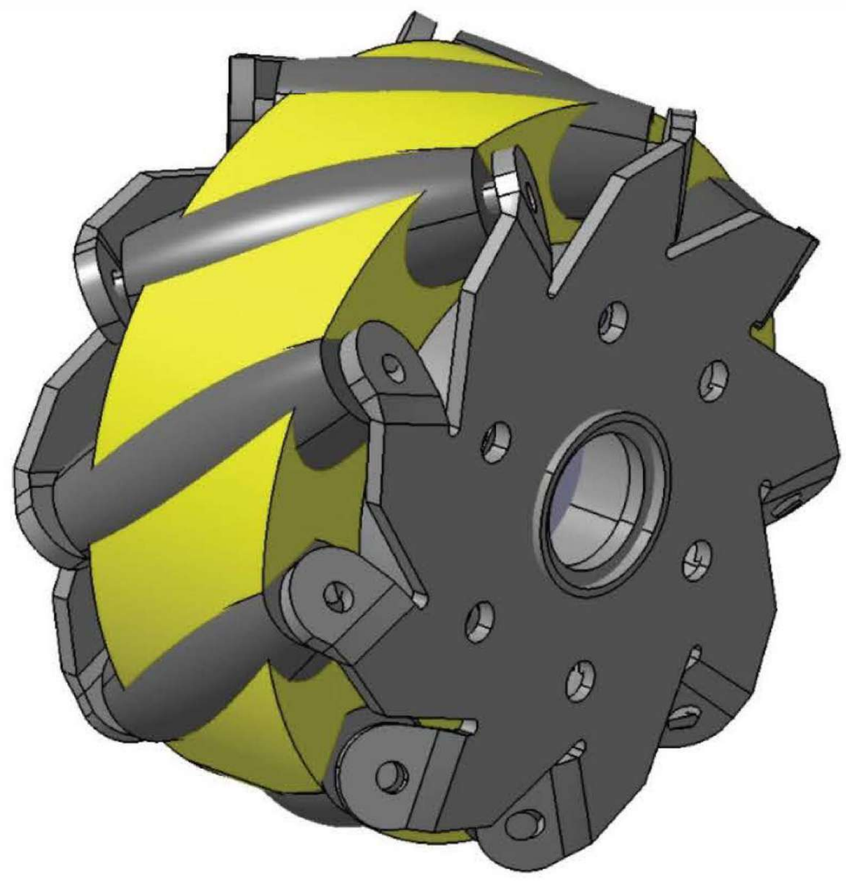
Difficulties in moving on unstable surfaces
Vehicles equipped with Mecanum wheels face significant challenges on surfaces such as sand, gravel, or soft soil. These terrains do not provide firm support, leading to traction loss and difficulties in maintaining the desired direction. Omnidirectional mobility, a major advantage of Mecanum wheels on hard surfaces, becomes inefficient when ground contact is unstable.

Sinking and slipping
Traditional Mecanum wheels do not distribute weight efficiently on soft surfaces, causing them to sink into sand or unstable soil. Additionally, standard rollers do not maintain optimal contact with the terrain, leading to slipping and significantly reducing traction. These issues affect the vehicle's ability to move forward and require greater energy consumption to compensate for the loss of grip.

Limited mobility in off-road environments
Mecanum wheels are designed for flat and hard surfaces, and their performance decreases drastically on rough terrain. Movement becomes unpredictable, and vehicle control is challenging, especially when turning or making lateral movements. This limitation reduces the applicability of Mecanum wheels in off-road applications, autonomous exploration, or intervention vehicles operating in difficult environments.

THE PROPOSED SOLUTION

This modular Mecanum wheel is specifically designed to ensure advanced mobility on low-traction surfaces or terrains that are traditionally challenging for this type of wheels, such as sand, gravel, or soft surfaces. Its modular design allows for rapid configuration and adaptation of individual components, providing a flexible solution for off-road applications or operations in difficult environments. Each roller is built using materials optimized for effective contact with sandy surfaces, featuring a profile that maximizes the contact area while minimizing sinking.



RESULTS AND DISCUSSIONS:

Improved Traction – Less slipping on sand, gravel, and soft soil, ensuring stable and efficient movement.

Reduced Sinking – Optimized weight distribution and roller design prevent sinking and traction loss.

Energy Efficiency – Better traction reduces energy consumption and optimizes directional control.

Adaptability & Durability – Modular design for various terrains, durable materials for long-term use.

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UNIVERSITATEA LUCIAN BLAGA DIN SIBIU

Autonomous parking drone

Scientific Research Project

Authors: Student Armăsăreanu Adrian
Student Graur Robert-Vasile
Student Șerb Radu Ioan
Coordinator: Professor Aurel Mihail ȚÎȚU

DESCRIPTION:

The project aims to develop a car-integrated robotic system capable of automatically identifying and occupying a parking space, reducing time and stress for drivers in congested areas. The idea started from the fact that in crowded cities it can be difficult to find a parking space. The autonomous parking drone is a small and efficient robotic system that can be integrated into a car and is automatically activated when the driver arrives in a high-traffic area or a large parking lot.

Components:

Technical components include LIDAR sensors, GPS, 3D cameras, artificial intelligence algorithms for navigation and an efficient power system. The operating mechanism involves launching the drone from the car, searching for an empty space, assisting the car to park autonomously and returning to the vehicle.

Advantages and Disadvantages:

Advantages include reducing pollution and optimizing parking space, but there are technical challenges such as safety, battery range and weather conditions.
Implementation involves three phases: hardware design, software development, prototype testing and improvements based on the results.
Disadvantages include high costs, legal limits and autonomy, but these can be addressed in future versions of the product. In the future we also want to collaborate with shopping malls or airports to make it easier to find parking spaces in their parking lots.

Implementation Plan:

Phase 1: Research and development
Identification of the required technological components. Develop an algorithm for parking space recognition.

Phase 2: Prototyping
Build the drone prototype and test functionality. Integration of the drone with the vehicle.

Phase 3: Testing
Validation of effectiveness under real conditions.

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Ministry of Education and Research

UNIVERSITATEA LUCIAN BLAGA DIN SIBIU

Rim-integrated sensors for curb detection

Scientific Research Project
Authors: Student Bălan Cătălin, Student Croitoru Bogdan, Student Mesia Radu
Coordinator: Professor Aurel Mihail ȚÎȚU,

DESCRIPTION:

Sensors integrated into a car's wheels to detect curbs are an innovation designed to help drivers avoid accidental collisions with the edge of the sidewalk or other obstacles. These sensors are placed on the wheels, providing more efficient coverage of the lower area, where curbs are harder to detect with traditional sensors in the bumper or side cameras.

They work using various technologies, such as ultrasound, radar, or optical cameras. Ultrasonic sensors emit signals that reflect off objects, helping measure the distance to curbs. Radar, on the other hand, uses electromagnetic waves to detect obstacles over greater distances and in unfavorable weather conditions. Optical sensors use cameras to analyze the surrounding environment and identify the edge of the road.

This technology helps prevent accidents by providing the driver with precise, timely information about objects near the wheels..

ADVANTAGES:

1. Improved Safety: Sensors provide real-time feedback to the driver, helping to prevent collisions with curbs, especially in tight parking spaces or when maneuvering in narrow areas.

2. Increased Convenience: By reducing the risk of scraping the wheels or damaging the car, the system saves time and money on repairs. It also reduces the stress of parking or driving in tricky situations.

3. Weather Resistance: Technologies like radar and ultrasound work well in various weather conditions (such as rain, fog, or snow), where optical sensors might struggle.

4. Integration with Other Systems: These sensors can be combined with other vehicle systems, like automatic braking or parking assist, to provide a comprehensive safety solution.

DISADVANTAGE:

1. Increased Cost: Adding additional sensors to the wheels may increase the overall cost of the vehicle, both in terms of initial purchase price and potential repair costs if the sensors are damaged.

2. Requires calibration and maintenance: May require reconfiguration after changing tires or after replacement.

3. Limited battery life: Most sensors operate on batteries that have a lifespan of about 5-10 years, after which they need to be replaced.

4. Risk of damage – When mounting and dismounting tires, the sensors can be accidentally damaged or even destroyed.

RESULTS AND DISCUSSIONS:

Sensors integrated into a car's wheels represent a significant step towards state-of-the-art automotive technology, having a major impact on driver safety and comfort.

They offer an innovative solution for preventing accidents in parking lots and maneuvering in confined spaces, by constantly monitoring the distance to obstacles and signaling them in a discreet and effective way.

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Vice-President of Romanian Association for Nonconventional Technologies Romania;
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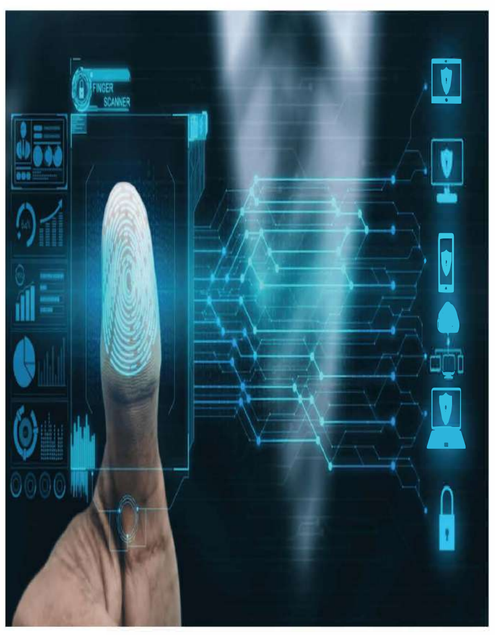
Ministry of Education and Research

FingerPay

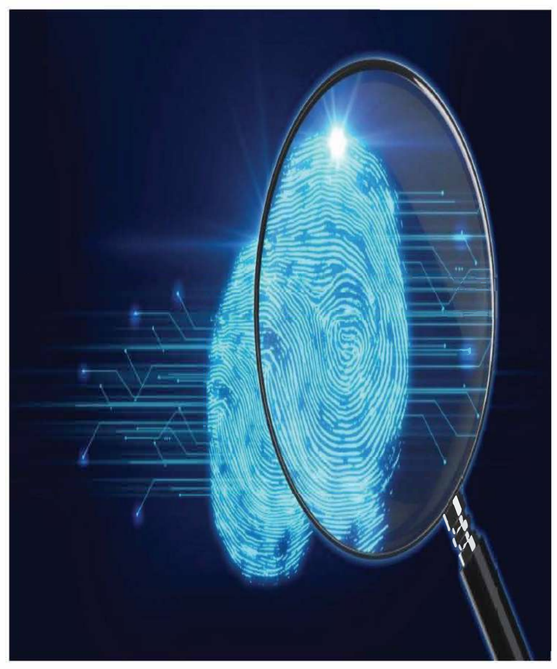
Scientific Research Project

Authors: Student Bănățeanu Ion-Dumitru,
Student Banu Constantin Gabriel,
Student Carstica Sebastian Alexandru,
Student Doda Gabriel-Horațiu
Student Badiu Dumitru
Coordinator: Professor Aurel Mihail ȚÎȚU,

DESCRIPTION:



FingerPay is an advanced and innovative payment method based on fingerprint recognition technology, offering a fast and highly secure way to authorize financial transactions. Essentially, this system eliminates the need for bank cards, passwords, or other traditional authentication methods, replacing them with a biometric method unique to each user: the fingerprint.



ADVANTAGES:

Increased Security – Using fingerprint authentication adds an extra layer of security since fingerprints are unique to each individual.

Speed – Transactions are completed quickly without the need to enter a PIN or other details.

Convenience – Users no longer need to remember passwords or carry physical cards.

FingerPay is used in various industries, from retail to financial services, and is becoming increasingly popular as technology advances. If you need more details or specific information, feel free to ask!

FIELDS OF APPLICATION:

Retail & Commerce – Fast payments in supermarkets, stores, and gas stations without cash or cards.
Restaurants & Cafés – Direct POS payments without a wallet or phone.
Public Transport – Quick access to buses, trains, or subways without physical tickets.
Events & Festivals – Authentication and payment at booths without long queues.
Healthcare & Pharmacies – Secure authentication and medication purchases without a bank card.
Corporate & Secure Access – Payments in company cafeterias or controlled access to buildings.

RESULTS AND DISCUSSIONS:

FingerPay, as an innovative biometric payment solution, holds great potential in enhancing both security and user experience in the digital payment ecosystem. However, challenges such as infrastructure limitations, adoption barriers, and privacy concerns need to be addressed in order to ensure its widespread success. Future research and development will play a crucial role in refining the system and expanding its applicability across various demographics and regions.

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Internal

Compressed air engine

Authors: Trușcă Darius Ciprian, Vida Andrei Valentin,
Cărăban Robert Fabian, Lup Lucian, Dumitras Alina Lucretia

D

A homemade air engine is a device that uses the energy of compressed air to generate mechanical motion. This type of engine can be made from readily available materials, using recycled parts, or hand-crafted components.

Operating Principle

The engine operates on the basis of the expansion of compressed air, which is stored in a tank and released in a controlled manner to drive a piston or rotor. The energy of the compressed air is converted into mechanical work, similar to heat engines, but without the combustion of fuel.

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ELECTRIC CAR MODEL

Authors: Lup Lucian, Dumitras Alina Lucretia

D

It is a small-scale reproduction of an electric vehicle, made for educational purposes. It is constructed from various materials and includes a functional electric propulsion system.

Main components of the model

Chassis and body – Made of plastic, wood, metal or composite materials, providing support and structure.

Electric motor – A small direct current (DC) motor, taken from electric toys or similar devices.

Transmission system – Includes gears or belts to transmit the motor's motion to the wheels.

Battery – The power source, a Li-ion battery.

Speed controller – The module that regulates the power to the motor.

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ELECTRIC VEHICLE CHARGING NETWORK AND ADMINISTRATION

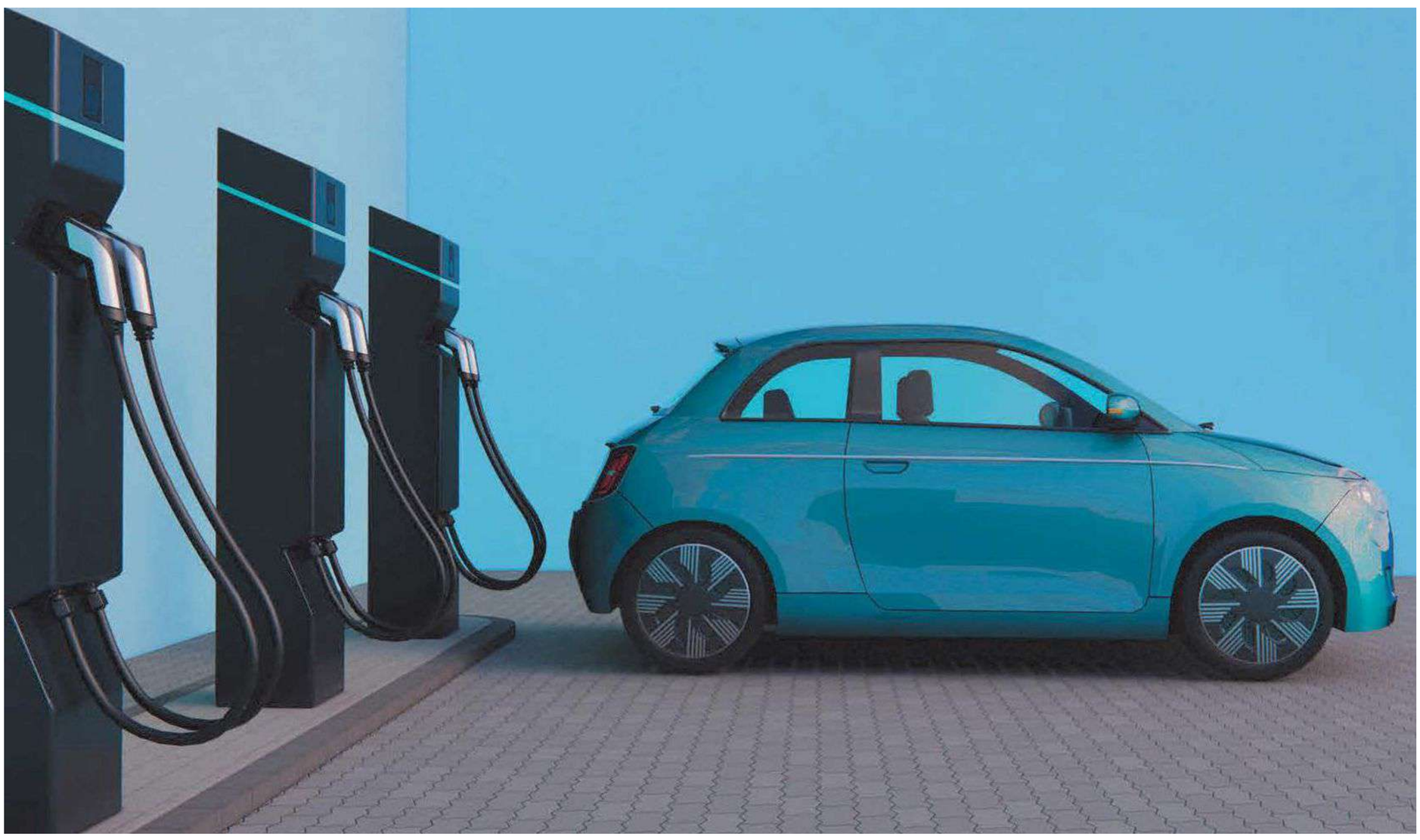
D

Author: Smart Business & Technologies Solutions SRL

The complete solution for electric charging infrastructure. We are pioneers in electric charging infrastructure, with over 10 years of experience. Since 2014, we have built an extensive network of charging stations, serving over 50,000 users and facilitating the charging of over 20 GWh of energy, of which over 70% comes from renewable sources." Focus on sustainable and environmental growth Pioneers in the field, VOL TRELLI, powered by EV connect is a Romanian company with experience in developing and implementing complete charging solutions for electric vehicles. With an active presence on the Romanian market since 2014, we offer innovative and scalable solutions.

Since the first stations installed in 2014, VOLTRELLI, powered by EVconnect has experienced impressive growth, reaching over 50,000 users who have charged over 20 GWh of renewable energy.

Today, we are a global leader in electric charging solutions, with a significant presence in Europe, the Middle East and Latin America: Romania, the United Arab Emirates, Jordan, Saudi Arabia, Montenegro, Germany, Spain, France, Hungary, Bulgaria, Slovenia, the Netherlands, LATAM (Peru, Chile, Colombia).



SCAN ME

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OPTIMIZATION OF TECHNOLOGICAL PROCESSING BY CUTTING THROUGH USING THE GPS WALTER APPLICATION: ANALYSIS AND IMPLEMENTATION IN THE CONTEXT OF MECHANICAL PROCESSING

Scientific research contract: no.9 /04.06.2024

Author/s: Constanța Rădulescu, Ștefan Sorinel Ghimișî, Alin Stăncioiu, Nicoleta-Maria Mihuț, Aurora Cătălina Ianăși, Alin Nioață, Elena Loredana Stăncioiu

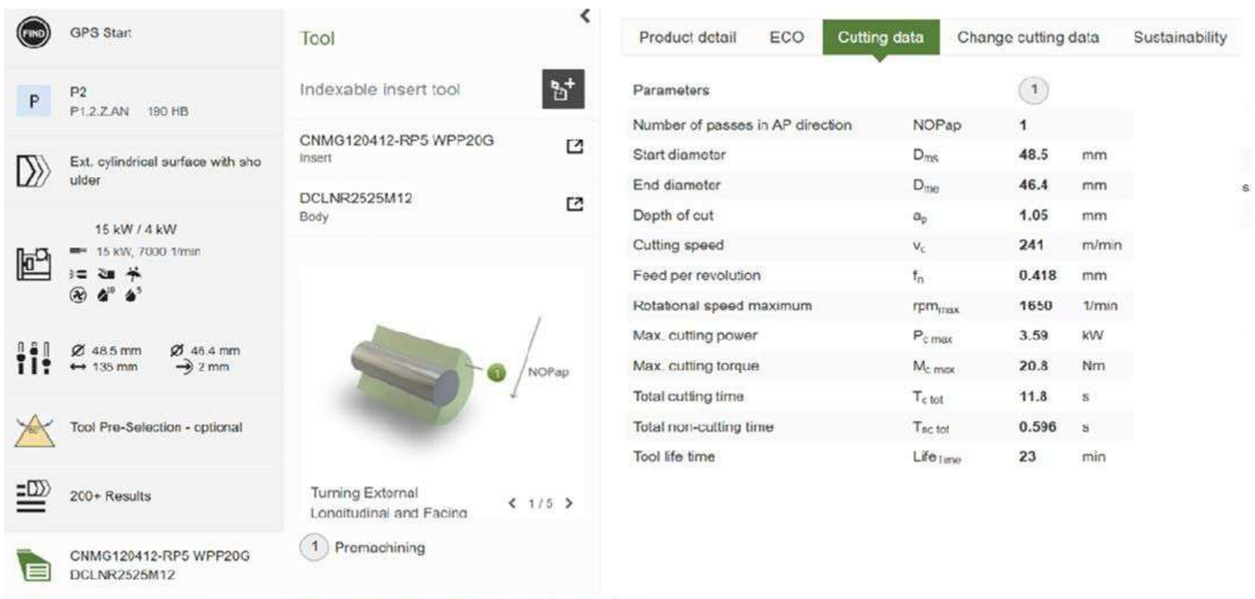
D

The general objective of the research project was to analyze and implement the Walter GPS application in machining processes, in order to increase their efficiency and productivity. The project aimed to identify and apply the most efficient technological solutions for optimizing work parameters, such as: cutting speed, feed and depth of cut, reducing production time and tool wear. It also aimed to improve the quality of machined parts and reduce operating costs. As a case study of the use of the Walter GPS platform, in order to determine the cutting regimes, a "distribution shaft" type part was chosen for the mass production variant, the operations: roughing turning and finishing turning.

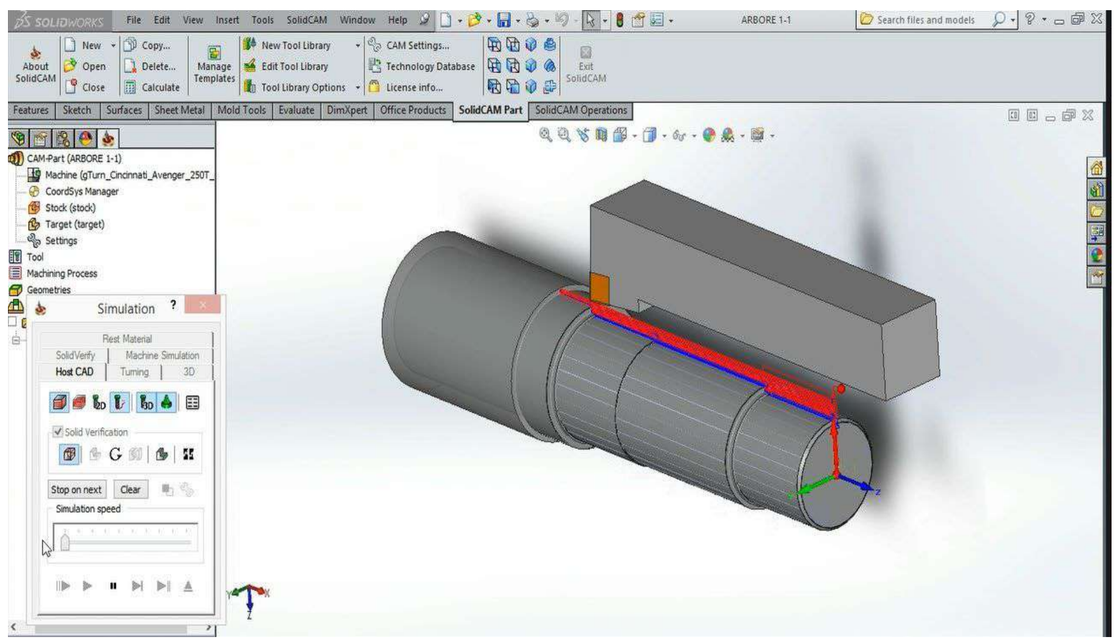
As a case study of the use of the Walter GPS platform, in order to determine the cutting modes, a "distribution shaft" type part was chosen for the mass production variant, the operations: roughing turning and finishing turning. The values obtained regarding the cutting modes were compared with the values obtained through the classical determination of the cutting modes (analytical method). Also, the part was drawn in SOLIDWORK, and then in SOLIDCAM the part processing simulation and the cutting tool trajectory tracking were performed, for a single variant.

In conclusion, the optimization of the machining process encompasses a wide range of aspects aimed not only at increasing productivity and reducing costs, but also at increasing the quality of the markets, safety, sustainability and durability of the machining process. The use of advanced technologies (e.g. simulation software, real-time monitoring, and applications for optimizing machining regimes) includes a crucial element in achieving these objectives.

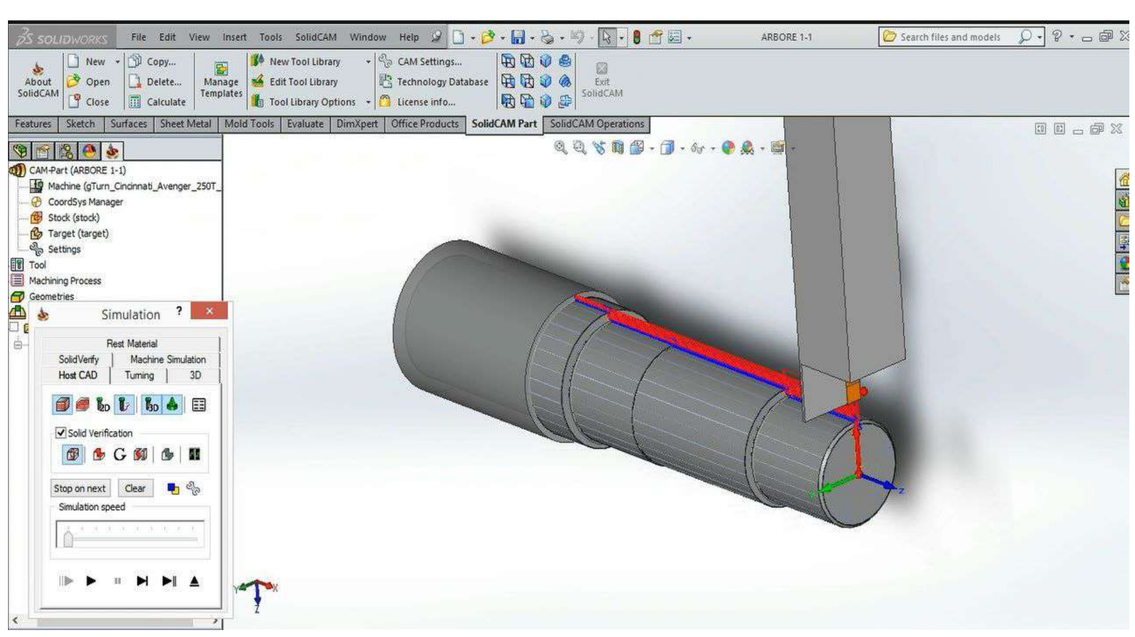
Pictures & graphics



The parameters of the cutting regime



Possibility of changing cutting parameters feed and speed with influence on insert durability



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OPTIMIZATION OF THE CNC PLASMA CUTTING PROCESS FOR COST REDUCTION AND IMPROVEMENT OF PERFORMANCE AND QUALITY

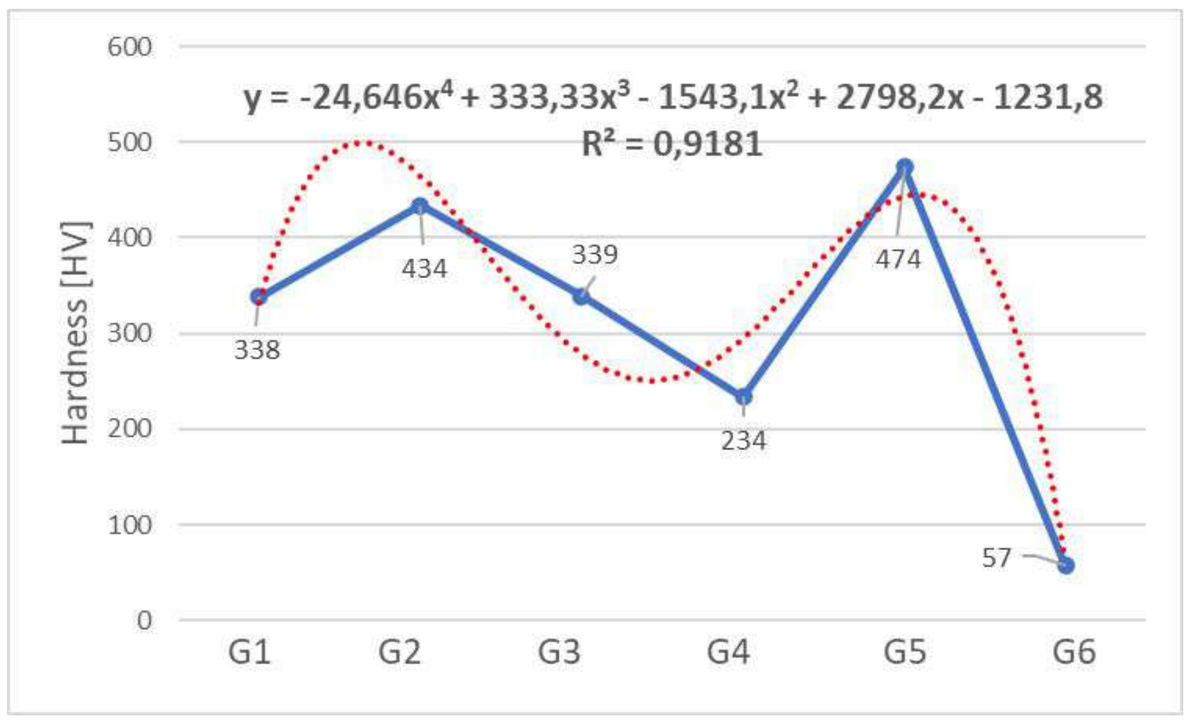
Scientific research contract: no.8 /04.06.2024

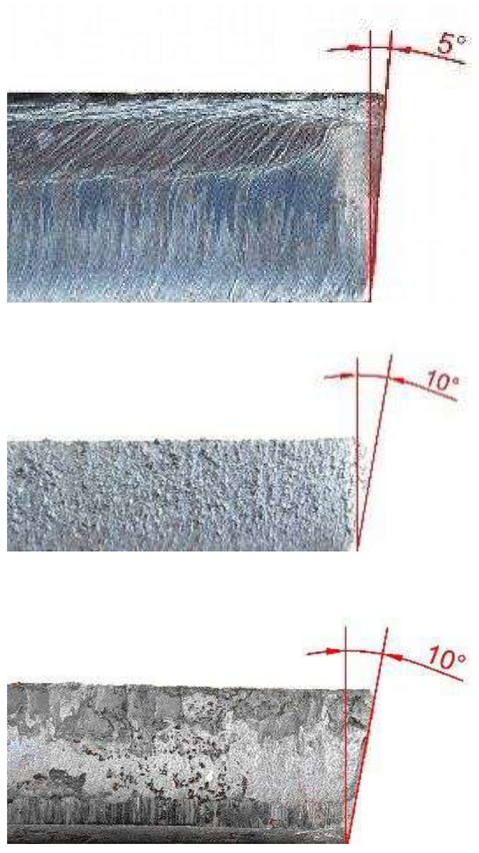
Author/s: Alin Stăncioiu, Ștefan Sorinel Ghimișı, Constanța Rădulescu, Nicoleta-Maria Mihuț, Aurora Cătălina Ianăși, Alin Nioață, Elena Loredana Stăncioiu

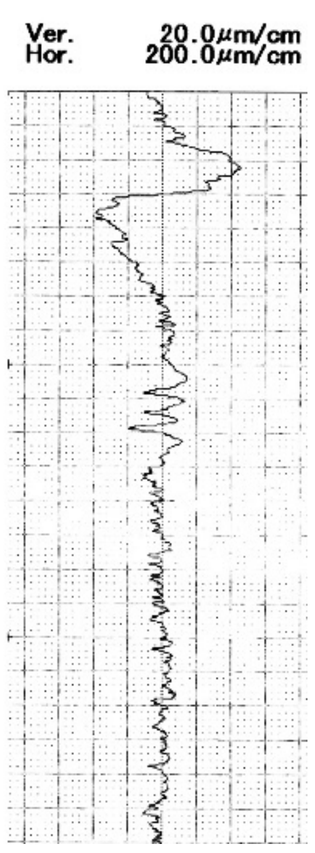
D

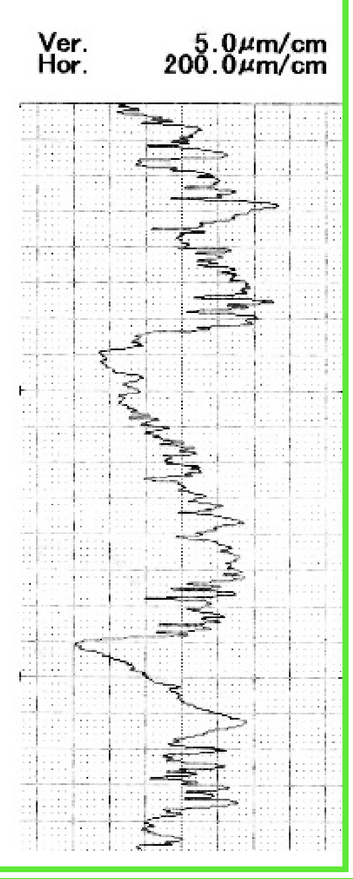
The paper analyzes the optimization of the CNC plasma cutting process to reduce costs, improve performance, and enhance the quality of machined parts. This technology enables fast and precise cuts on conductive materials such as steel and aluminum, but its efficiency depends on process parameters and proper equipment configuration. The selection and adjustment of cutting current, arc voltage, and gas type influence the thickness, speed, and quality of the cut. The distance between the nozzle and the material also plays a crucial role, determining the precision and final appearance of the piece. The plasma cutting process requires careful configuration and calibration of the CNC equipment, with each component directly impacting overall performance. Monitoring the wear of consumables such as nozzles and electrodes helps maintain cutting quality and extend the equipment's lifespan. Implementing advanced technologies for automatic parameter adjustment aids in process optimization and reduces material waste. Cost reduction is achievable by adjusting cutting speed and current, using alternative gases, and adopting more energy-efficient solutions. These measures not only lower operational expenses but also contribute to reducing environmental impact. Continuous equipment monitoring through predictive maintenance systems allows for defect prevention and minimizes downtime.Optimizing the CNC plasma cutting process is essential for achieving high-quality products, reducing costs, and increasing sustainability. By precisely adjusting parameters and utilizing modern equipment, an efficient, cost-effective, and environmentally friendly process can be ensured, meeting the demands of the modern industry.

Pictures & graphics









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EXPERIMENTAL STAND
BATTERY CHARGE DISCHARGE
VOLTAGE MONITOR

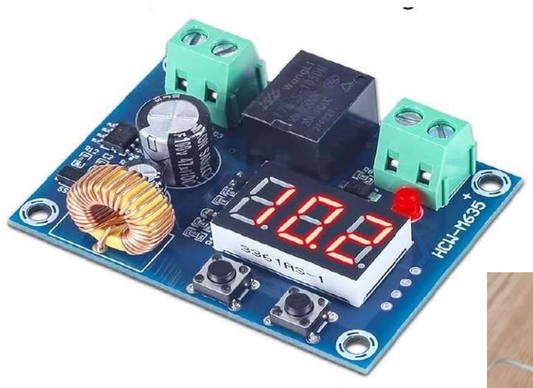
Student Project

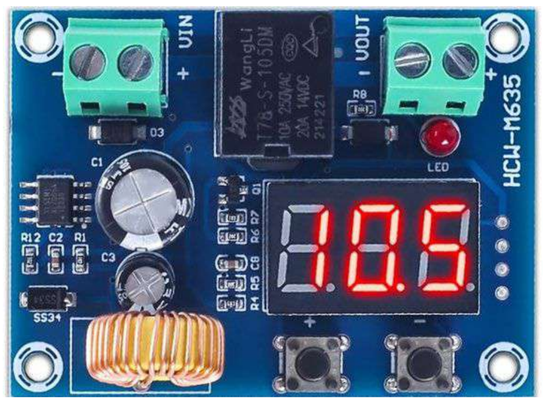
Authors: Iulian Nistor, Alexandru Rus

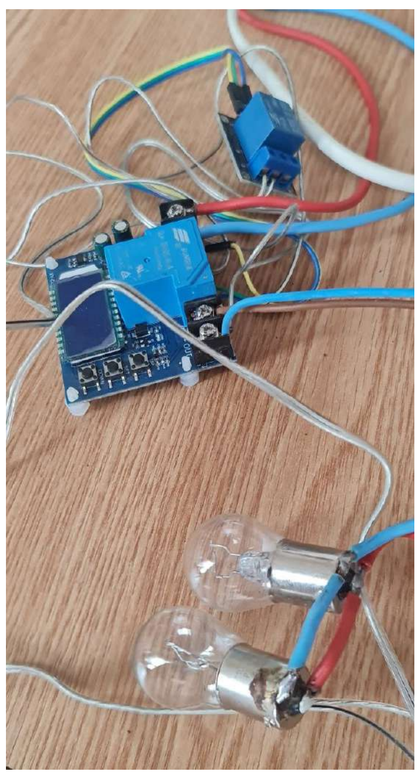
Mentor Corneliu Birtok Baneasa

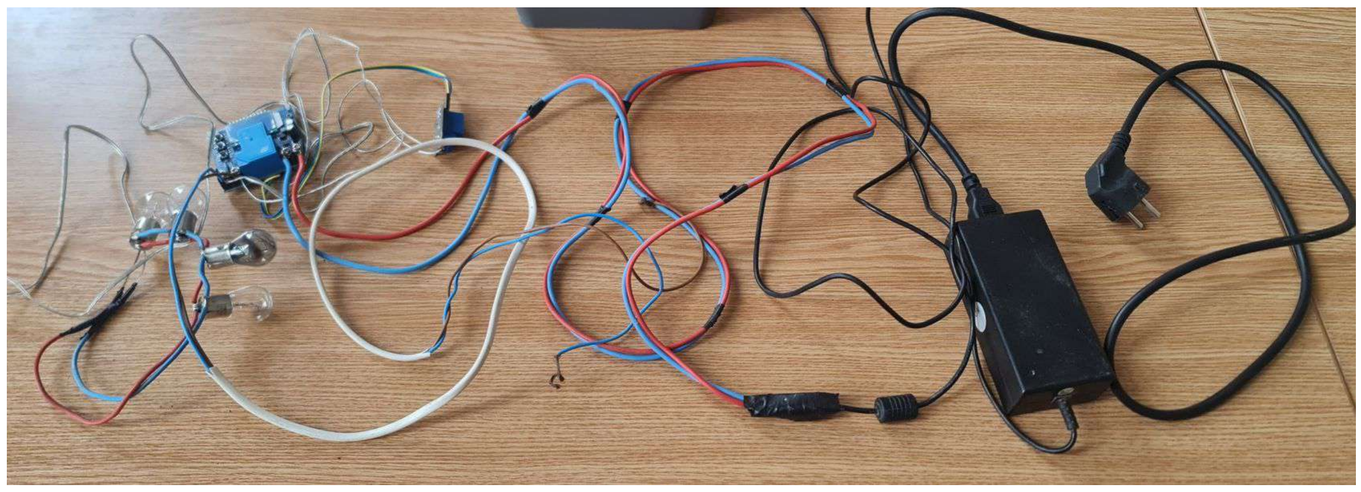
D

XY-CD63L is a DC 6V-60V 30A Battery Charge Discharge Voltage Monitor. It is a discharge protector when the battery is connected to the input terminals. It is a charge protector when the battery is connected to the output terminals. It can connect voltage from DC 6V-60V Battery and the input/output voltage are same. It can set battery discharge/charge voltage to prevent the battery from over-discharging/over-charging and causing damage. The output voltage can continue to provide voltage to the load when the battery charging voltage rises to the allowable discharge value. Therefore, it can effectively protect the service life of the battery and make the use of the battery safer and more reliable.









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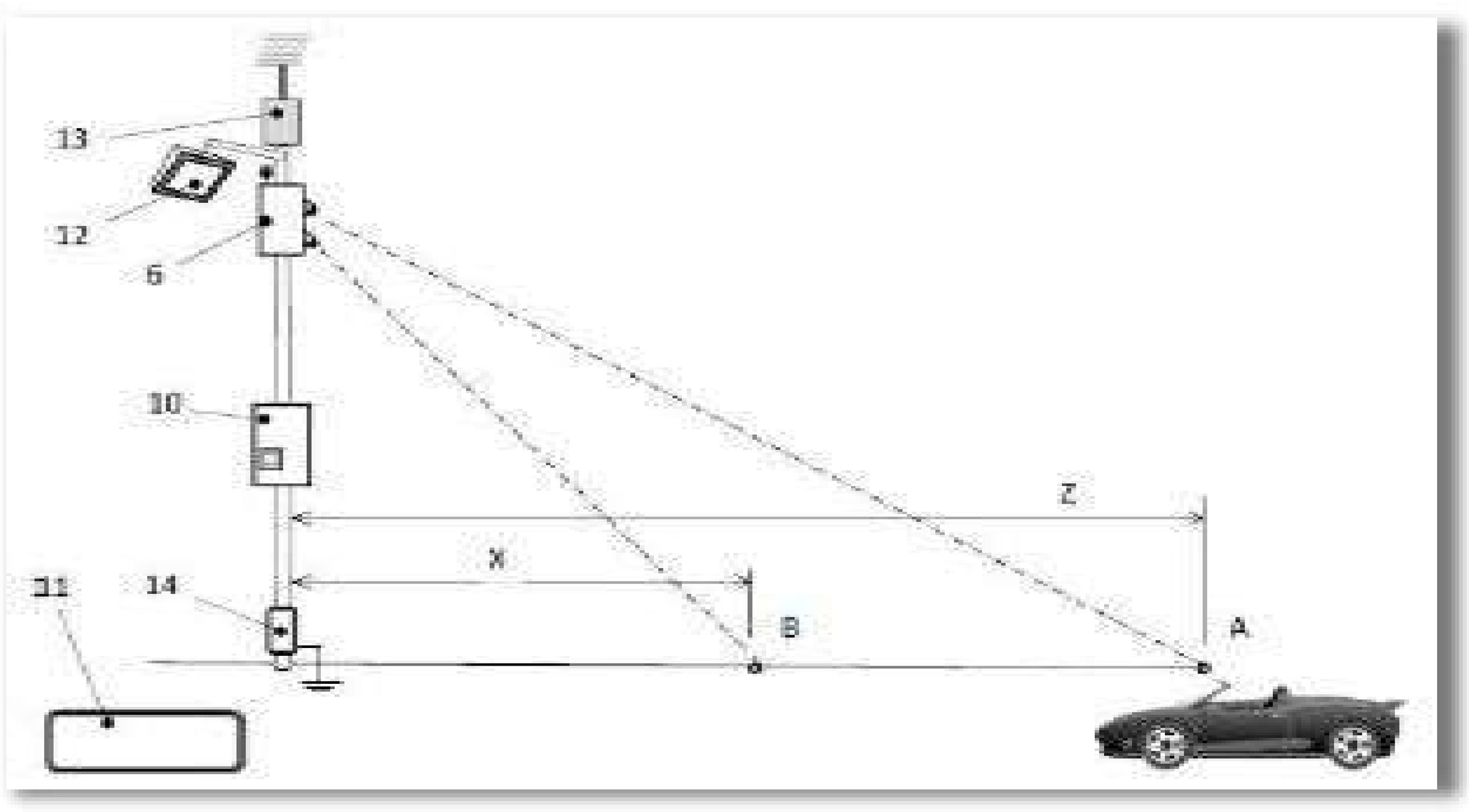
MONITORING SYSTEM FOR CONTROL OF VEHICLE SPEED LIMITS ON PUBLIC ROADS

Patent:*No. O.S.I.M.-A/00001/03.01.2024*

Authors: **Pavel Ştefan, Ungureanu Daniel-Viorel**

D

The invention refers to a fixed electrical system for preventing accidents caused by excessive speed on public road segments with vehicle speed restrictions.



ADVANTAGES:

Detects when a vehicle exceeds the allowed speed limit on a designated road segment and determines its actual speed.

It prevents the driver from exceeding the legal speed limit.

Verifies compliance with speed adjustment requests.

In case of noncompliance, it neutralises the vehicle's control system through an electromagnetic pulse, causing it to come to a stop.

It records, archives and transmits data via an internet connection to authorised authorities responsible for managing such situations.

The installation is energy self-sufficient.

The installation does not pollute the environment.

The generation of the electromagnetic pulse is automatically disabled when emergency vehicles (police, rescue, firefighters, military, government officials, etc.) pass through the designated area and are reactivated after their passage

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CNC TRAINING CENTER IMPLEMENTATION IN POLITEHNICA UNIVERSITY OF TIMISOARA

Authors: coordinator: Assoc. Prof. Ph.D. Adrian BUT
student: Marius CIOBANU

D

This Young people need to be motivated by demonstrating the relevance of manufacturing technology and in direct connection to the “Hi-Tech” systems, products and services which are essential to their way of life. In the paper is present the CNC(Computer Numerical Control) TRAINIG CENTER concepts concept and the results of the implementation in “POLITEHNICA” University of Timisoara, Romania. CNC Technology is the key technology which makes today’s manufacturing possible. Raise awareness of opportunities in manufacturing and motivate young people to become hi-technologists are the CNC trainig center concept who was develop in our technical education center, to operate and program the CNC machine tools.

Base on the collaboration between manufacturing department and automation and computer department of our university was possible to make the implementation of the CNC technology , who represent one application at the border between this two directions of specialization.

Using the competitive CNC training center, who was develop in our university, compose by one CAD/CAM laboratory, one simulator room where is made the CNC program simulation on CNC simulators equipments and one shop flour who is equip with the last generation of CNC machine tools, the students and the peoples from industrial companies who want to up great their skills, can project, program and execute high technological parts.

Using this “close system” is possible to learn, to optimize, to research every steps of the “technological life” of any product: projecting-programming-manufacturing, all this, assisted by the computer.

In the paper are present too, the results and the new directions what we intend to develop in academic area but in the same time, the collaboration with the industrial companies .

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CONCEPT OF A CNC PLASMA CUTTING MACHINE

Authors: coordinator: Assoc. Prof. Ph.D. Adrian BUT
student: Darius BUZATU

D

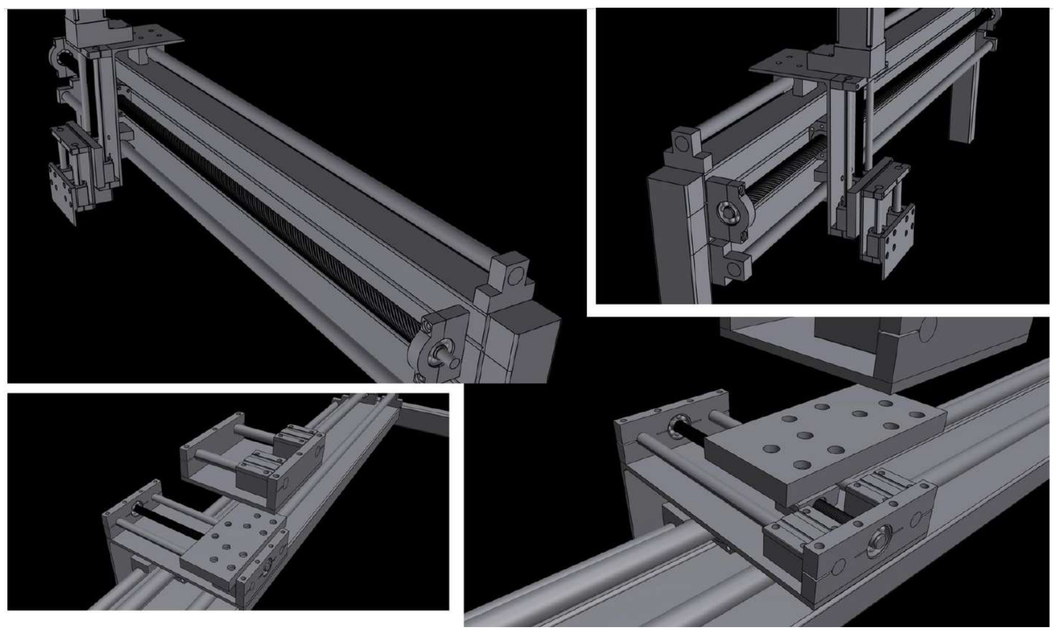
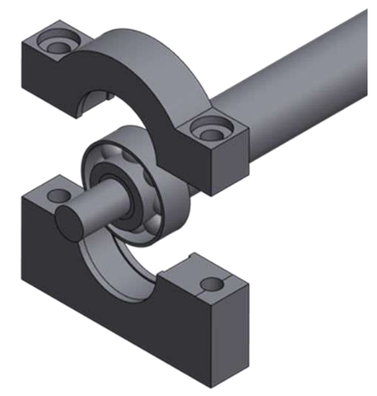
This project aimed to develop and implement a low-cost CNC system for precise plasma cutting, utilizing accessible components and DIY methods to create a practical solution for various machining tasks.

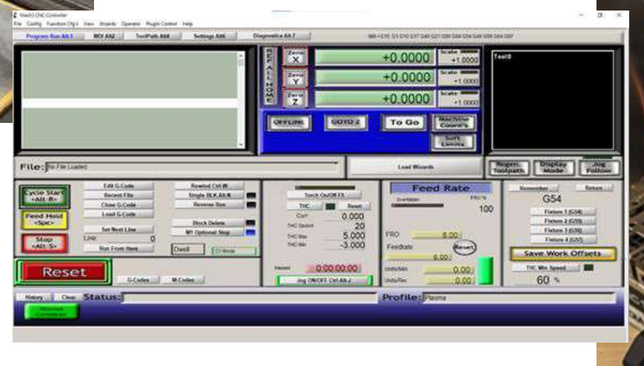
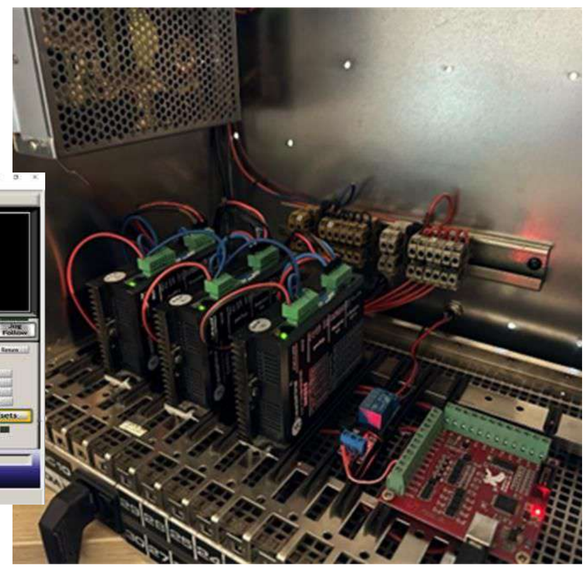
The CNC machine was built using sturdy rectangular tubing, designed and welded for optimal durability. Precision and stability were achieved with SBR 20 linear guides and SFU 2005 ball screws. Electronic components, including a BSMCE04U control board and Nema 42 stepper motors, were carefully integrated and calibrated to ensure smooth operation, with additional relays and limit switches for safety and functionality.

A key feature of this CNC is its compatibility with a 2.2 kW spindle, which expands its capabilities to include milling and other machining operations in various materials, adding versatility for a wide range of applications.

The construction process involved initial design, sourcing essential components, welding and assembling the frame, installing guides and screws, connecting electronic parts, and calibrating the system for accuracy and repeatability. Testing confirmed the machine's full functionality, with precise and efficient cuts that met project expectations, validating the feasibility and practicality of the approach.

Overall, this project illustrates that a precise and economical CNC plasma cutting machine can be achieved with accessible materials and DIY methods. Future enhancements will include advanced technologies like servo motors and Festo portals to elevate the machine to a professional level of precision and performance.

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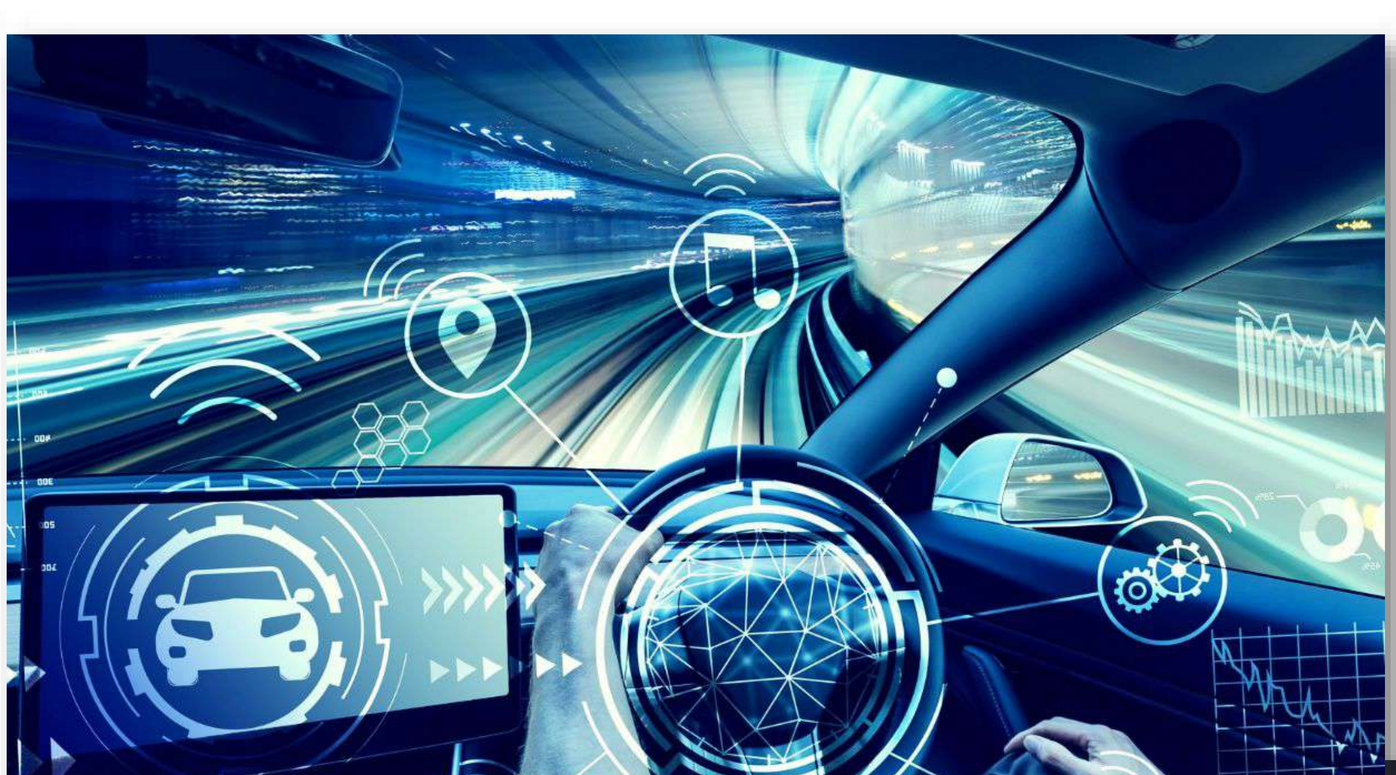
Will's Total Garage

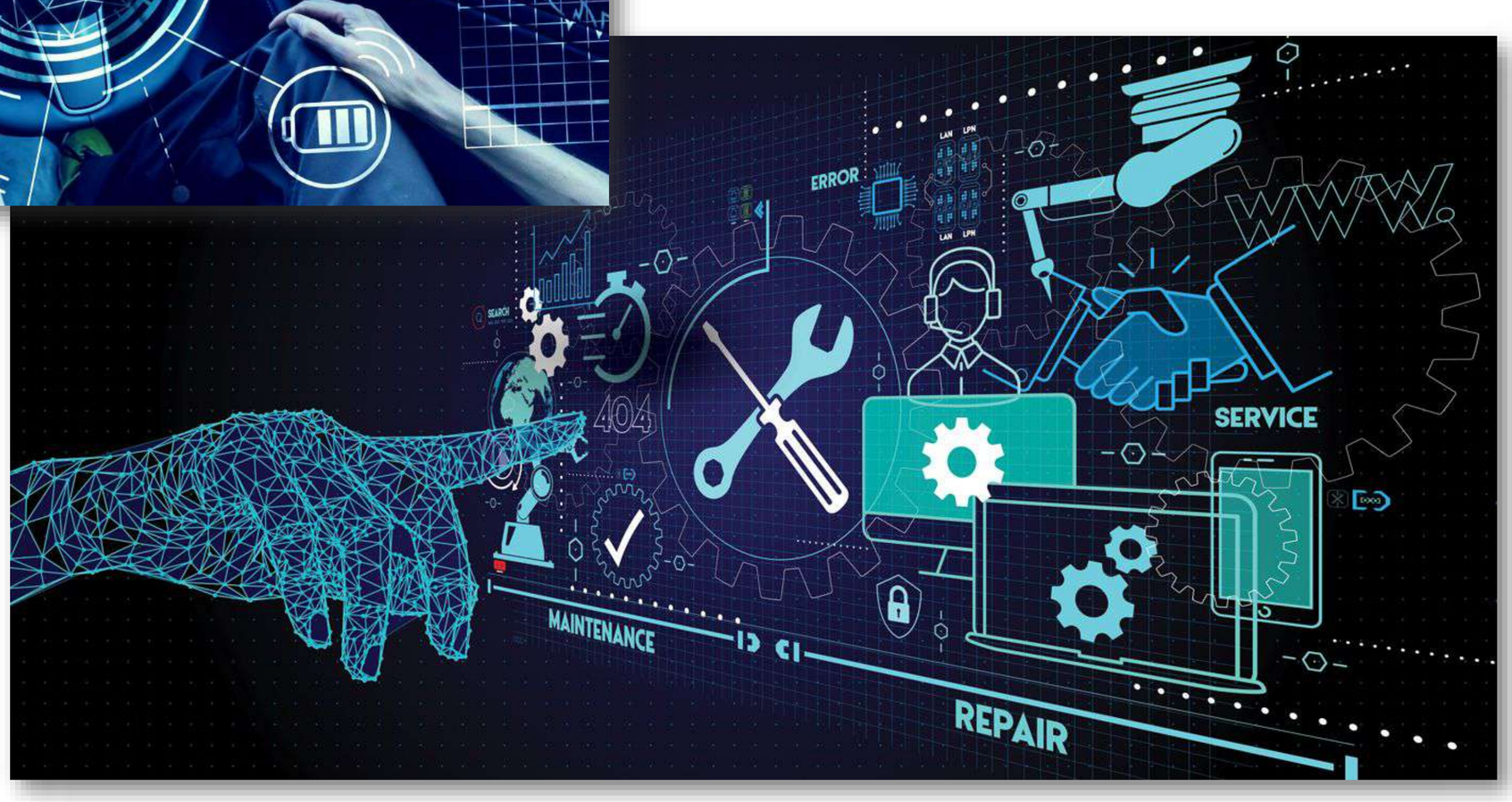
AUTOMOTIVE DIAGNOSTICS by Will's GARAGE

D

Author: ***Daniel Gabriel IORDACHI & Team***

Will's Total Garage, your trusted partner for leading diagnostic services in the automotive industry. With a team of experts passionate about technology and innovation, we are committed to providing accurate and efficient diagnostic solutions for your vehicle. Whether it's diagnosing mechanical, electronic or software issues, our experienced team uses the latest OBD diagnostic technology and equipment to quickly and accurately identify your vehicle's problems. From passenger cars to commercial vehicles and entire fleets, we offer a full range of diagnostic services tailored to your specific needs. With access to the latest software updates and diagnostic databases, we are able to provide customized solutions and efficient repair solutions. Transparency and open communication are fundamental to us. That's why our team will always thoroughly explain the diagnostic results and available repair options so you can make informed decisions about your vehicle.





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ADAM'S SERVICE

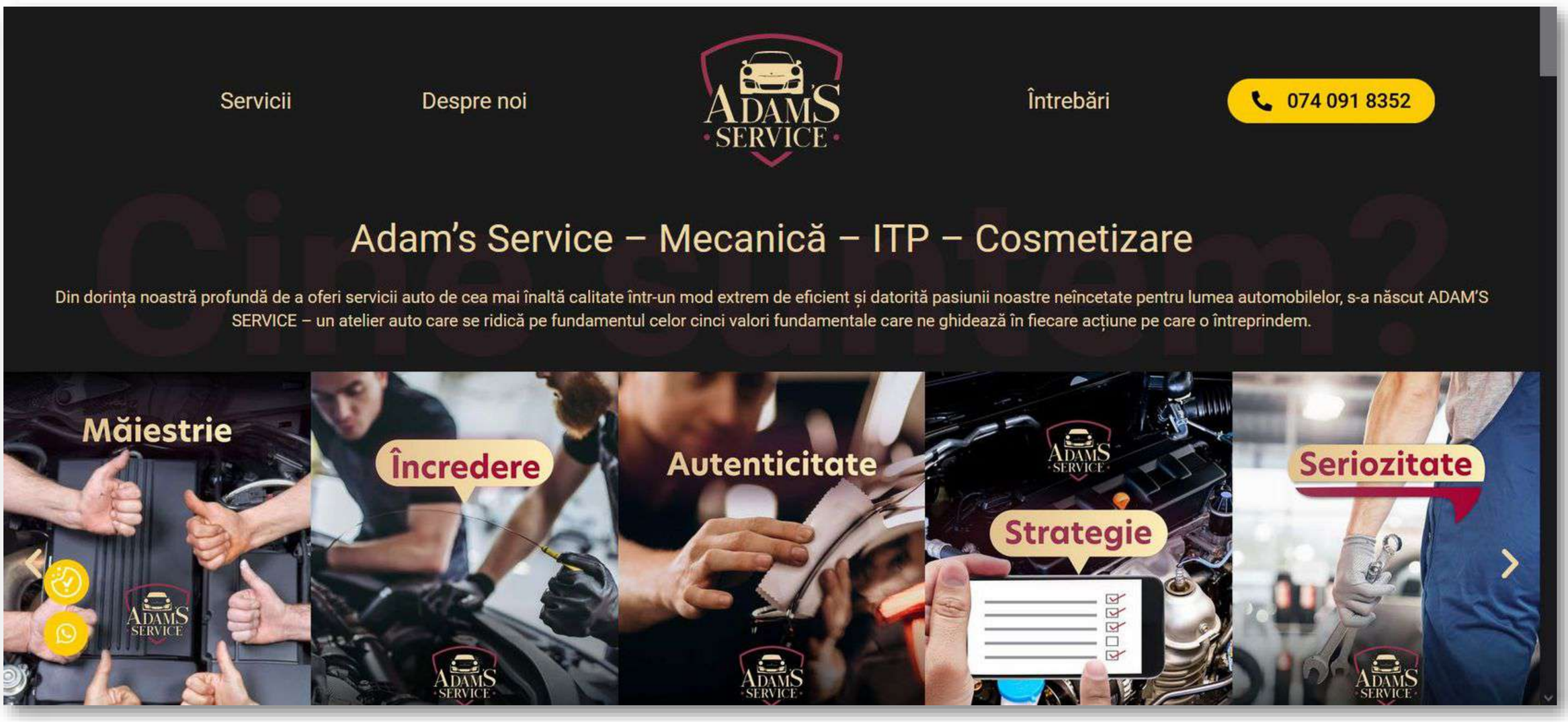
Everything in one place for your car!

D

Author: Florin ADAM & Team

With an undeniable passion for the world of automobiles, Florin, the CEO of Adam's Service, wanted to create a company that would offer high quality solutions and services, exceeding the expectations of customers in Alba Iulia and always being up to date with the latest technologies and industry trends.

Thus, in an attempt to satisfy the increasingly complex needs and requirements of car owners, ADAM'S SERVICE was born.



SCAN ME

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Presentation link: https://adamservice.ro/servicii-auto/

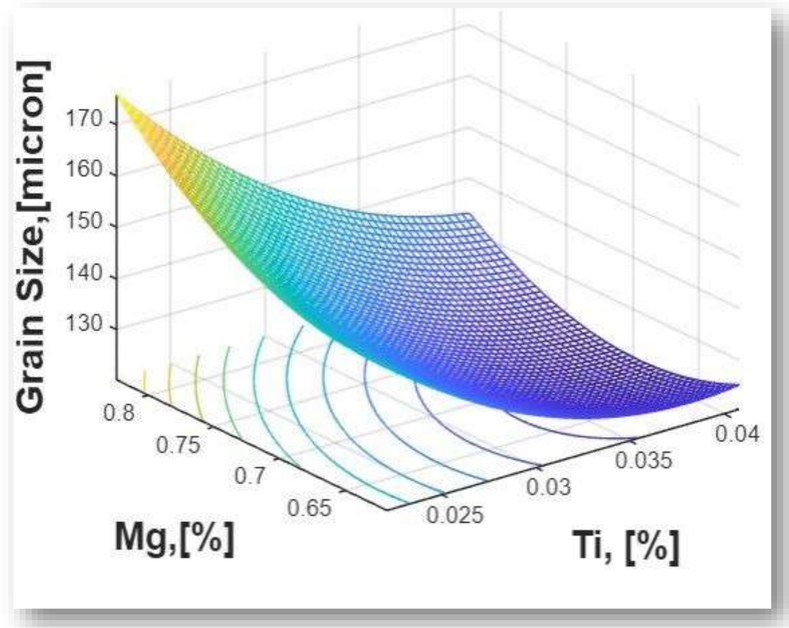
ALUMINUM ALLOYS FOR CAR RIMS

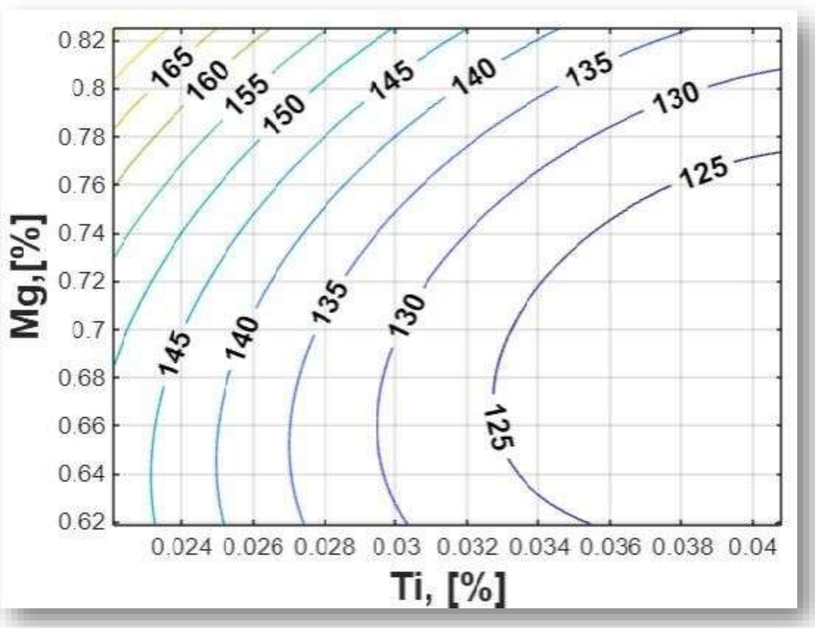
PhD Thesis

Authors: Doru SAPTA, Ana SOCALICI, Vasile PUTAN, Corneliu BIRTOK BANEASA

D

Aluminum alloy 6082 is used in various applications in the automotive industry, construction, and the transportation sector. It is widely used and has replaced alloy 6061 in many applications. It has high corrosion resistance and high hardness. It is very difficult to achieve fine-grained structures in aluminum alloys through various processes. In the case of aluminum alloy 6082, the hardening phase is Mg2Si. Its size is determined by the presence of iron and silicon. These alloys use magnesium and silicon in their composition, can be heat-treated, have good forgeability, and high corrosion resistance. Globally, the manufacturing of automotive wheels is carried out using aluminum alloys through casting and/or plastic deformation.





The experimental data were collected and processed statistically. The goal was to establish correlations between grain size (considered a dependent parameter) and the chemical composition elements that influence grain refinement. It is observed that the alloying elements Si, Mg, Mn, as well as Ti, used for grain refinement, positively influence the mechanical properties within the limits of these elements. Specifically, an increase in Ti leads to finer grain size, which also results in higher values for mechanical characteristics.

Using high-quality charge materials leads to minimal variations in the chemical composition elements, and following alloying, only small differences in chemical composition are observed from one batch to another. The narrow variation limits for chemical elements resulted in acceptable variations in the alloy's qualitative characteristics.

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BSM MOTORS

BSM MOTORS

Sorin Mihai BOBARU
Mentor: Prof. Corneliu BIRTOK BANEASA

D

The BSM Service division is "Out of passion for mechanics!"

Mechanical services

Trucks:
oil change;
change filters;
change pads;
greasing;
+++
Utility Cars :
oil change;
change filters;
change pads;
+++
Cars:
change oil / filters; repair direction and braking systems;
+++
OBD diagnostics, vcds function activations, headlight polymerization and more.

@BSMMOTORS2025

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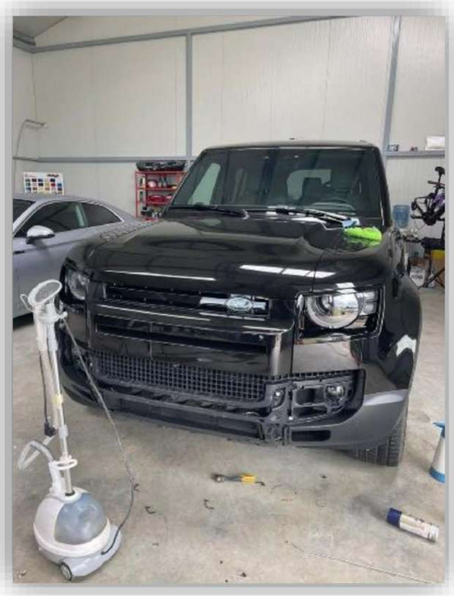
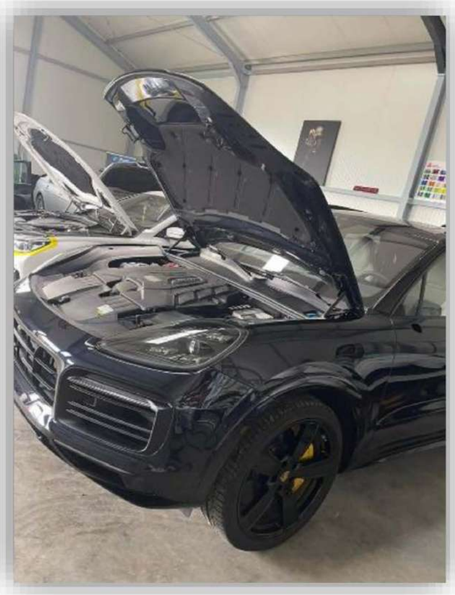
AutoVest Service

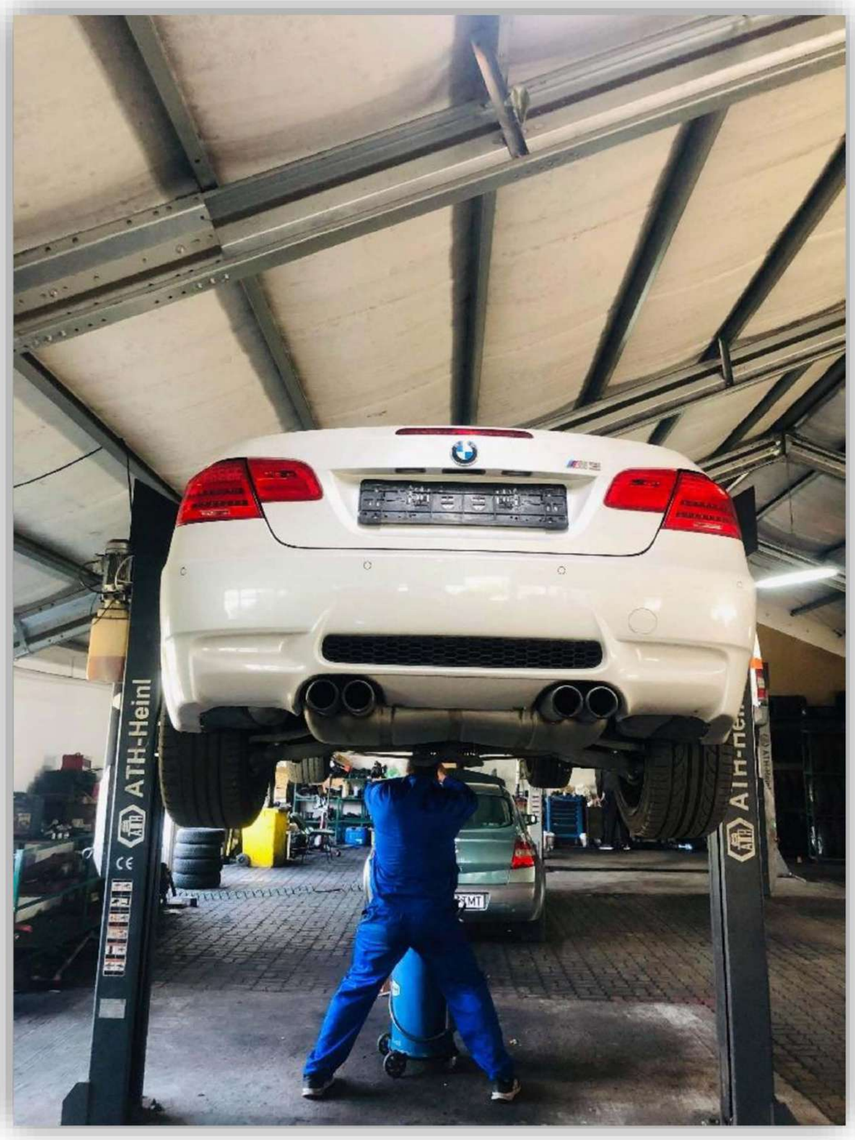
Author: Mararu Leonard Nicolas

Whatever the size of your car, Auto Vest Service can offer you premium services with no hidden costs for all pockets. We can offer you all the benefits of a service representative of trained mechanics, the latest diagnostic devices and original parts. We are committed to providing you with the best services that can save you money. We are confident that once you try our services you will not be disappointed.

Our main activity is the maintenance and repair of motor vehicles, offering a wide range of services (diagnostics, testing, checks, adjustments, maintenance and mechanical and electrical repairs, etc.).







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TRACTION CALCULATION FOR VOLSWAGEN SCIROCCO

Student Project

Authors: Alin-Andrei POPESCU
Mentor: Prof. Corneliu BIRTOK BANEASA

D

The traction calculation of a vehicle such as Volkswagen Scirocco refers to the determination of the force required to set the vehicle in motion and maintain optimal grip on the road. This depends on several factors, including the vehicle's weight, engine power, type of drive (eg front or all-wheel drive) and road conditions.

n[rot/min]	ω[rad/s]	v[km/h]	P[kw]	P[hp]
800	83.73333333	24.92423147	11.49164128	15.62863215
1200	125.6	37.3863472	17.86146192	24.29158822
1600	167.4666667	49.84846293	24.4254159	33.21856562
2000	209.3333333	62.31057867	31.2	42.432
2400	251.2	74.7726944	37.6896	51.257856
2800	293.0666667	87.23481013	43.87413333	59.66882133
3200	334.9333333	99.69692587	49.5872	67.438592
3600	376.8	112.1590416	54.6624	74.340864
4000	418.6666667	124.6211573	58.93333333	80.14933333
4400	460.5333333	137.0832731	62.2336	84.637696
4800	502.4	149.5453888	64.3968	87.579648
5200	544.2666667	162.0075045	65.25653333	88.74888533
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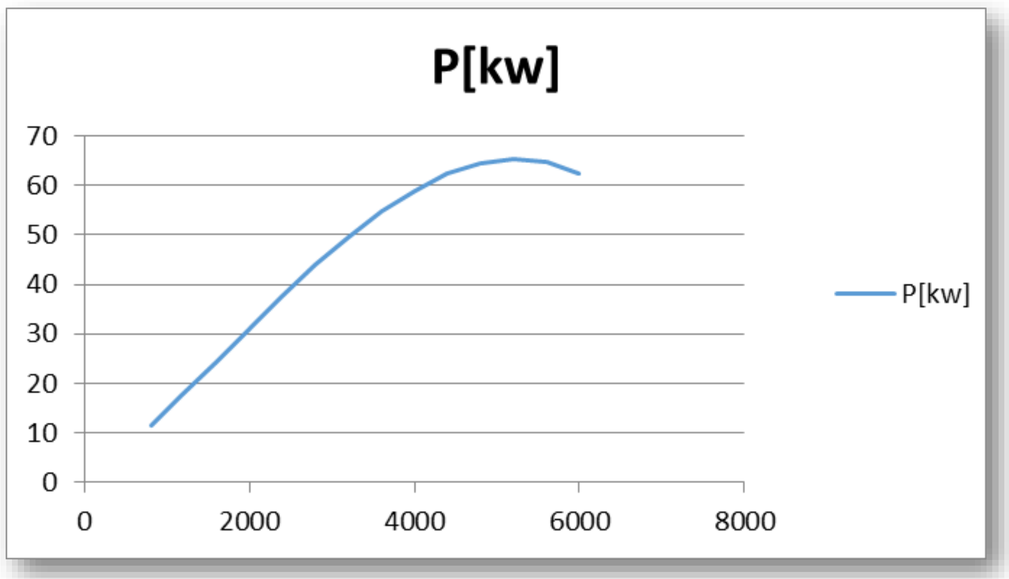
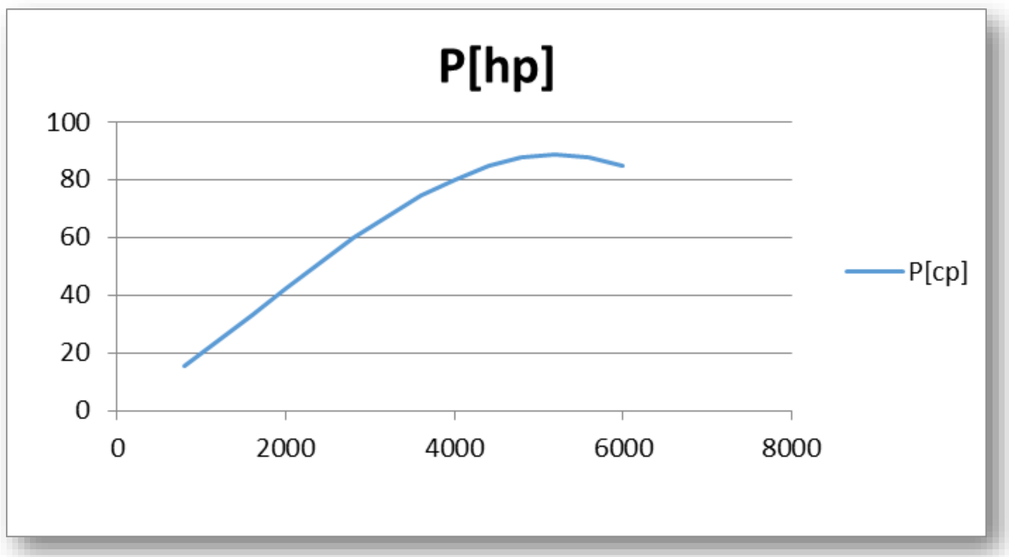
6000	628	186.931736	62.4	84.864





For the Scirocco, traction is provided by a front-wheel drive system, which means that the front wheels are the ones that transmit the engine's power to the road. The calculation includes the evaluation of the friction force between the tires and the road surface, as well as the analysis of the weight distribution on each wheel. The result determines the performance of the vehicle in terms of acceleration and stability, depending on the technical parameters specific to the model.

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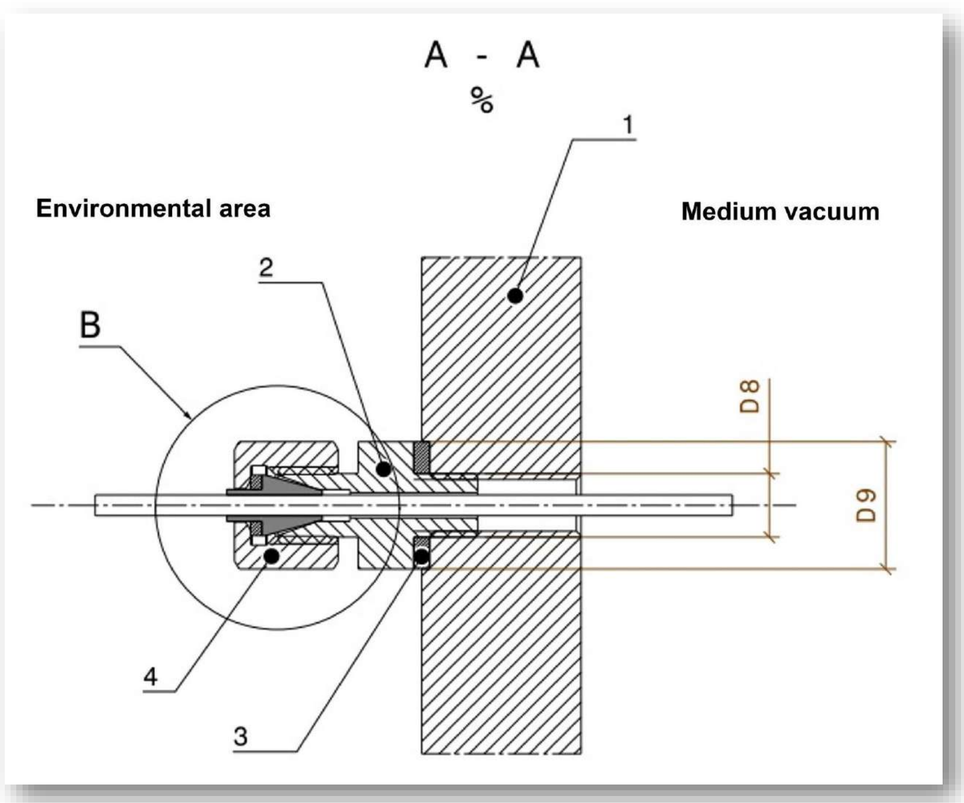
SYSTEM OF NON-METALLIC FERRULE WITH A METAL WASHER, FOR SEALING HYDRAULIC, PNEUMATIC OR ELECTRICAL CABLES, WHICH MAY ALSO BE UNINSULATED CONDUCTORS, INTENDED FOR ENTERING IN MEDIUM VACUUM CHAMBERS

A2024 00451

Jeni-Alina VILAG, Valeriu Alexandru VILAG, Nicolae MĂCRIŞOIU, Cosmin Petru SUCIU, Răzvan Edmond NICOARĂ, Iulian VLĂDUCĂ

D

The invention relates to a sealing system using a non-metallic ferrule, with good resistance to temperature and chemical agents and with electrical insulation properties, cylindrical, in two stages, with a beveled upper cylindrical end, called the working diameter, and a lower cylindrical part, with a diameter smaller than the working diameter of the upper cylindrical end, of the non-metallic ferrule, on which a metal washer made of stainless steel or other metallic materials is placed, which is guided on the smaller diameter of the non-metallic ferrule, so that the outer diameter of the metal washer is equal to the upper working diameter of the non-metallic ferrule, for sealing hydraulic, pneumatic and electrical pipes intended for access to medium vacuum chambers, for testing phenomena associated with space propulsion through exothermic chemical reactions, or cold and/or electrical space propulsion.



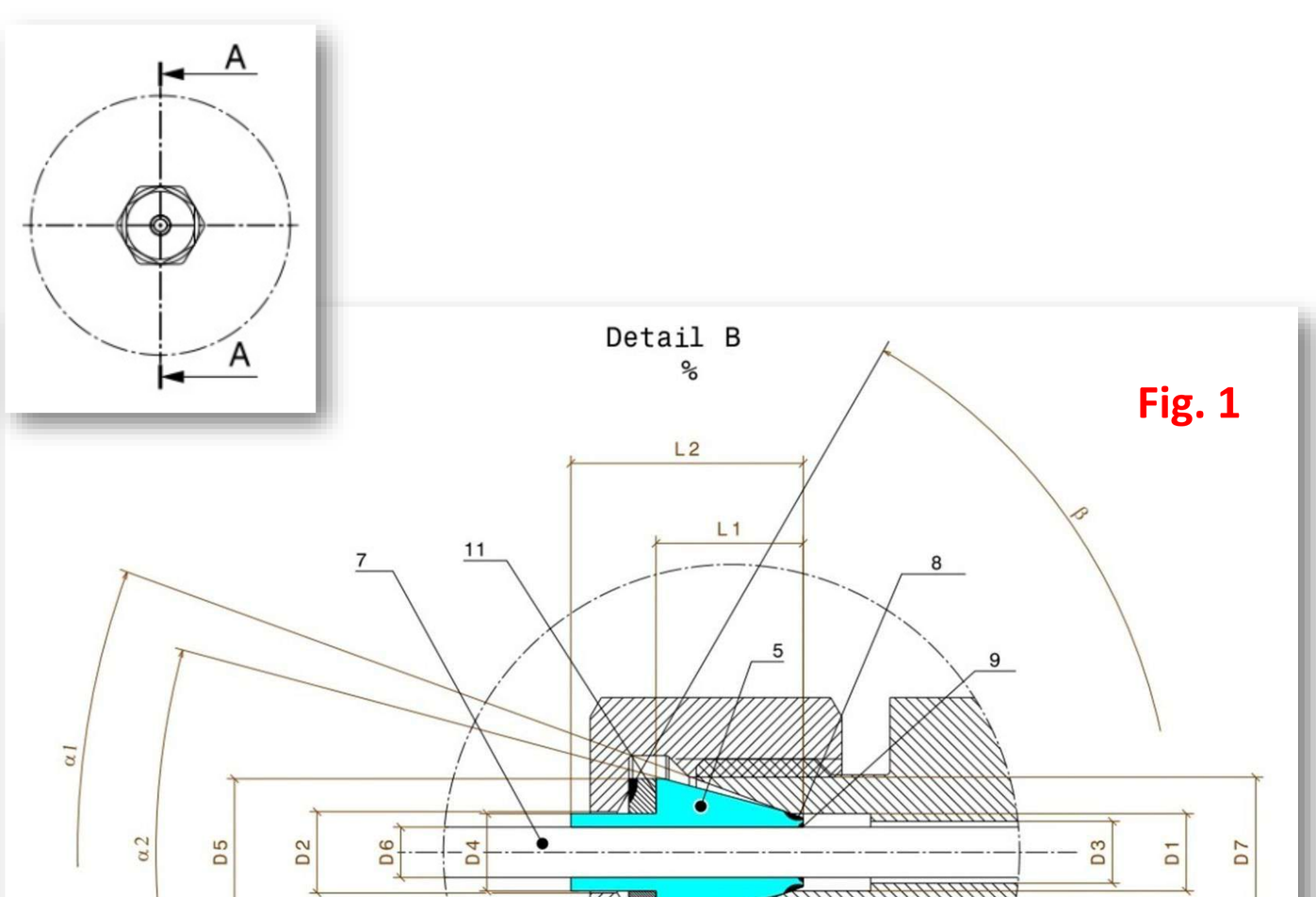


Fig. 1

The technical problem solved by the invention consists in using a sealing assembly that includes elements made of different materials, with different degrees of deformation, which allows the sealing between two environments with different chemical composition and gas-dynamic parameters (pressure, temperature) and which allows access of pneumatic, hydraulic pipes and electrical cables, which can also be uninsulated conductors, from one environment to another, by the fact that the non-metallic ferrule and metallic washer system allows a very good seal in the medium vacuum range, and can also be used in the medium pressure range above atmospheric, up to 2Mpa (20 bar), by using a cylindrical ferrule with a non-metallic, frustoconical end, which partially deforms in a non-destructive manner, so as to allow disassembly and reuse for the same purpose, allowing adhesion to the pipe surface in the angular contact area with the nipple on the frustoconical sealing surface, an area elastically deformed by the pressure exerted by the washer behind it, pushed by a flare nut, by screwing onto the nipple, with a certain screwing moment, determined by the design. The nipple in turn is screwed onto the body of the vacuum vessel, the sealing being achieved with respect to the external environment by a deformable gasket made of a soft metal such as annealed copper, aluminum or flexible thermoplastic material, with good resistance to temperature and chemical agents.

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COLOR FILTER CALIBRATION SYSTEM FOR SCHLIEREN VISUALIZATION SYSTEMS INTENDED FOR FLUID FLOWS, WITH RECTANGULAR LIGHT SOURCE

A2024 00596

Emilia Georgiana PRISĂCARIU, Iulian VLĂDUCĂ

D

The invention relates to a calibration system for schlieren visualization systems, which use rectangular light sources intended for color filters with the help of which it is possible to determine, from the color gradient introduced into the schlieren images by them, the density gradients of the studied flows, which can be flows given by chemical reactions, supersonic / hypersonic flows, flows with convective and turbulent effects with temperature gradients. To investigate flows with density gradients different from those existing in the environment in which the flow propagates, several quantitative schlieren visualization methods can be implemented, which generally provide details about the existing density gradient fields of them. Such a color filter is designed so that its properties highlight the studied character of the flow. A color filter is characterized by the level of sensitivity it offers to the implemented schlieren system (the most accurate representation of the smallest and largest density gradients) and the ease with which it can be implemented, directly influenced by the type of color distribution on the filter image (colors with gradual distribution in the RGB spectrum, filter with segmented color distribution, etc.). The system is made up of six subassemblies, A, B, C, D, E and F and individual elements different from those contained in the subassemblies, connected to each other and individual elements different from those contained in the subassemblies, arranged at the heights H1 mobile and H2 fixed with the distances between them defined by L1,...,L6, which is presented in the form of a schlieren system in Z configuration, and which presents a white light source, a biconvex converging lens with a diameter of 2 inches ~50mm for focusing the white light beam, fixed by an optical mass, a square diaphragm that ensures rectangular collimation in dimensions 0.5x0.5...1.0x1.0mm of the white light beam, fixed by the optical mass, large diameter parabolic mirrors, 10 inches ~254mm, the phenomenon analyzed, the X-Y robotic system fixed to a fixed support, to which the film holder plate is fixed on which the by gluing with Loctite the 35mm films cut to a maximum length of 38mm, by means of a pressing plate and a high-speed CMOS camera operated by means of a trigger cable in connection with the control module dedicated to the X-Y robotic arm system.

Fig. 1

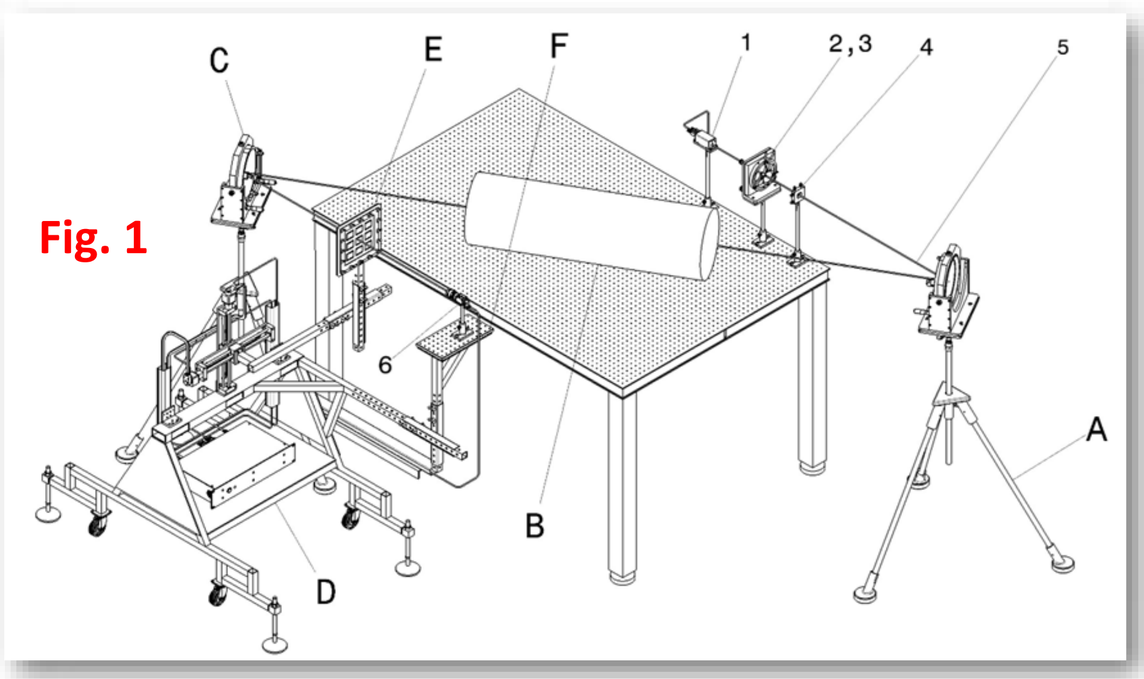


Fig. 2

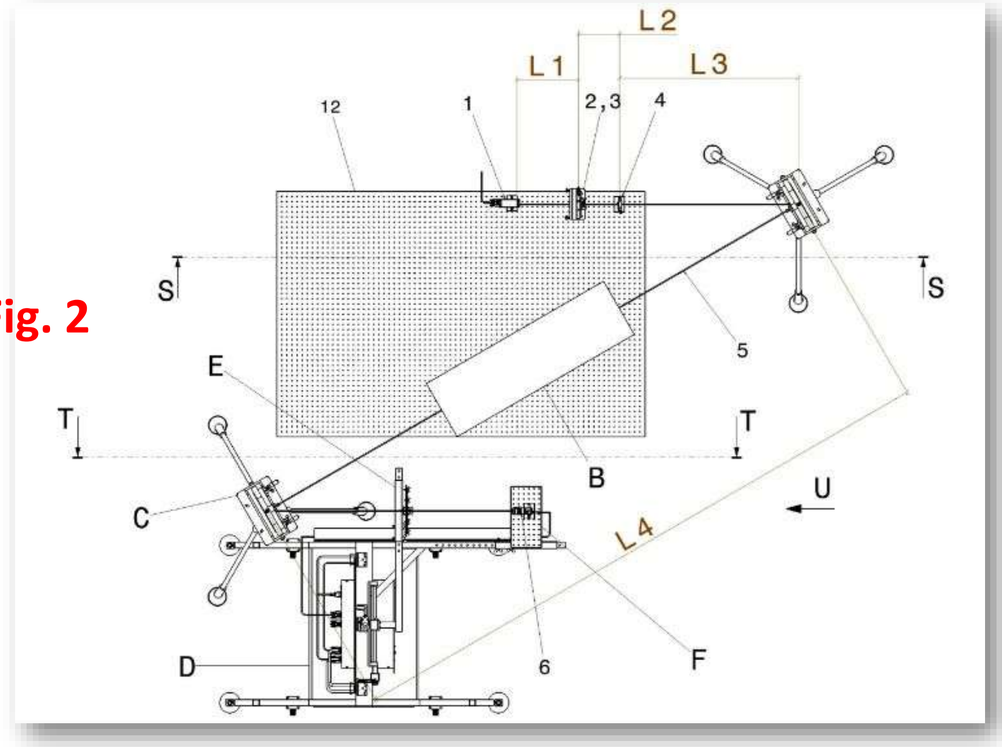


Fig. 3

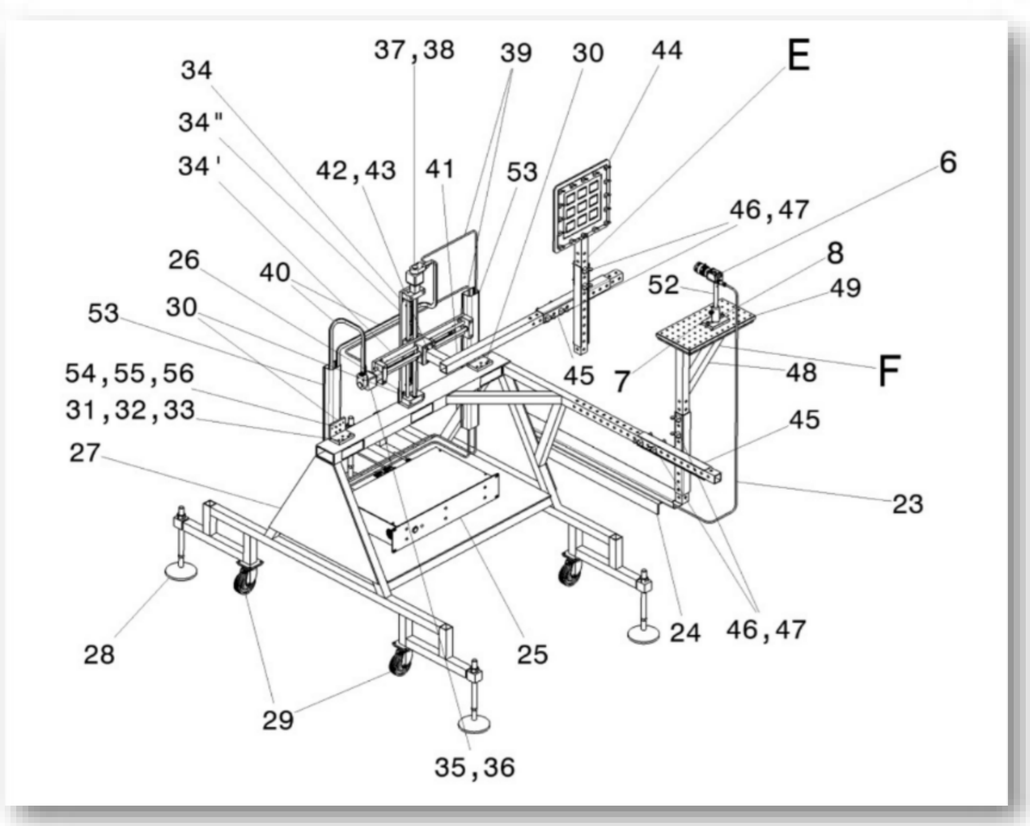
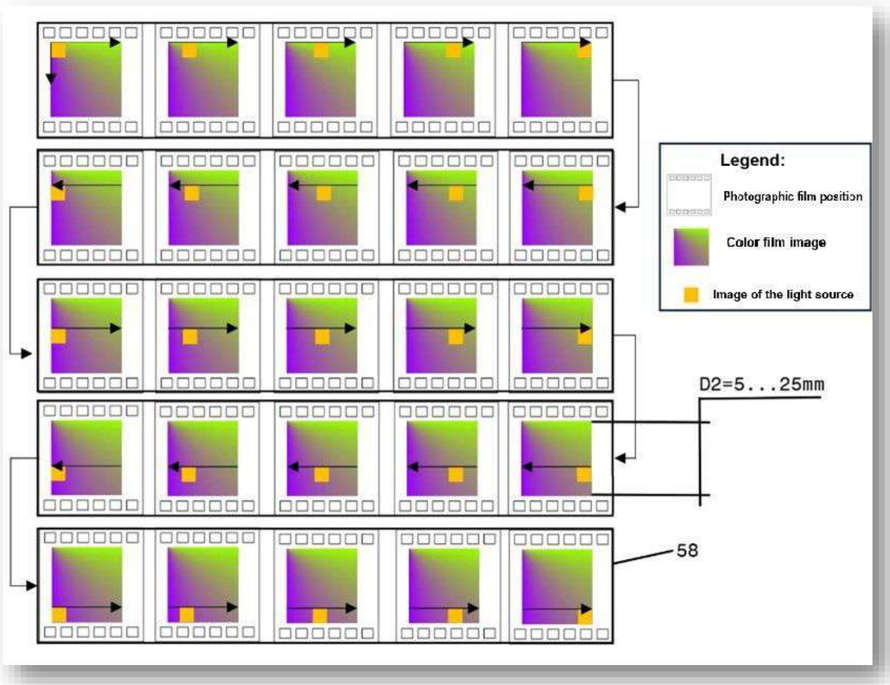


Fig. 4



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CENTRIFUGAL EXPERIMENTAL TESTING FACILITY FOR SUPERSONIC AND HYPERSONIC PROPULSION SYSTEMS

A2024 00730

Răzvan Edmond NICOARĂ, Iulian VLĂDUCĂ, Jeni-Alina VILAG, Cosmin Petru SUCIU, Alexandru HANK, Bogdan NĂVLIGU

D

The invention relates to a test facility for high and very high-speed propulsion systems, operating at supersonic and hypersonic (Mach 5) regimes (5 times the speed of sound), capable of reproducing the operating conditions specific to high altitudes (low temperatures and pressures). The facility has the role of testing supersonic and hypersonic propulsion systems in real conditions, using a controlled environment that allows the characterization and optimization of the respective systems. The facility consists of an electro-mechanical system that allows the driving of an arm at high speeds, the arm at the end of which the experimental assembly is mounted.

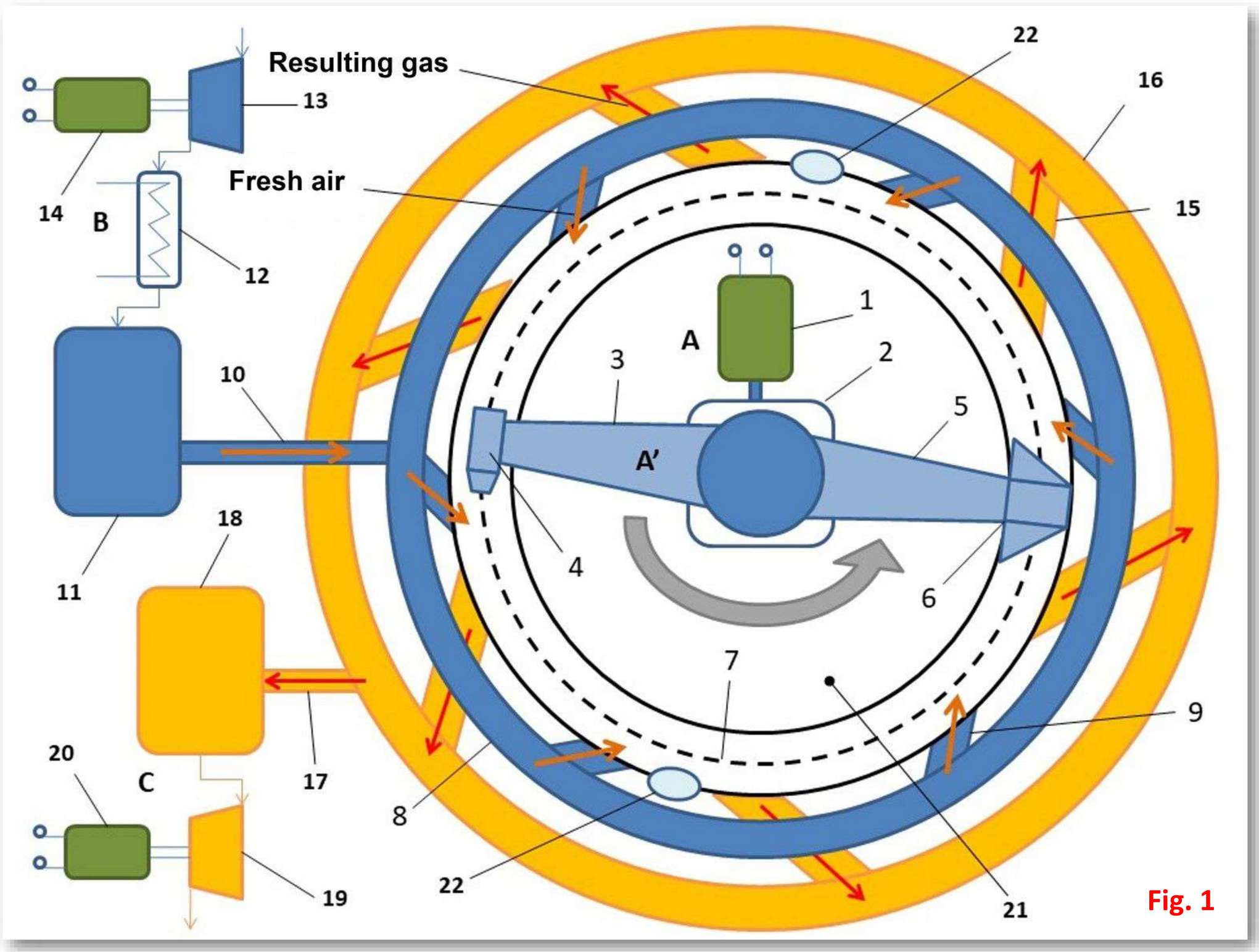

Fig. 1

Thus, the experimental model moves at very high speeds through a controlled environment, allowing specific measurements to be performed and relevant data to be collected regarding the operation of the respective system, consisting of three main subassemblies and individual components, namely a centrifugal system (A) consisting of a variable speed electric motor (1), engaged by means of a mechanical transmission (2) which in turn drives a rigid system (A') consisting of an arm (3) on which the experimental model (4) is fixed and an arm (5) to which the pusher (6) is fixed, for the evacuation of the gas resulting from the supersonic/hypersonic movement of the experimental model (4) through the working channel (7), the system (A') being placed in a vacuum chamber (21), to reduce friction losses of the rotational movement, a compressed air intake system (B) consisting of: the aerodynamic compressor (13) driven by the electric motor (14) which provides a flow rate of air with high pressures and temperatures, the air thus supplied being cooled using the cooler (12) and stored in the buffer tank (11), for supplying air at the simulated altitude parameters, via the connection ports (9) and (10) and the fresh air distribution ring (8), an exhaust system (C) consisting of: the exhaust buffer tank (18), connected to the blower (19), driven by the electric motor (20) and which allows the collection of the gas resulting from the supersonic/hypersonic movement of the experimental model (4) through the working channel (7), via the connection ports (15) and (17) and the collection ring (16) and viewing windows (22) through which, using a high-speed CCD camera not shown, the flow and parameters around the experimental model (4) can be determined as it passes through the viewing windows (22).

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ISIM TIMIȘOARA
National Research & Development Institute for Welding and Material Testing - ISIM Timișoara

Modular tool for friction stir welding and processing

Patent application No. RO 138013 A2 (A/00557/12.09.2022)

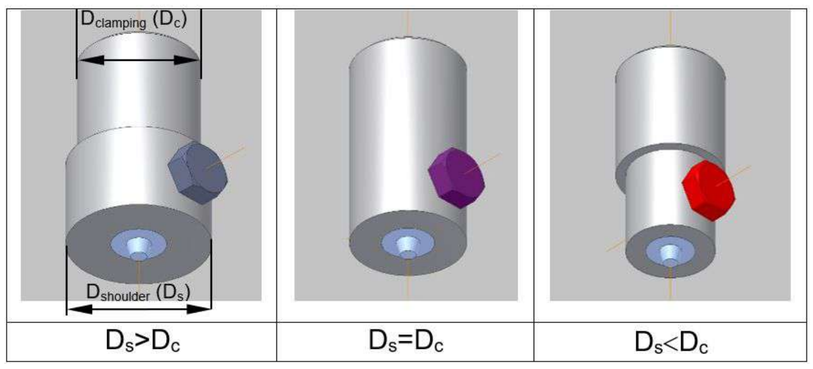
Author: Lia-Nicoleta Boțilă

D

Friction stir welding (FSW) and friction stir processing (FSP) are innovative and environmentally friendly solid state joining / processing processes, based on frictional heating and plastic deformation of the materials to be welded / processed, produced by the interaction of a non-consumable rotative tool with the surfaces to be joined / processed. The process temperature is below the melting temperature of the materials to be welded / processed.

Object of the invention:
The development of modular tools for friction stir welding and processing FSW/FSP, made of interchangeable and reusable elements. The combinations between these elements will generate, quickly and at lower cost, a multitude of variants for modular tools.

Current technical situation:
The tools used for friction stir welding/processing have various geometries and are generally a monoblock design, being made of sintered tungsten carbides or various types of steels. When the tool is damaged, it will be completely replaced, involving costs related to higher tool material consumption, labor costs and the time required to make a new tool.

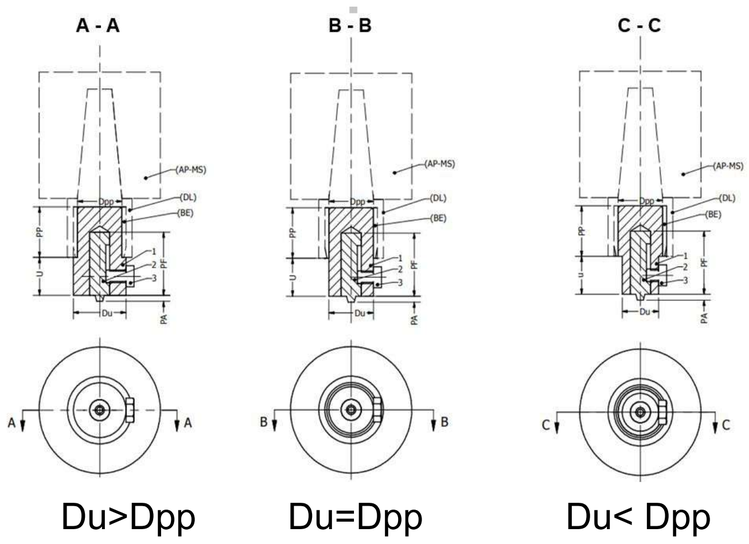


Variants of modular tool for friction stir welding and processing

Various tools for friction stir welding and processing

The technical problem solved by invention:

- a modular tool for FSW welding / FSP processing, having a special construction, made of interchangeable and reusable elements for various applications, which solves the problem of high costs of tool materials, labor and time required to make tools in monoblock construction;
- a multitude of types, sizes and geometric configurations of FSW welding / FSP processing tools for various applications, made quickly and with lower costs, by combining interchangeable and reusable elements.



Du>Dpp Du=Dpp Du< Dpp

Description of the modular tool:

1 - tool body, provided with a clamping part (PP) and a shoulder (U);
2 - tool pin, provided with a fixing part (PF) and an active part (PA);
3 - screw-type clamping element.
The clamping part (PP) allows the tool to be clamped with an elastic bushing (BE) in the working device (DL) mounted on the main shaft (AP-MS) of the specialized FSW/FSP machine. The working device (DL) can be provided with a set of interchangeable elastic bushing (BE), with different inner diameters that allow the mounting of modular tools with different diameters of the clamping area.
The modular tool shoulder (U) has a central hole in the lower part for positioning of the pin (2) and in the lateral part it has a threaded hole where a screw-type clamping element (3) is inserted to fix the pin inside the tool. The shoulder of the modular tool (U) can have diameter (Du) greater, equal or smaller than the diameter of the clamping part (Dpp) of the tool in the working device (DL), usually 16 - 25 mm. Sets of the component elements of the modular tool can be made from different materials, with various geometries and dimensions. The diversity of possible combinations of these elements, can generate quickly at a low cost a multitude of variants of modular tools with interchangeable/reusable elements, for various FSW/FSP applications.

Advantages:

- rapid construction of a geometric tool configuration only by assembling specific modules appropriate to the application in which it will be used;
- possibility of quick and easy mounting of the modular tool into an integrated work device on a specialized FSW machine,
- reduction of manufacturing costs for FSW/FSP tool by replacing the one-piece tool with the modular one, with interchangeable elements.
- modular tool may have component elements made of heat-treated steels resistant to high temperatures. Expensive materials (e.g. sintered tungsten carbides) will be used only for the pin of the modular tool, in the case of welding / processing of metallic materials with high hardness, as well as with high plasticizing temperatures;
- efficient use of the welding / processing tool's pin by:
  - the possibility of using a portion of its fixing part in the tool body to restore the geometry / dimensions of the worn active part;
  - the possibility of reusing it to achieve another geometry of the pin's active part, with smaller dimensions, for other applications.

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Device for determining the coefficient of friction when sliding in static mode with digital dynamometer

RO-BOPI 135282 A0

Authors: Bogdan – Roth Mihail, Romanet Mirela

D

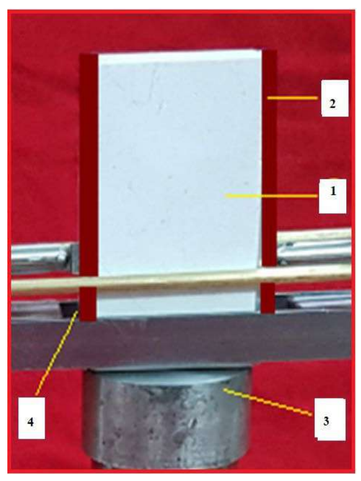
The invention relates to a device for determining the coefficient of friction in static conditions.

The device is designed to measure the coefficient of friction between different materials. It has been specifically developed to maintain a constant friction force. In this device, the test body (14) is held in equilibrium by two jaws (12) that apply pressure to it (Fig. 1). By adjusting the clamping force of the jaws (12), the system reaches the limit state.

The pressing force at the limit state is measured by the dynamometer (5). The magnitude of this force represents the reaction force NNN in the limit conditions. Consequently, the static friction coefficient is determined. The assembly drawings of the device, illustrating its components and operation, are shown in Fig. 1.

The main component of the device, the test body, is depicted in Fig. 2. This piece consists of a rectangular plastic body (1) with a steel cylinder (3) attached to the bottom to increase its mass. This design eliminates potential errors that could arise if a lower-mass body were used. On the lateral sides of the rectangular body (1), two rails (2) made of the first test material are attached using adhesive.

Fig. 1(a) See front



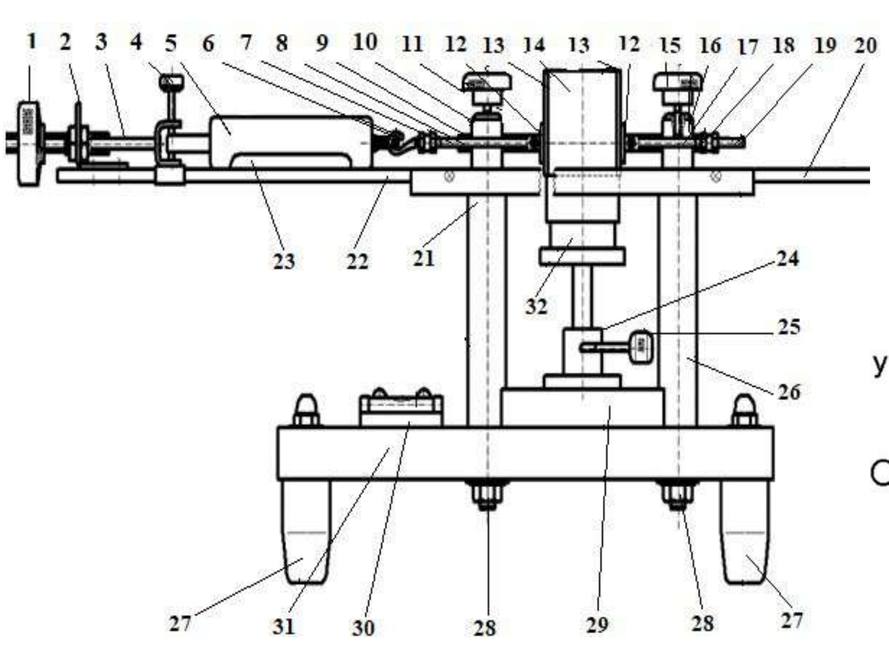
The assembled test piece is weighted using the digital dynamometer (5). The sliding friction force remains constant, as derived from equation (7.5). The above-described assembly is fixed in a specific position using jaws (4), which have a layer of the second test material applied at the contact surface.

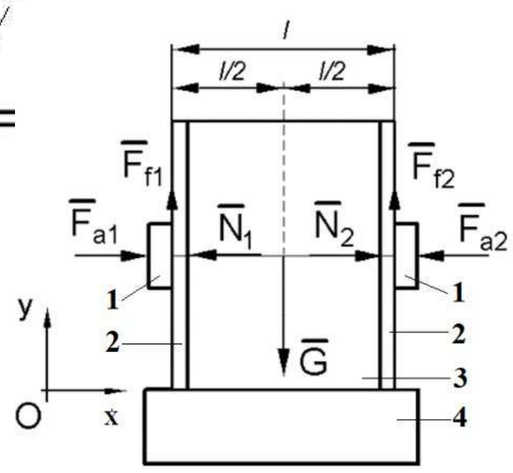
The jaw system (4) in Fig. 1 ensures the application of two pressing forces $\bar{F}_{a1}$ și $\bar{F}_{a2}$. The two forces have the same magnitude, which is indicated by the digital dynamometer (5) in Fig. 1.

Fig. 1(b) Vedere of his

The assembled test piece is weighed using the digital dynamometer (5). The sliding friction force remains constant, as derived from equation (7.5). The above-described assembly is fixed in a specific position using jaws (4), which have a layer of the second test material applied at the contact surface.

The jaw system (4) in Fig. 1 ensures the application of two pressing forces $\boldsymbol{\bar{F}_{a1}}$ și $\boldsymbol{\bar{F}_{a2}}$. The two forces have the same magnitude, which is indicated by the digital dynamometer (5) in Fig. 1.





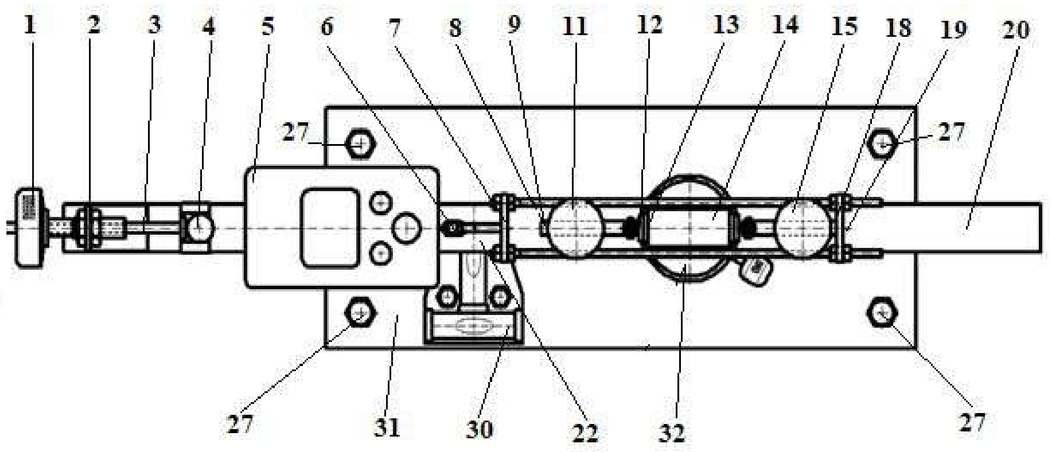


Fig. 2 illustrates the mechanical modeling of the main test piece.
To determine the coefficient of friction, we will write the equilibrium equations for the forces acting on the main test piece.

To determine the friction coefficient, we will write the equilibrium equations for the forces acting on the main part.

$$\sum_x = 0 \quad N_1 - N_2 = 0 \rightarrow N_1 = N_2 = N \tag{1}$$

$$\sum_y = 0 \quad F_{f1} + F_{f2} - G = 0 \tag{2}$$

$$\Sigma_{Mo} = 0 \text{ (punctul de intersecție al forțelor } N_1, N_2, G \tag{3}$$

$$\sum_{Mo} = 0 \quad F_{f1} \cdot \frac{l}{2} - F_{f2} \cdot \frac{l}{2} = 0 \rightarrow F_{f1} = F_{f2} = F_f \tag{4}$$

$$2F_f - G = 0 \rightarrow F_f = \frac{G}{2} \tag{5}$$

The coefficient of friction during sliding in static mode is determined using the **classical limit equation** given by the **laws of friction**:

The device is independent (it does not rely on an external power source or a mechanical testing machine). To generate the pressing force $\boldsymbol{F_{a1} = F_{a2}}$ (the normal reaction N), the device is equipped with its own loading system. The magnitude of this force is read on the dial of a high-precision electronic dynamometer (5).

The two materials for which the coefficient of friction needs to be determined are distributed as follows: One material is fixed on the clamping jaws (12).

The second material, in the form of rails (13), is attached to the movable piece (test body) (14) using adhesive. Before starting the experiments, the device, placed on a table, must be leveled by adjusting the height of the support legs (27). A bubble level (30) will indicate horizontality in both directions (X, Y). The sequence of operations for determining the coefficient of sliding friction is as follows:The movable piece (test body) (14) is positioned for testing using a telescopic mobile support (24), equipped with a height adjustment screw (25).The test body is clamped by a fixed jaw on the left side and a movable jaw on the right side. The movable jaw is actuated by a screw (3) mounted on the subassembly consisting of a slide and the dynamometer fixing screw (5) (see Fig. 1).The dynamometer measures the magnitudes of the pressing forces applied to the test body, ensuring $\boldsymbol{F_{a1} = F_{a2}}$. Before starting the pressing operation, the digital dynamometer (5) is activated and zero. A clamping force is applied by adjusting the screw (3).By loosening the screw (25), the telescopic support can be removed. The test body remains suspended in the clamping jaws (12).The pressing force on the test body (14) is gradually reduced until sliding occurs. At this moment, the dynamometer records the pressing force $\boldsymbol{N_1 = N_2 = N}$ at the limit state. This force value N is recorded in the experimental data collection table.

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Non-circular gear with continuous variation of the distance between axles (with a slide and sliding stone) with automatic adjustment

RO-BOPI 135847 A0

Authors: Bogdan – Bogdan –Roth Mihail, Romanet Mirela, Ripeanu George -Razvan

D

The invention relates to a gear wheel with variable misalignment, driven by a sliding-block mechanism operated by a DC electric motor.

The use of this device allows for a wide range of variable gear ratios. It has a broad application range and can replace a crank-slider mechanism.

The device consists of a circular gear wheel (3) that can be misaligned using a slide and a sliding block, along with an electric motor that controls the misalignment variation. The sliding-block mechanism ensures the system's self-locking during operation, eliminating the need for additional securing elements.

This device can be used in drive mechanisms for agricultural and textile machinery or in automated packaging processes. Practical applications demonstrate that there are many situations where a variable gear ratio is necessary for controlling assembly or machining processes.

Variable gear ratios can convert rotary motion into linear or oscillating movements with variable speeds. The implementation of such variable gear ratios or variable displacement between axes can also be achieved using these non-circular eccentrically misaligned gears, remotely controlled during operation.

The mathematical expression of the gear ratio considers the engagement between two gears: one centered and the other eccentric. Additionally, as a functional requirement, the rotation center of the eccentric gear must remain on a fixed line.

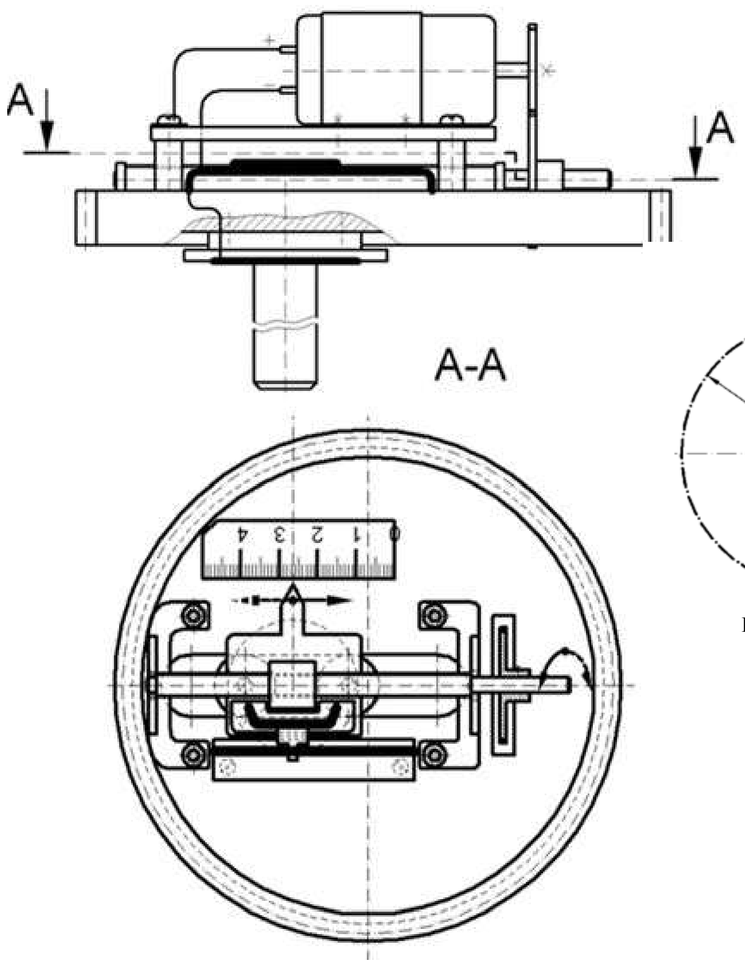

Fig.1. Variant for misalignment with sliding mechanism and sliding stone.

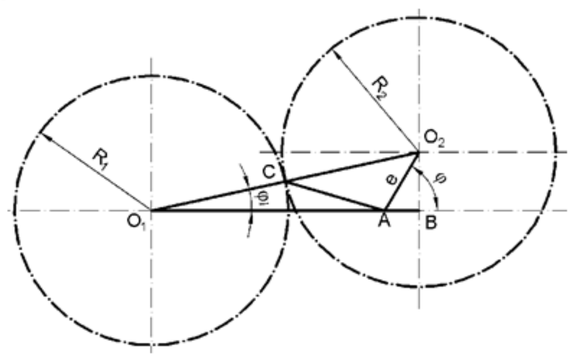

Fig. 3. Gear ratio calculation scheme.

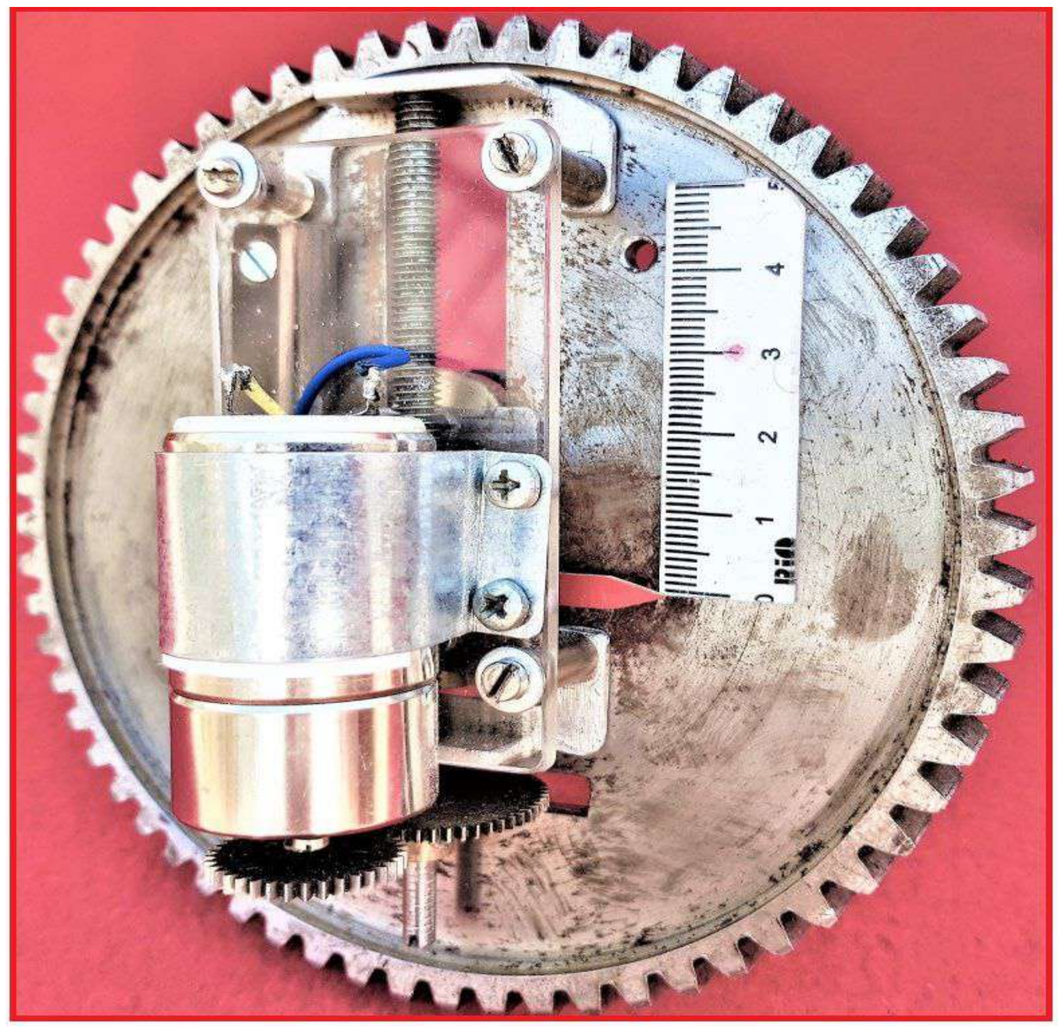

Fig. 2. Overview, misalignment with sliding mechanism and sliding stone.

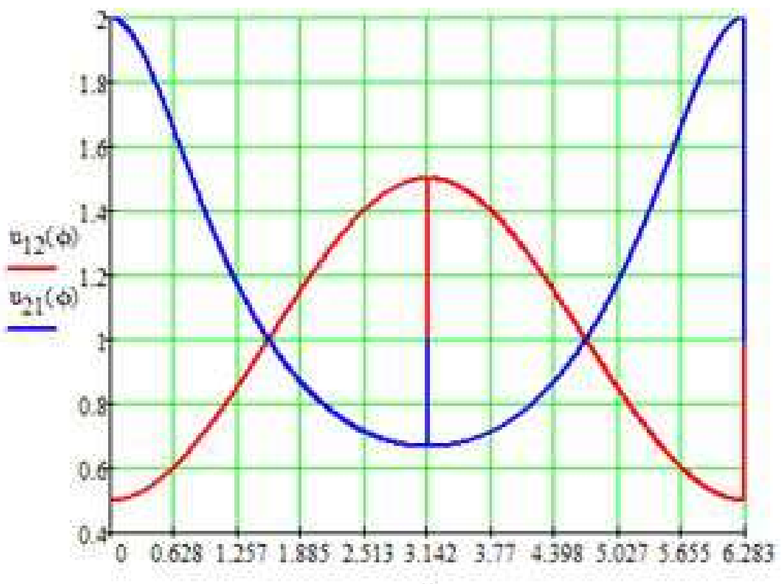

Fig. 4. Gear ratios between the two wheels.

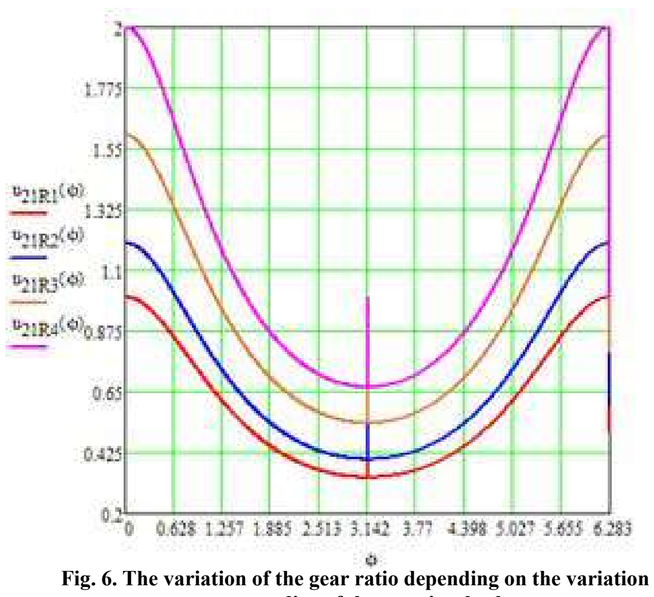

Fig. 6. The variation of the gear ratio depending on the variation of the radius of the centric wheel.

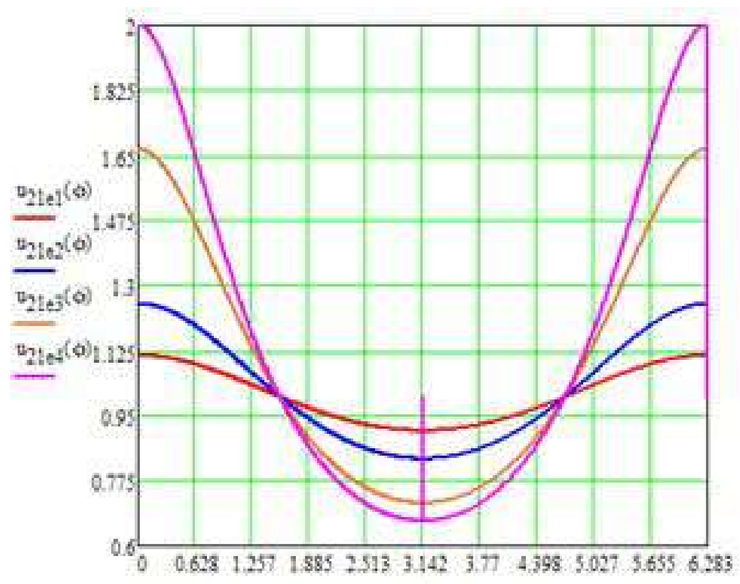

Fig. 5 Variation of the gear ratio as a function of eccentricity.

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TUGBOAT “NEREO”, 1: 43 SCALE, FAST ATTACK BOAT S-100, 1:35 SCALE

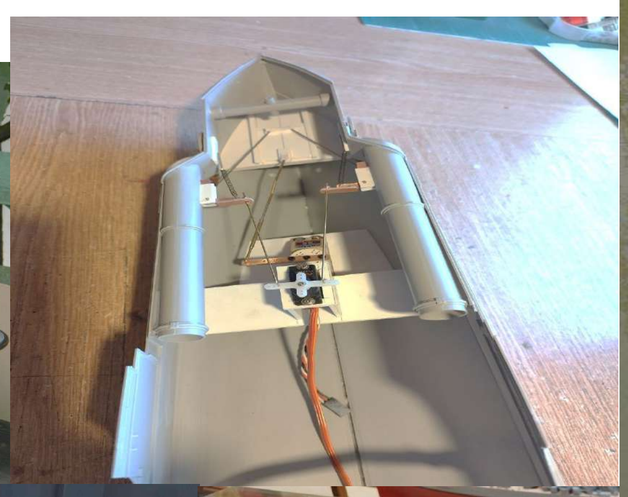
Modelships Project

D

Author: George POPA – Emerit Master of sport

Scratchbuild modelships according to original shipyard plans and documentation. The modeltugboat “Nereo” is a true to scale replica of a WW 2 italian armed tugboat used by the italian navy to defend against aircrafts during the war. The model is fully functionaland can complete the following functions: forward / backward, left / right, anchor maneouvering, smoke and sound generator, navigation lights.

All these functions can be activated using a 10CH proportional remote control. The model has won the Gold medal in following international competions: World Chamionship NS class, Ornetta, Poland, 2017; european championship Burgas, Bulgaria, 2019; World championship C class, Rijeka, Croatia,2021, World champion ship C class, Jablonec, Czech Republic, 2023.



Fast attack S100 built by Kriegsmarine in WW2 and widely used on all naval operations aroun Europe. The model represents one of the ships used in Black Sea. RC model capable of launching electric torpedoes and also all basic running functions. Model has been awarded with the gold medal in C6 class at World championship in Jablonec, Czech Republic.

Presentation link: ***https://www.facebook.com/gemarmodelships***

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SCAN ME

Eccentric circular geared wheel with gearmotor attached for continuous variation between the axes of a gear with remote control operation of the motor during operation

RO-BOPI 135849 A0

Authors: Bogdan – Roth Mihail, Romanet Mirela, Ripeanu Razvan -George

D

The invention relates to a gear wheel with variable misalignment, driven by a remotely controlled electric motor.
The use of this device allows for a wide range of variable gear ratios. It has a broad application scope and can replace a crank-slider mechanism.
The device consists of a circular gear wheel that can be misaligned using a worm gear mechanism and a motor to adjust the misalignment. The worm gear mechanism ensures the system's self-locking during operation, eliminating the need for additional securing elements.
This device can be used in drive mechanisms for agricultural and textile machinery or in automated packaging processes. Practical applications demonstrate that there are many situations where a variable gear ratio is necessary for controlling assembly or machining processes.
Variable gear ratios can convert rotary motion into linear or oscillating movements with variable speeds. The implementation of such variable gear ratios or variable displacement between axes can also be achieved using these non-circular eccentrically misaligned gears, remotely controlled even during operation.
To determine the mathematical expression of the gear ratio, the case of engagement between two gears—one centered and the other eccentric—is considered. Additionally, as a functional requirement, the rotation center of the eccentric gear must remain on a fixed line.

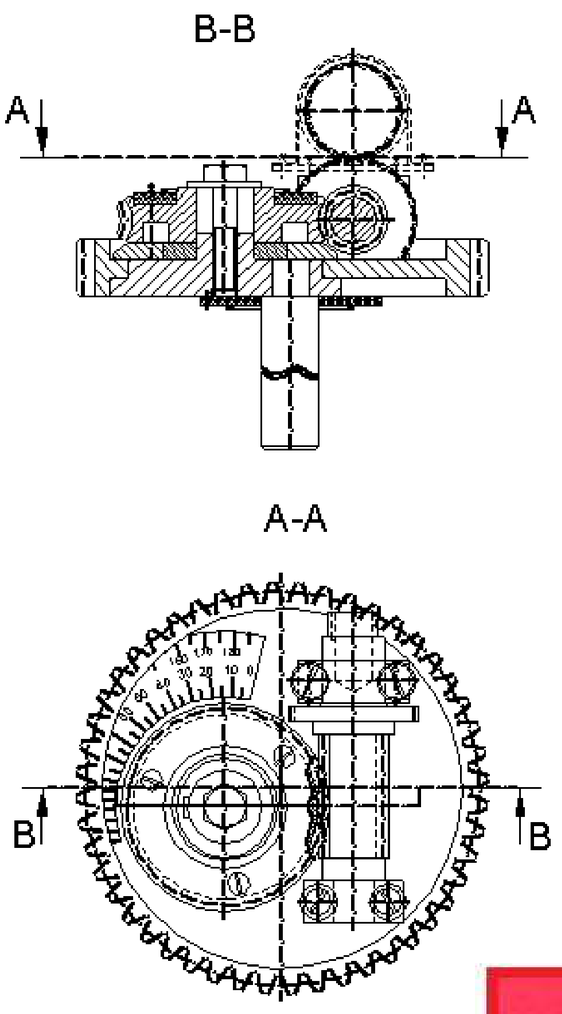

Fig. 1. Variant for screw misalignment – worm wheel

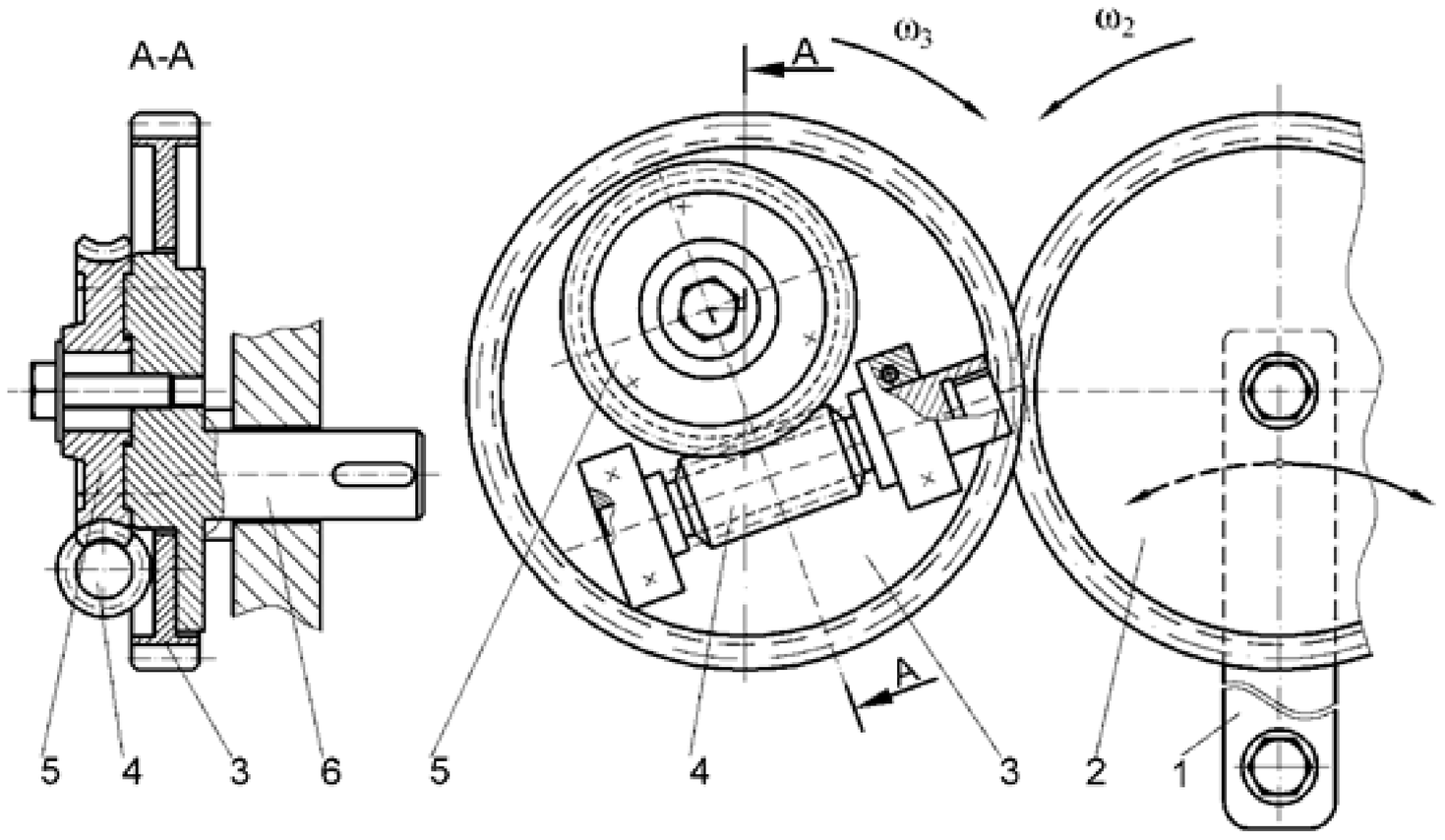

Fig. 3. Screw and worm wheel eccentric device

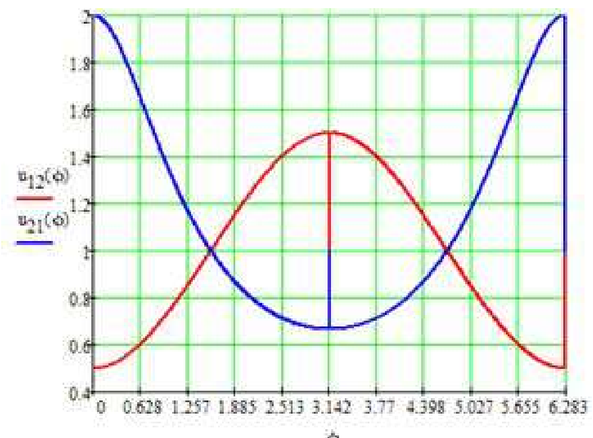

Fig. 4. Gear Ratios Between the Two Wheels

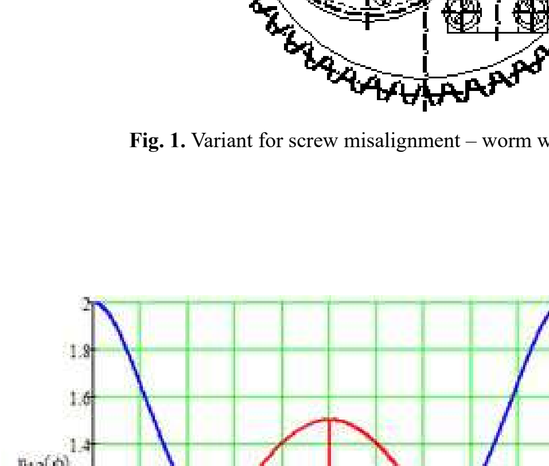

Fig.5. Variation of gear ratio as a function of eccentricity

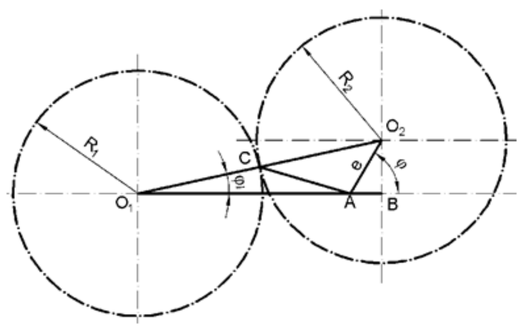

Fig. 2. Overview with screw misalignment – worm wheel

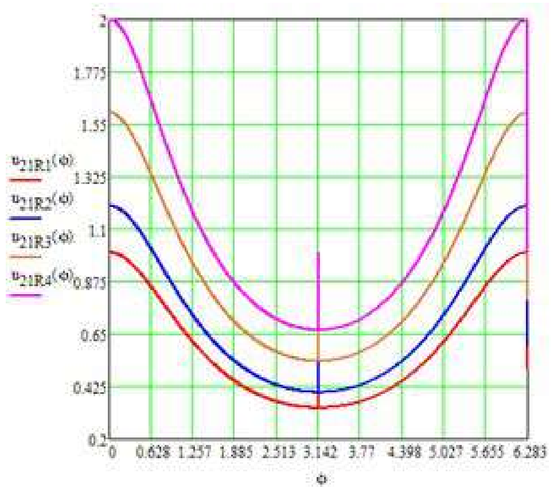

Fig.6 Variation of gear ratio depending on the variation of the radius of the centric wheel

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Device for bending a recessed console with digital measurement of its own actuation force

RO-BOPI 135999 A0

Authors: Bogdan – Roth Mihail, Romanet Mirela, Ripeanu George -Razvan

D

The invention relates to a device for bending test recessed bars driven by a force at the free end with the possibility of applying the force itself with a digital dynamometer. To measure the force, it is read on the digital display of the dynamometer. The device is intended for the investigation of plastic specimens subjected to bending in brackets. Due to the small size of the device, it can be inserted between the polarization filters of a photoelasticimeter, where the state of tensions in the specimen can be visualized in polarized light, depending on the load achieved by operating the operating wheel. The self-pressure force can be precisely adjusted, as the force value is read on the display of the digital dynamometer with an accuracy of three decimal places. Fig.10 *Shows the isochromates* ***for the recessed bar driven at the free end by a concentrated force F***.

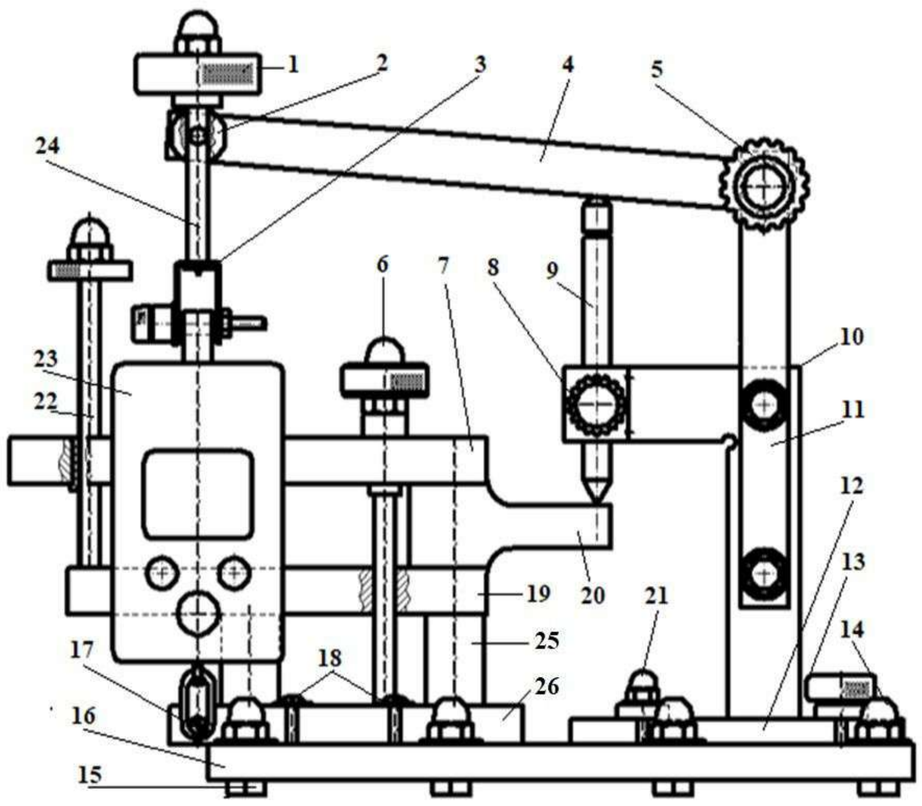

Fig. 1. Device with digital dynamometer for bending test of recessed bars

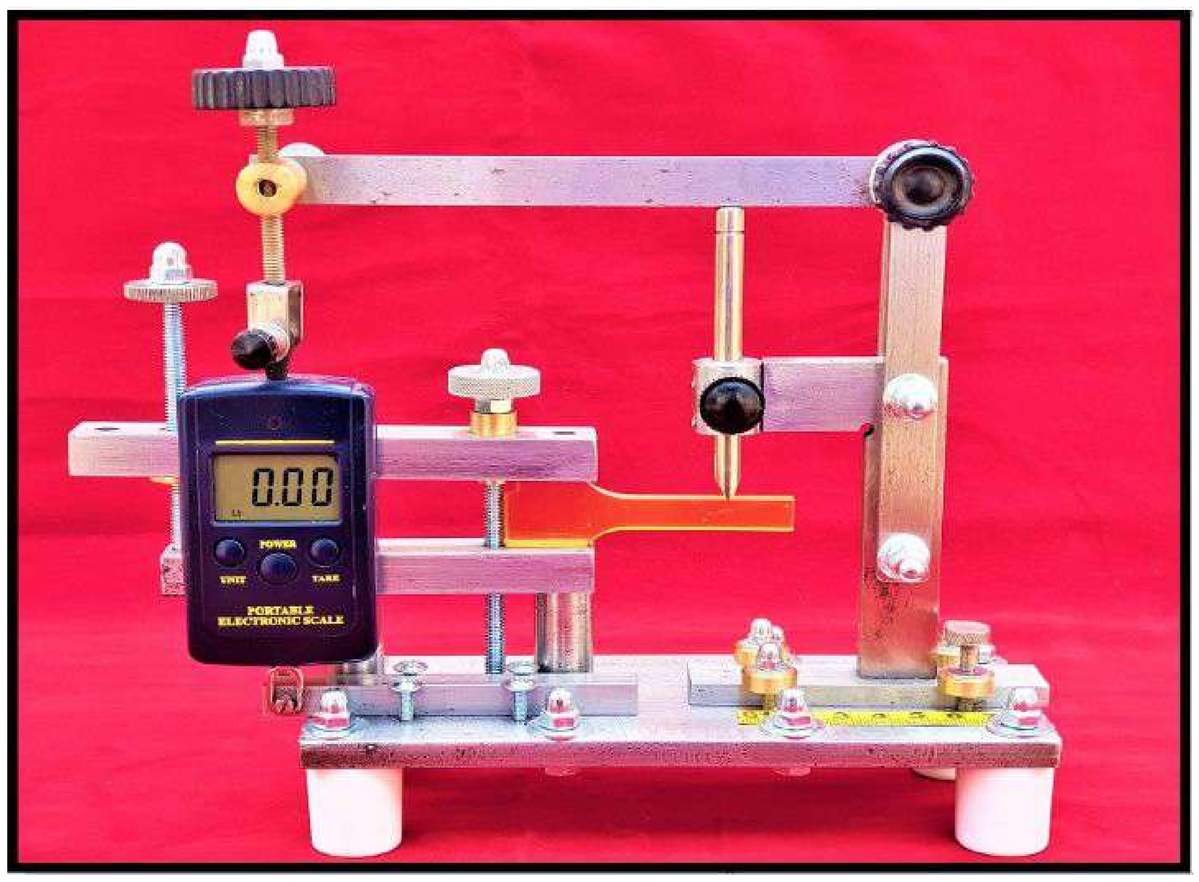

Fig. 2. Photo of the device with the digital bending test dynamometer of recessed bars

Fig. 5. Photo of the photoelasticimeter and the device during the request of the test tube **(2)**

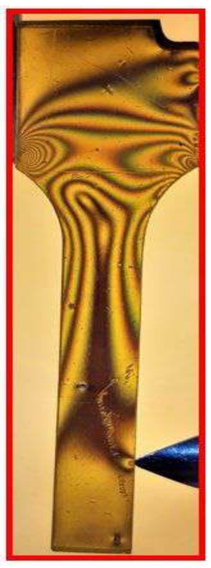

Fig.6. Variation of contour stresses

Fig. 3. Photo of the photoelasticimeter and the device during the request of the test tube **(1)**

Fig.4. Variation of contour stresses

Fig. 9 Photo of the photoelasticimeter and the device during the request

Fig.10 Variation of contour stresses

Fig. 7. Photo of the photoelasticimeter and the device during the test tube request **(3)**

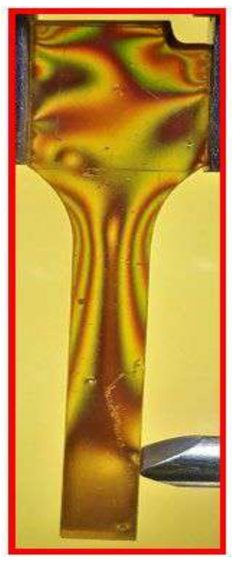

Fig.8. Variation of contour stresses

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Straight-toothed circular tooth-testing device

RO-BOPI 135898 A0

Authors: Bogdan – Roth Mihail, Romanet Mirela, Ripeanu George-Razvan

D

The invention relates to a device for testing the teeth of circular tooths with straight plastic teeth. The device conforming to the invention comprises a partially toothed metal wheel which can rotate around a fixed shaft engaged in the rotational movement by means of a movable rack operated by a testing machine. On the partially toothed wheel is mounted a metal piece of rack-and-pinion tooth type that acts on a plastic toothed wheel with the role of test specimen, mounted on the same horizontal shaft fixed on a support. The proposed device was designed and manufactured as a result of the need to test the strength of the teeth of the gears with straight teeth, made of plastics. The device has a compact construction. It can be attached to a classic machine for mechanical tensile and compressive strength tests.

With this device, toothed specimens with straight teeth made of Necuron 1300 material were tried, until a tooth broke. Two circular gear specimens were made and tested with module 2 and module 4.5 respectively.

The device presented in the RO128055B1 Patent[69], shapes the tooth to be broken as a rigid recessed beam, driven at the free end by a concentrated force transmitted by the testing machine. In this way, the interaction between the teeth of the gears during operation is not reproduced.

As we have seen from previous mechanical tests, the Necuron 1300 material has a very high bending capacity. In this situation, it was necessary to make the test device to reproduce the actual stress mode from the operation of the gears. The description of the components of the said device is shown in fig.1.

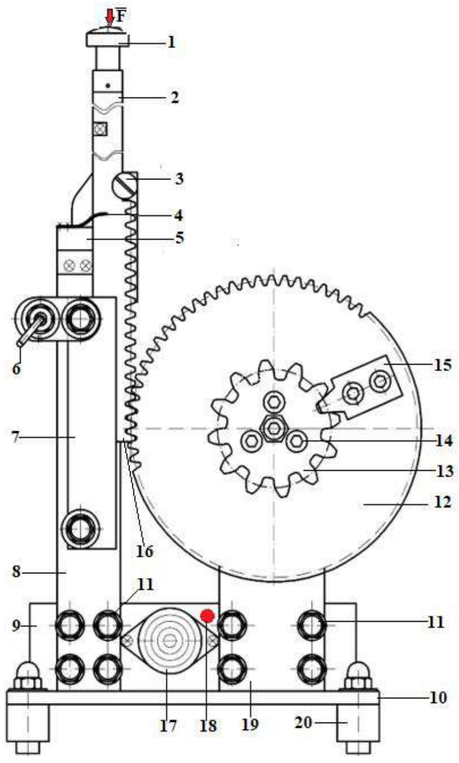


Fig. 1 Sketch of the device for testing the teeth of circular gears with straight teeth

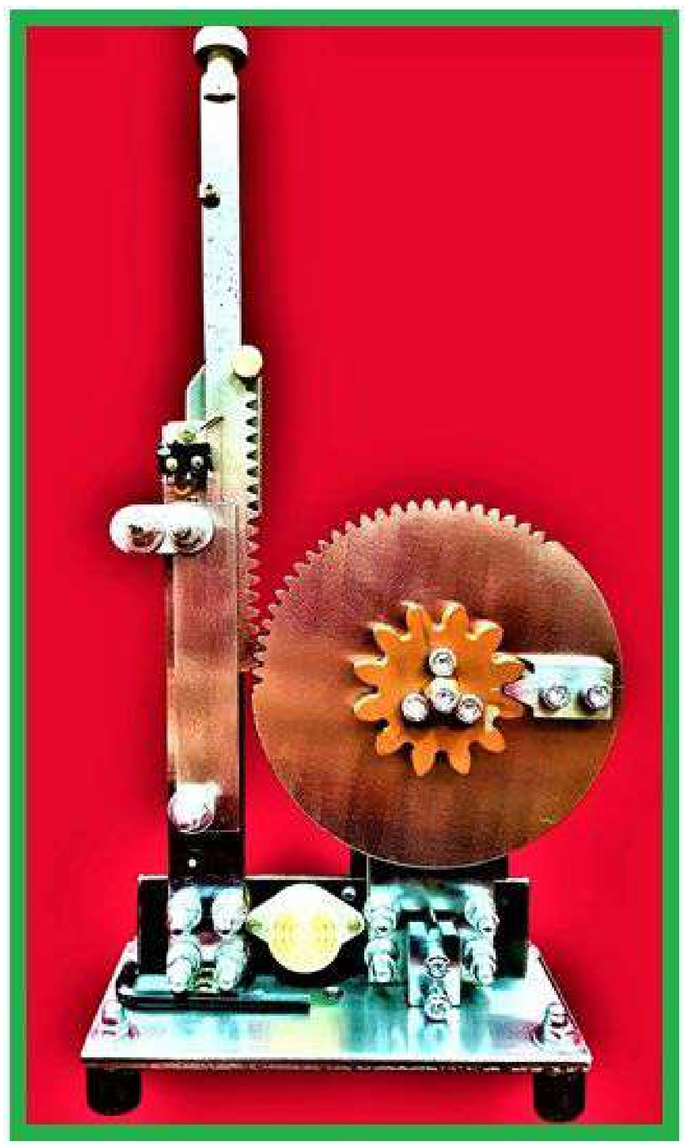


Fig.2. Photographic image of the device taken with the 4.5 mm module gear specimen

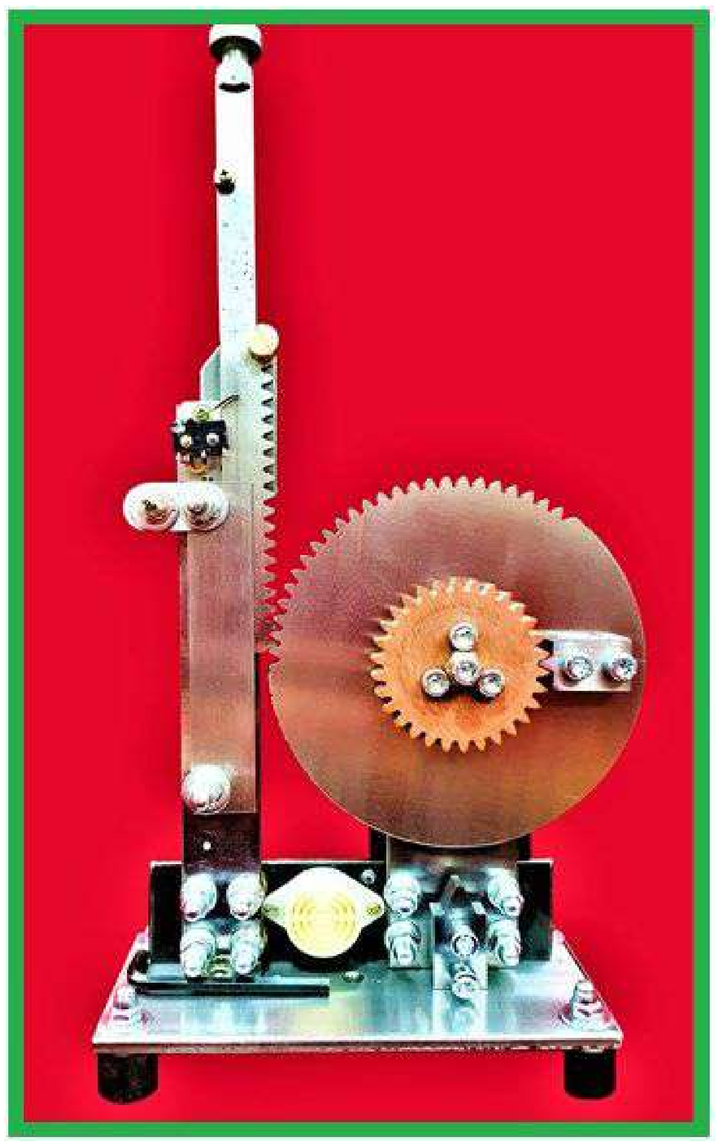


Fig.3. Photographic image of the device taken with the 2 mm module gear specimen

Fig.4. Gear specimens and rack and pinion tooth stress parts

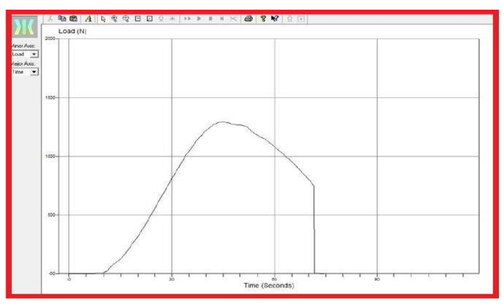


Fig. 6. Force variation curve - time for breaking the second tooth

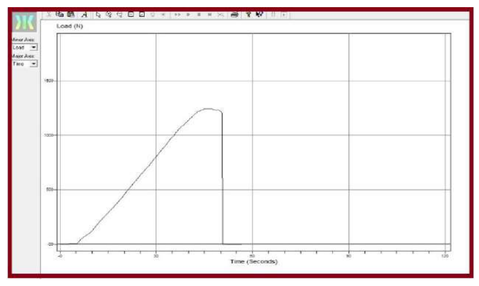
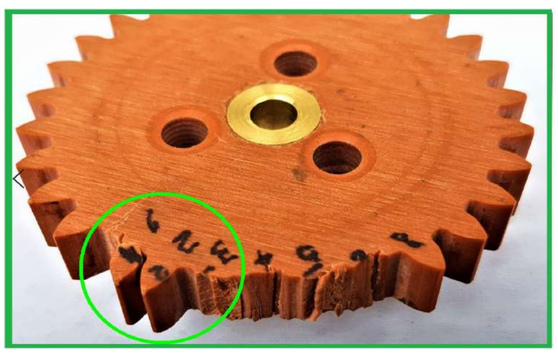
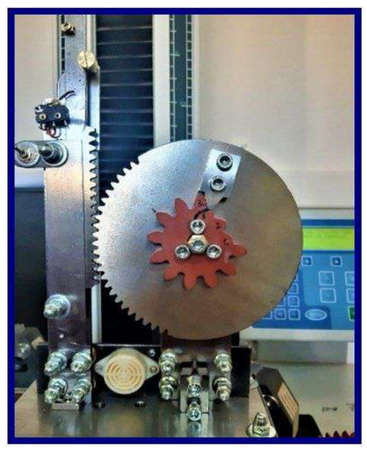


Fig.5. Force-time variation curve at breakage of the first tooth

Fig. 8. Gear Tube
(a) Toothed and detached teeth specimen; (b) Tooth-wheel specimen with tooth break shape highlighting





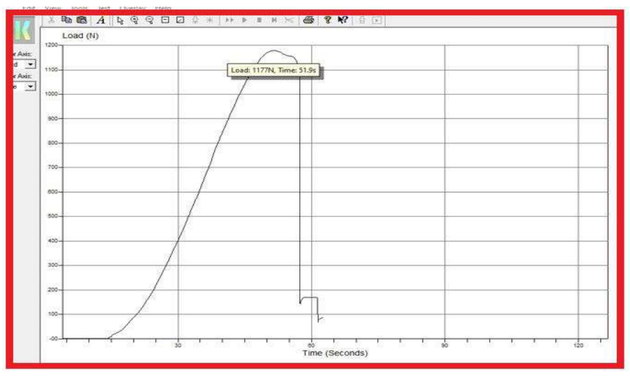


Fig.7. Gear wheel specimen device after breaking the third tooth

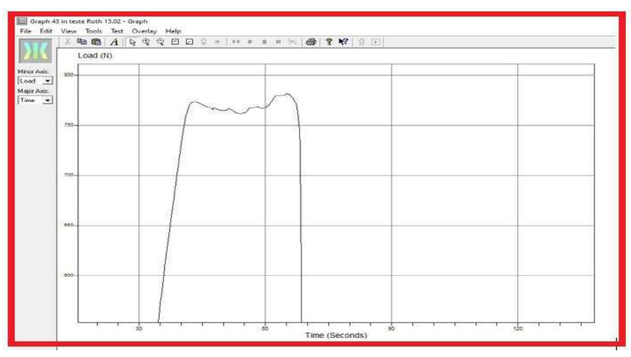


Fig. 11. Force variation curve - time for breaking the second tooth of the module 2 mm

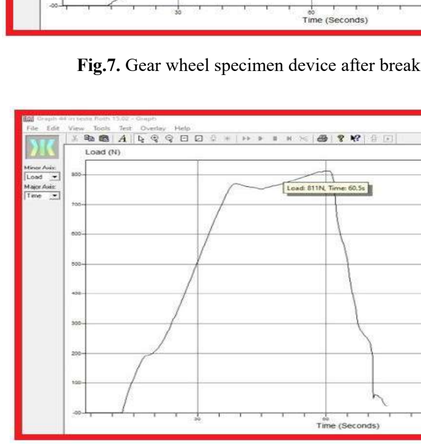


Fig. 9. Trying to break the first tooth

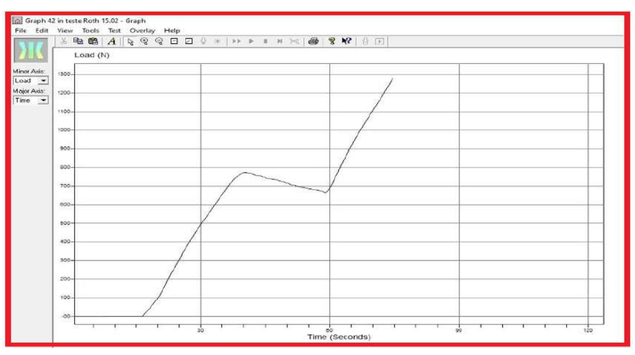


Fig.13. Force variation curve - time for breaking the first tooth of the 2 mm module

Fig. 12. Force variation curve - time for breaking the third tooth of the modulus 2 mm

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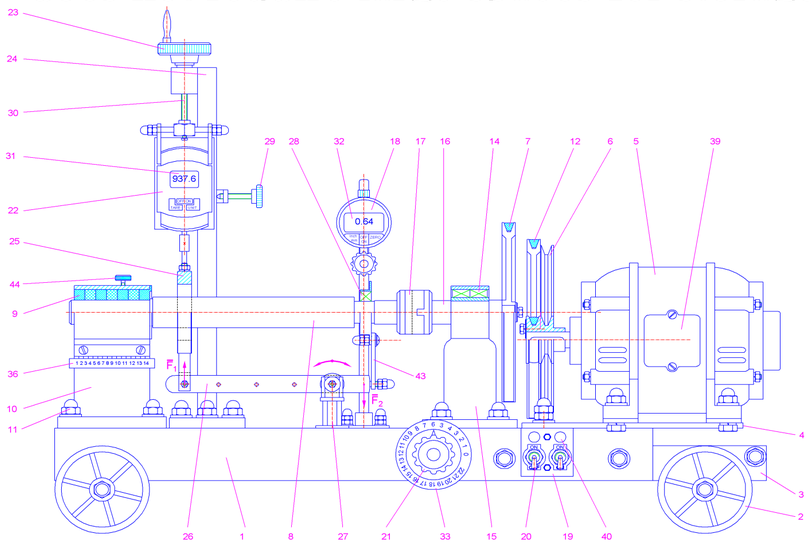
TEST STAND FOR DETERMINING MECHANICAL AND TRIBOLOGICAL CHARACTERISTICS IN STATIC AND DYNAMIC CONDITIONS USING THE RESISTIVE STRAIN GAUGE METHOD FOR SLIDING BEARINGS MADE OF PLASTIC MATERIALS, DESIGNED FOR OPERATION WITH CANTILEVER SHAFTS, FEATURING AN INTEGRATED LOADING SYSTEM AND DIGITAL FORCE AND DEFLECTION READING

A/ 00189/2024

Authors: Bogdan – Roth Mihail, Romanet Mirela, Zisopol Dragos-Gabriel, Dinita Alin, Minescu Mihail, Ripeanu Razvan -George

D

The invention relates to a stand for the determination of mechanical and tribological characteristics in static and dynamic mode by the method of resistive tensometry of plastic sliding bearings intended for operation with cantilever shafts with their own system of loading and digital reading of force and arrow. The sectioned experimental bearing with tensometric marks glued on these sections fig. 8 is located in the stand housing together with the conjugated experimental shaft. At the free end of the shaft, the force is applied, F_2 and by means of a digital dynamometer that generates the force that acts on a system of levers that amplifies the force, and the arrow is read on the screen of the digital comparator. The stand designed and executed in this way was made with a minimum consumption of materials, does not require large spaces for storage, has its own system for generating and measuring force and arrow.$F_1 F_1$



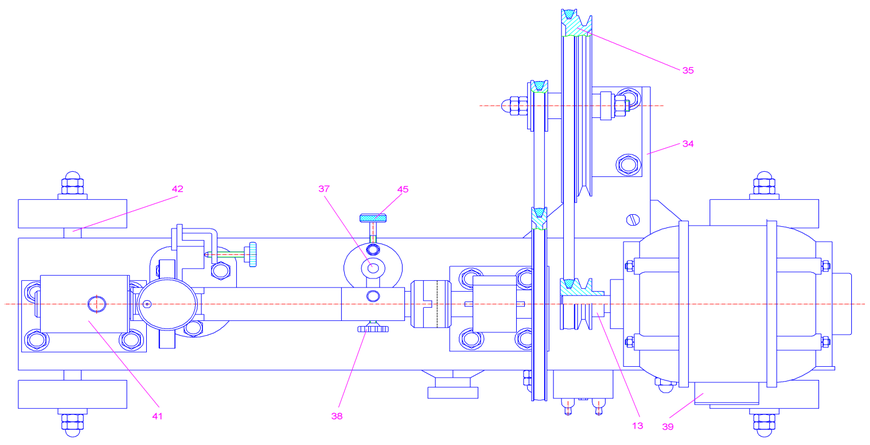


Fig. 1 . General drawing of the stand for testing sliding bearings (side view)

Fig. 4. The sliding bearing mounted in the housing (front view).

Fig. 3. Sliding bearing (sectioned) with applied strain gauge marks.

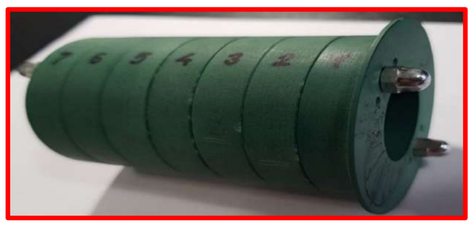


Fig. 2. Experimental sliding bearing made of Necuron 1050 material

Fig. 5. The sliding bearing mounted in the housing (rear view

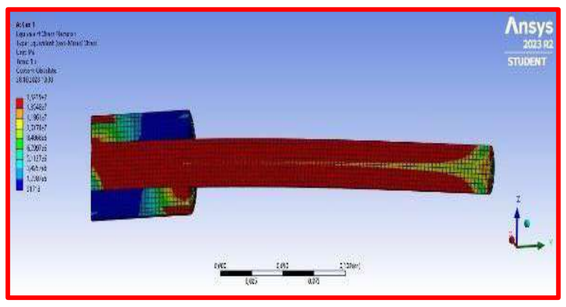


Fig. 6 Bushing-spindle assembly

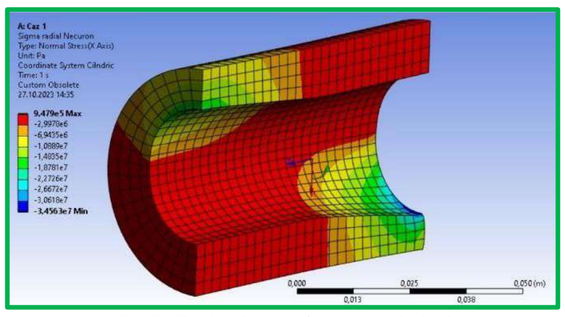


Fig. 7. The distribution of stresses in the bushing

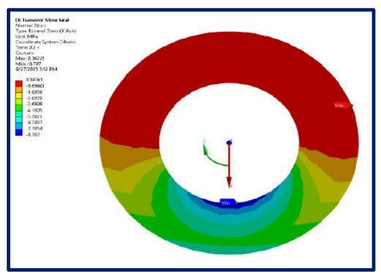


Fig. 8. MEF modeling of plain bearing without clearance μ =0.3

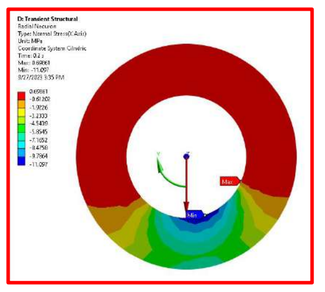


Fig. 10. MEF modeling of plain bearing with clearance 0.2 mm μ =0.3

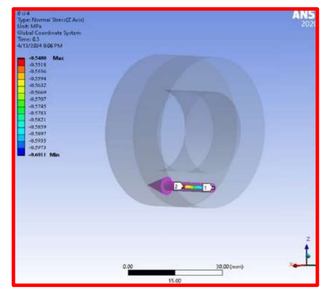


Fig.11.. Capture of the MEF machining of the cantilever bearing for the first two sections of the bearing showing the position of strain gauge marks 1 and 2 for force $F_2 = 235.2\ N$

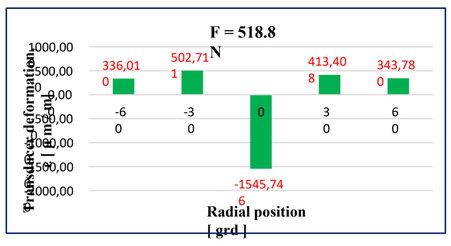


Fig. 12. Variation of deformations for mark 1, located on the lower generator and strain gauge marks 9,11 located radially at 30 degrees, left - right from the vertical axis of the bearing, respectively strain gauge marks 10,12 located radially at 60 degrees, left - right to the vertical axis of the bearing.

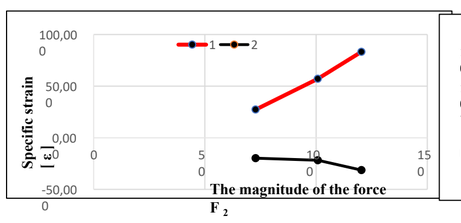


Fig. 13. shows the variation of the average specific deformations corresponding to the 3 forces applied to the free end of the shaft **(16)** for tensometric marks 1 and 2 located on the lower generator.

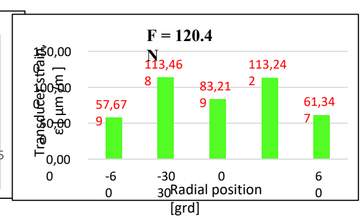


Fig. 14. Variation of deformations for mark 1, located on the lower generator and strain gauge marks 9,11 located radially at 30 degrees, left - right from the vertical axis of the bearing, respectively strain gauge marks 10,12 located radially at 60 degrees, left - right to the vertical axis of the bearing.

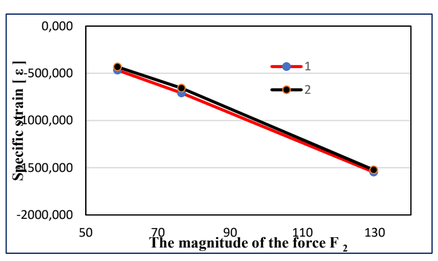
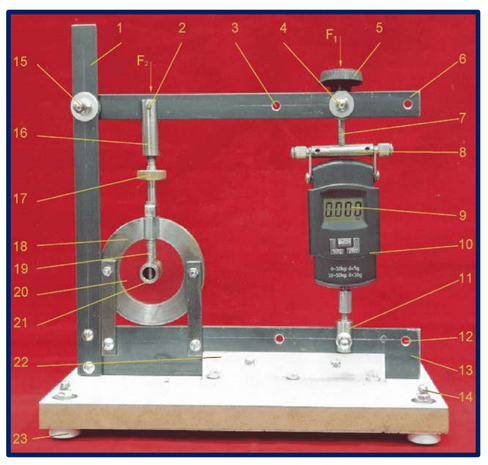
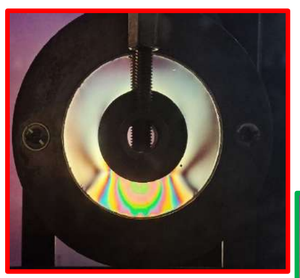
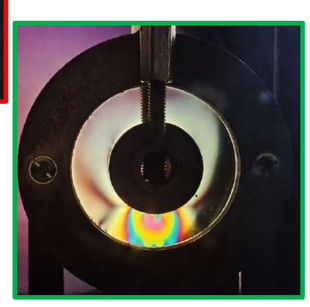


Fig. 15. The variation of the average specific deformations for tensometric marks 1 and 2 corresponding to the 3 forces applied to the free end of the shaft.

Comparison of the radial stresses of the results obtained experimentally and by the MEF method for $F_2 = 235.2\ N$	
Tensometric mark 1	Tensometric mark 2
$\sigma_{exp.} = -0.584\ MPa$	$\sigma_{exp.} = -0.541\ MPa$
$\sigma_{MEF.} = -0.601\ MPa$	$\sigma_{MEF.} = -0.548\ MPa$







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Stand for the determination of stresses and deformations along and at the height of the tooth for gears with inclined teeth and large widths by the method of resistive tensometry

Fig. 4. Gear ratios between the two wheels.

A00095/12-03-2025

Authors: Bogdan –Roth Mihail, Romanet Mirela, Bucur Mihai – Tiberiu, Cananau Sorin, Ripeanu George –Razvan, Dinita Alin

D

The invention relates to a stand for the determination of stresses and deformations in the length and height of the tooth for gears with inclined teeth and large widths by the method of resistive tensometry. With the original design stand, it is possible to simulate the operating behavior of gears with long, inclined, bent teeth, from the moment they enter the gear until they exit the gear. The variant of the stand designed by the author differs a lot from a constructive point of view compared to other stands. The stand is designed to operate attached to a universal laboratory machine for compression, which generates the force applied tangentially to the tooth, a force that determines the bending moment of the tooth along its length and height.

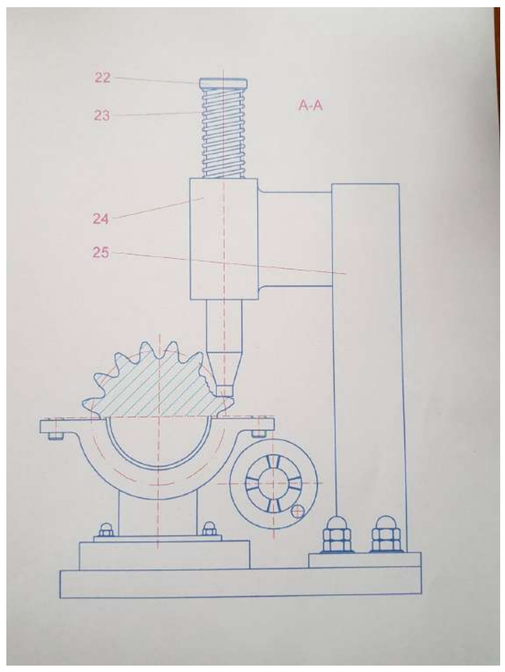


Fig.1 Stand sketch (front view)

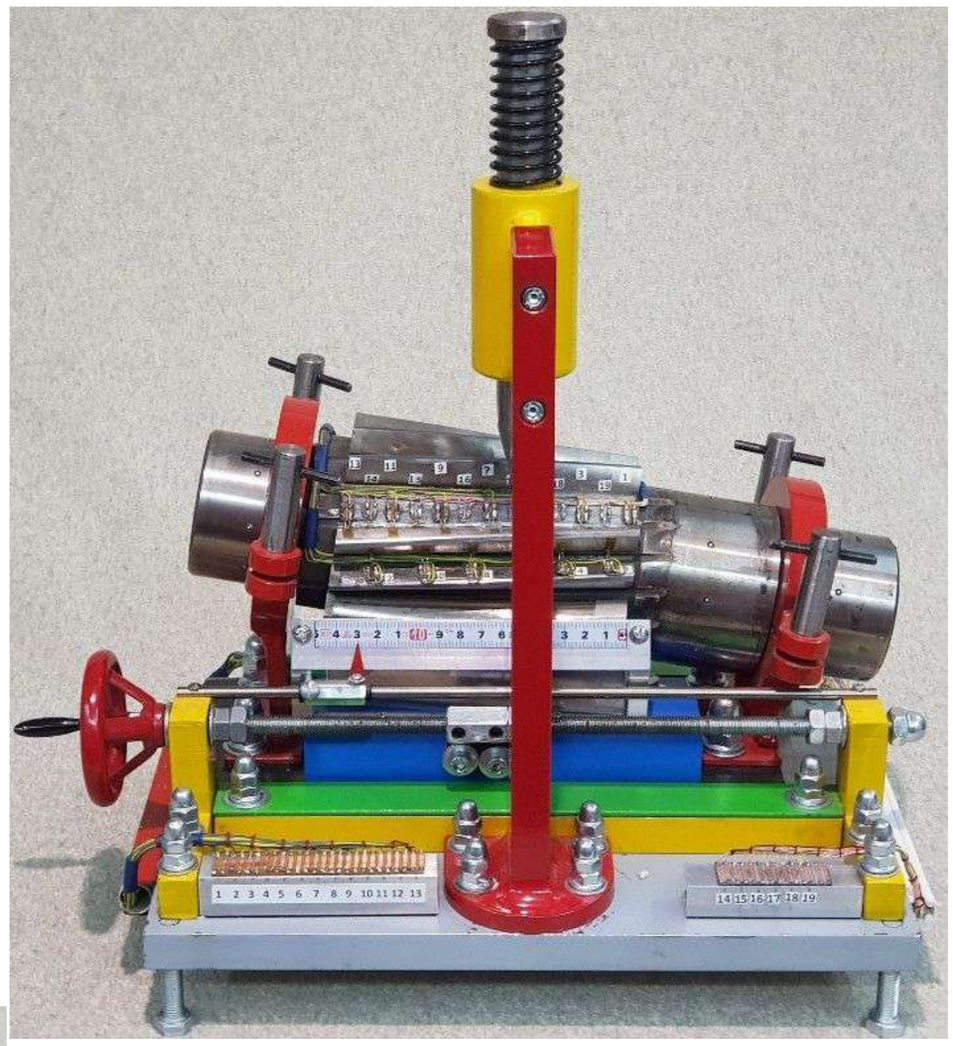


Fig. 4. Image of the stand (top view).

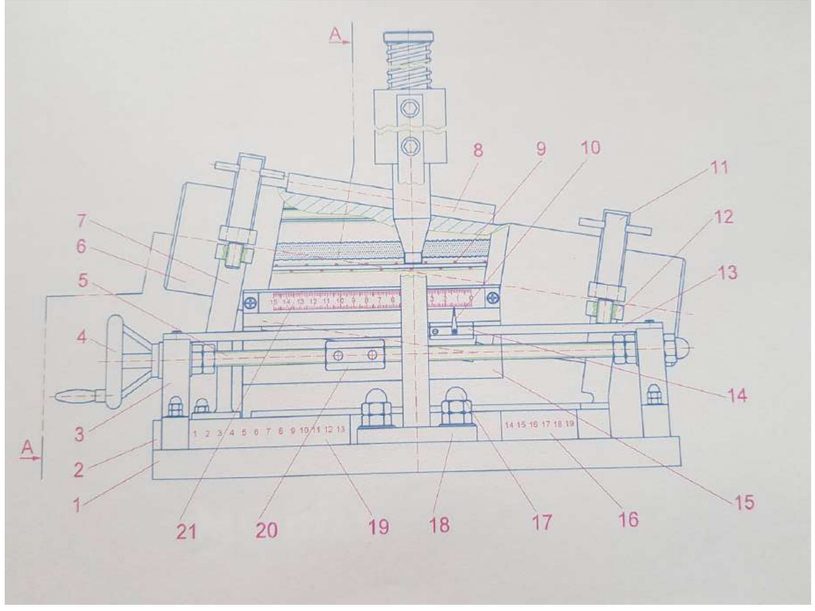


Fig.2 Stand Sketch (Side View)

Fig. 3. Picture of the stand (front view).

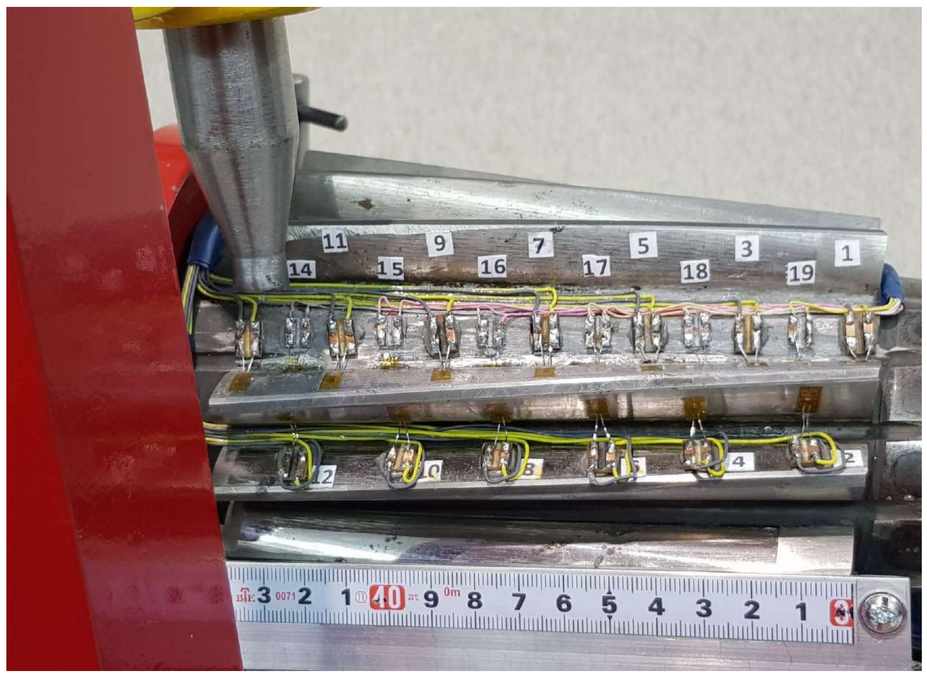
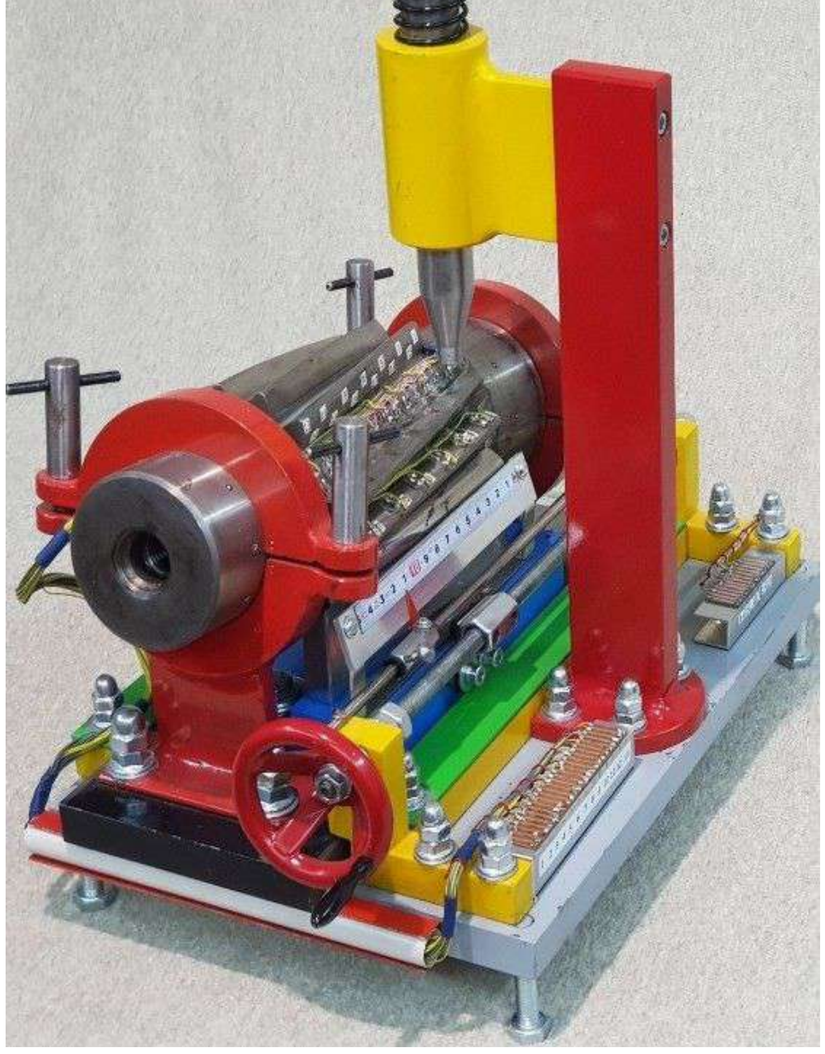
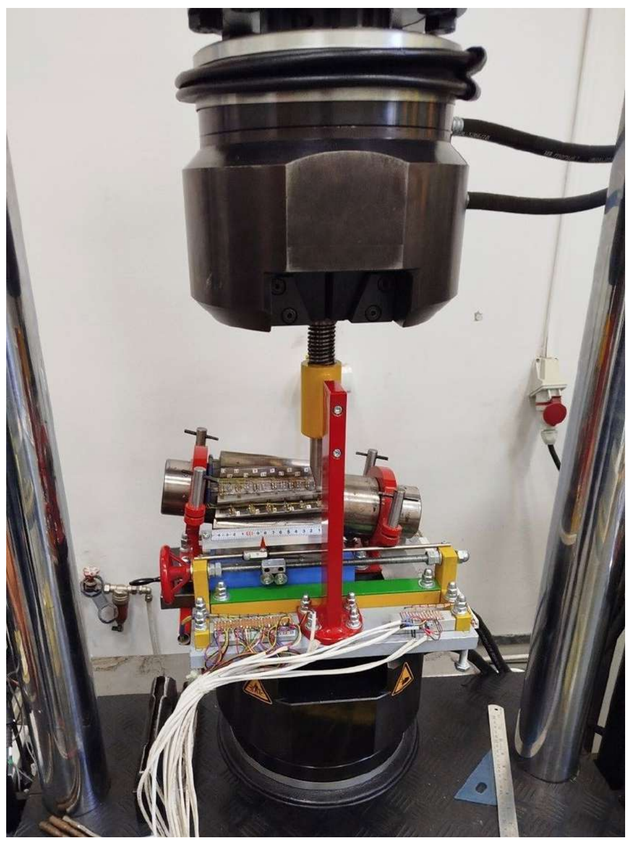
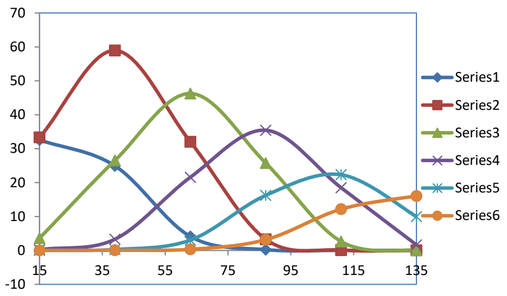
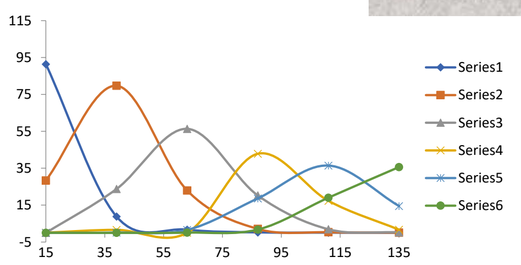


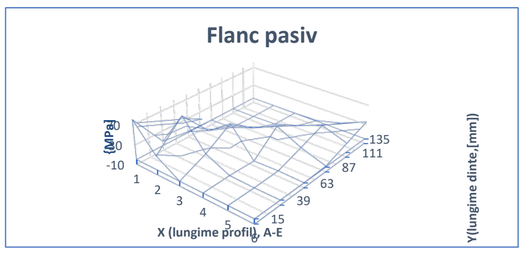
Fig.6. Image of the stand (detail of tensometric marks on the experimental tooth – top on the active flank and down on the passive flank)

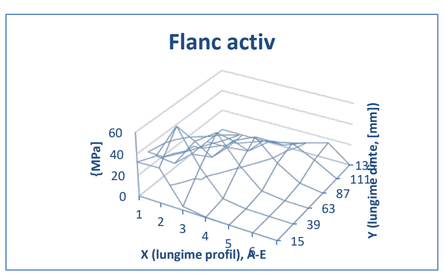


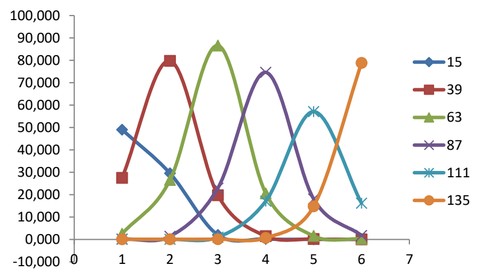


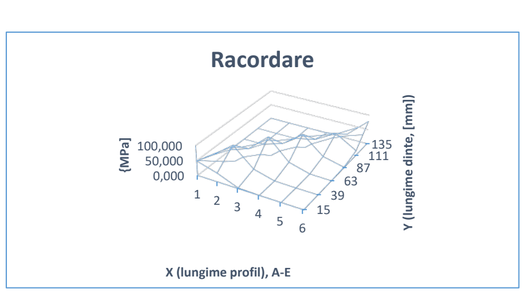












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Sustainable governance framework for universities in the perspective of Society 5.0

Patent/project: Research and innovation project
(governance model/decision-making support framework)
Author/s: Gabriela Ignat, Lilia Șargu

E

The project proposes an innovative governance framework designed to support universities in their transition to University 5.0, aligned with the principles of Society 5.0 and sustainable development goals. The framework integrates the social, environmental, educational, and institutional dimensions of sustainability into the strategic management and decision-making processes of universities. It enables higher education institutions to go beyond traditional academic functions by adopting a stakeholder-oriented governance model, in which students, academic staff, society, and public institutions actively contribute to the implementation of sustainability.

The proposed approach supports universities in: integrating sustainable development principles into institutional governance and policies; improving stakeholder participation in decision-making processes; strengthening sustainability education and awareness within the academic ecosystem; improving transparency, communication, and institutional accountability; supporting innovation, interdisciplinarity, and social engagement in line with the requirements of Society 5.0. The framework acts as a decision-support and strategic governance tool, helping universities assess opportunities and challenges related to sustainable transformation while increasing institutional resilience, social impact, and long-term value creation.

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ADAPTABILITY TO TELEWORKING IN EUROPEAN COUNTRIES

Aniela Bălăcescu, Aurelia Pătrașcu, Loredana Maria Păunescu

The paper explores the adaptability to telework in 30 European countries, studying on the one hand the similarities and differences between them, and on the other hand how authorities implement national and European digital strategies and the involvement of all stakeholders (public, private sector, civil society) in the process of digital transformation.

The methodology used in the research allowed us to group the analyzed countries according to the variables related to internet access, user training level, level of digital skills of employees, level of habituation and acceptability of staff on the use of digital technologies, degree of use of the Internet in everyday life, in relations with public authorities and in working from home.

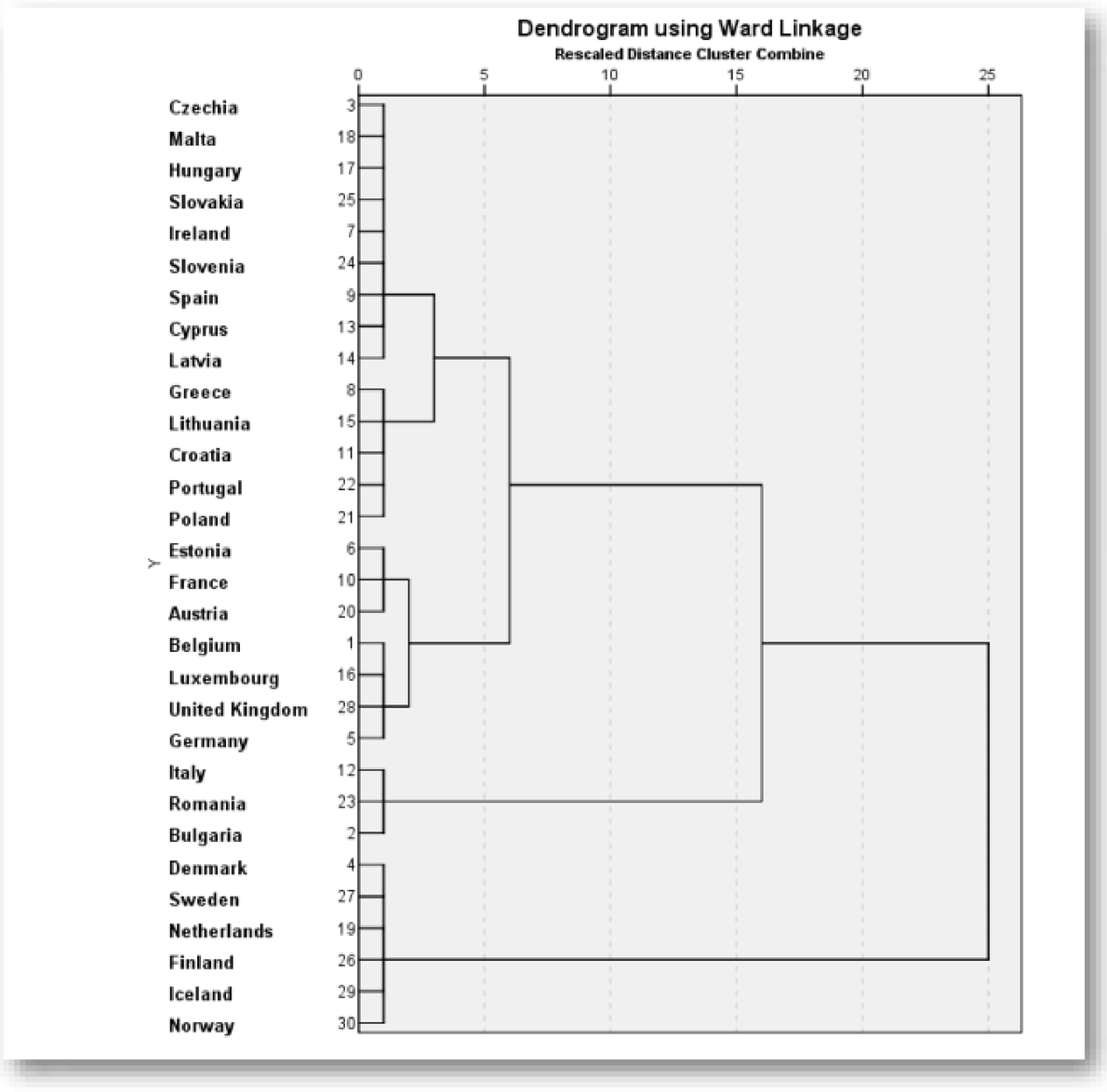


Table no. 4. The structure of clusters

Cluster	N	
1	4	Belgium, Luxembourg, UK, Germany
2	3	Italy, Romania, Bulgaria
3	9	Czehia, Malta, Hungary, Slovakia, Ireland, Slovenia, Spain, Cyprus, Latvia
4	6	Denmark, Sweden, Netherland, Finland, Iceland, Norway
5	3	Estina, France, Austria
6	5	Greece, Lithuania, Croatia, Portugal, Poland

The results of the study show that there are large disparities in the telework adaptability, such as: poor adaptability (Southern and South-Eastern Europe), medium adaptability (Central Europe), high adaptability (Western and Central Europe), very high adaptability (Northern and Northwest Europe). The results also suggest that the success of rapid adaptation to telework seems to be linked to the quality of digital skills. Rapid technological change is a real challenge for employees, who need to continuously adapt their skills to the new requirements. The employees' digital skills can be enhanced through corporate investments made in their training and the adoption of digital technologies and investments. On the other hand, supporting a digitally skilled workforce through policy tools and actions helps to build and deliver sustainable human capital. The Nordic countries are at the forefront of the digital transformation process and can serve as role models for the other states in developing and implementing digital strategies, otherwise the use of inadequate policy tools will increase social inequalities.

Contact: Bălăcescu Aniela – e-mail: anielabalacescu@gmail.com

IMPACTUL ECONOMIC PE CARE ÎL AU PROIECTELE DE FINANȚARE START UP PLUS ȘI DIASPORA

THE ECONOMIC IMPACT OF START UP PLUS AND DIASPORA FINANCING PROJECTS

E

Patent/project number: Seria O Nr. 7271 din 10.05.2022

Author/s:Șargu Lilia, Manea Ciprian, Ignat Gabriela

Oportunitatea dezvoltării afacerilor in perioada contemporană asistată de finanțările externe o constituie proiectele orientate spre interesarea tinerilor in afaceri și atragerea surselor financiare câștigate in exterior. Orientarea celor două direcții strategice pe filiera finanțării europene a constituit o experiență pentru cei care vor să pună o idee de afaceri in practică, o șansă reală pentru cei motivați să nu mai plece din țară sau să revină în țară și o bună oportunitate pentru un start în afaceri a celor ce până acum nu au mai avut experiențe de acest tip. Estimarea rezultatelor implementării proiectelor orientate segmentelor de dezvoltare a activității de antreprenoriat a constituit o sursă de valoare pentru fundamentarea elementelor managementului proiectelor, identificarea factorilor dezvoltării durabile, asigurarea sursei de bune practici privind acțiunile de susținere a afacerilor, studii și cercetări pentru argumentarea teoretico-practică a teoriilor orientate pe domenii economico-manageriale, formarea unor concluzii relevante obiectivelor strategice pentru dezvoltarea IMM-urilor. Rezultatele studiului fiind o sursă nu doar pentru economia și mediul de afaceri din România, dar și un suport pentru celelalte țări interesate în implementarea proceselor de finanțare externă a antreprenoriatului și mediului de afaceri orientat pe elemente inovatoare cu aplicarea celor mai noi tehnologii și cu elemente de dezvoltare durabilă. Bunele practici fiind preluate au șansa de izbândă mai mare atunci când sunt filtrate prin prisma problemelor și deficiențelor identificate de aplicanții anteriori, fapt ce a stat și la baza cercetării realizate și prezentate de autori în conținutul studiului. Valorificarea elementelor de noutate identificate în rezultatul cercetării vor asigura o certitudine în procesele de planificare, evaluare, implementare și control al ulterioarelor finanțări legate de subiectul dezvoltării și susținerii ideilor de afaceri bazate pe antreprenoriat durabil.

Summary:

The opportunity for business development in today's world assisted by external funding is projects aimed at getting young people interested in business and attracting financial sources from abroad. The orientation of the two strategic directions on the European funding channel has been an experience for those who want to put a business idea into practice, a real chance for those motivated not to leave the country or to return to the country and a good opportunity for a business start-up for those who have not had experiences of this kind before. Estimation of the results of implementation of projects oriented to the segments of development of entrepreneurial activity was a source of value for substantiation of elements of project management, identification of factors of sustainable development, provision of source of good practices on actions of business support, studies and researches for theoretical-practical argumentation of theories oriented to economic-managerial fields, formation of conclusions relevant to strategic objectives for SME development. The results of the study being a source not only for the Romanian economy and business environment, but also a support for other countries interested in implementing processes of external financing of entrepreneurship and business environment oriented on innovative elements with the application of the latest technologies and with elements of sustainable development. Good practices being taken up have a greater chance of success when they are filtered through the prism of problems and shortcomings identified by previous applicants, which was also the basis of the research conducted and presented by the authors in the content of the study. Harnessing the elements of novelty identified in the research output will provide certainty in the planning, evaluation, implementation and monitoring processes of subsequent funding related to the topic of developing and supporting business ideas based on sustainable entrepreneurship.

REPUBLICA MOLDOVA

Agenția de Stat pentru Proprietatea Intelectuală

CERTIFICAT

DE ÎNREGISTRARE A OBIECTELOR DREPTULUI DE AUTOR ȘI DREPTURILOR CONEXE

SERIA O NR. 7271

DIN 10.05.2022

Eliberat în temeiul Legii nr.139/2010 privind dreptul de autor și drepturile conexe, obiectul de pe verso a fost înregistrat în Registrul de Stat al obiectelor protejate de dreptul de autor și drepturile conexe

Director General

CHIȘINĂU

Seria: O

Numărul de înregistrare: 7271

Data înregistrării: 21.04.2022

Numărul cererii: 2054

Denumirea obiectului: „IMPACTUL ECONOMIC PE CARE ÎL AU PROIECTELE DE FINANȚARE START UP PLUS ȘI DIASPORA"

Autor/i:

Șargu Lilia IDNP: 0971104422789

Manea Ciprian CNP: 1880817104274 (România)

Ignat Gabriela CNP: 2670921221300 (România)

Titularul drepturilor patrimoniale:

Instituția Publică Academia de Studii Economice din Moldova

IDNO: 1007600005951

EXTRAS

din Legea nr. 139/2010 privind dreptul de autor și drepturile conexe:

Art. 5 alin. (6): Protecția dreptului de autor se extinde asupra formei de exprimare, dar nu se extinde asupra ideilor, teoriilor, descoperirilor științifice, procedeelor, metodelor de funcționare sau asupra conceptelor matematice ca atare și nici asupra invențiilor cuprinse într-o operă, oricare ar fi modul de prelucrare, explicare sau de exprimare.

L.Ș. Șef Direcție Drept de Autor

AGENȚIA DE STAT PENTRU PROPRIETATEA INTELECTUALĂ A REPUBLICII MOLDOVA

Centre for Innovation and Technological Transfer, Șargu Lilia, centru.itt@gmail.com

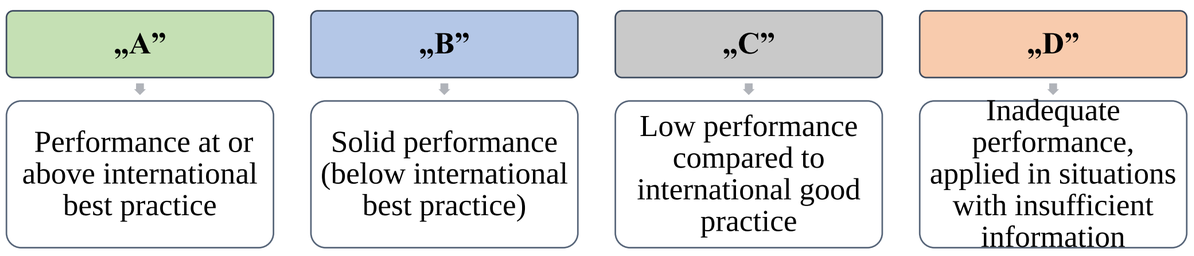
Estimating the performance of national and regional tax systems

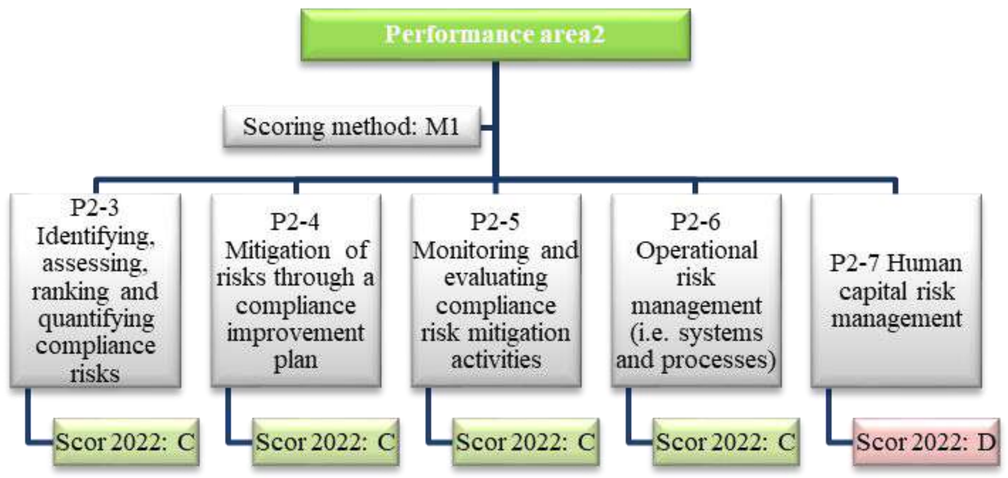
Patent/project number: Seria OȘ Nr. 7978 din 15.08.2024

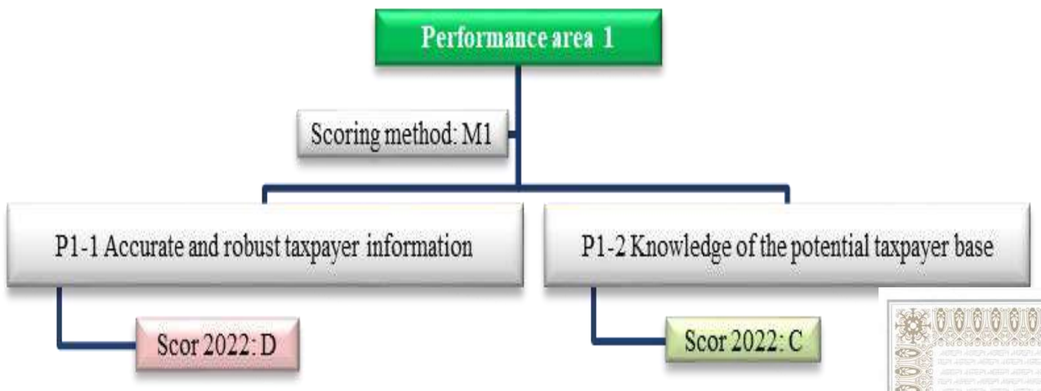
Author/s:Șargu Nicu

E

9 performance areas and 32 high-level indicators essential to assessing tax administration performance, and each of the 55 measurement dimensions associated with these scores is scored on a four-point 'ABCD' scale, reflecting the level of performance compared to international good practices







REPUBLICA MOLDOVA

Agenția de Stat pentru Proprietatea Intelectuală

ADEVERINȚĂ

privind înscrierea obiectelor dreptului de autor şi ale drepturilor conexe

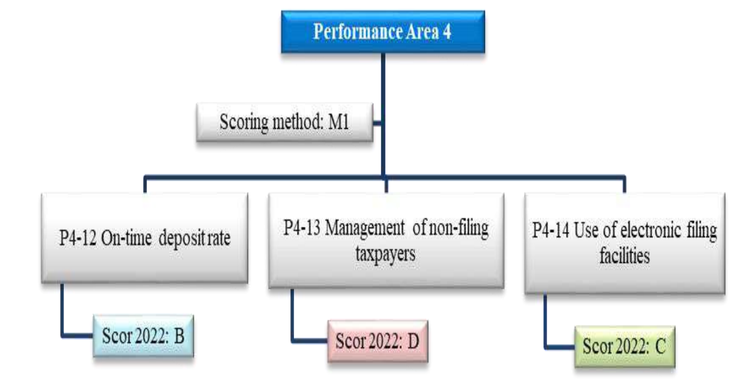
SERIA OȘ NR. 7978

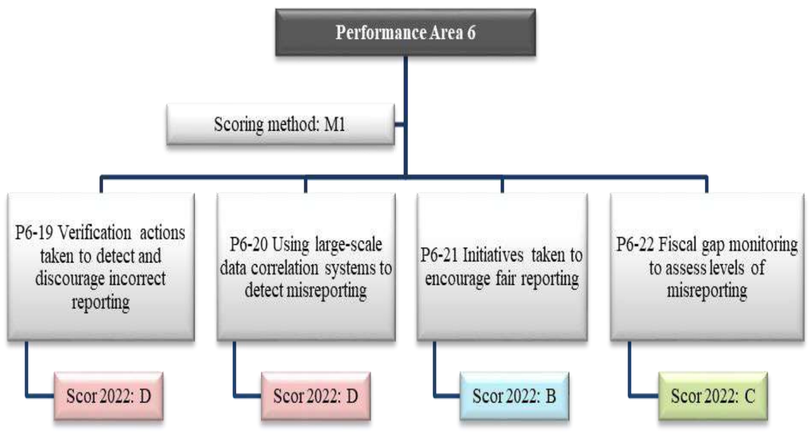
DIN 15.08.2024

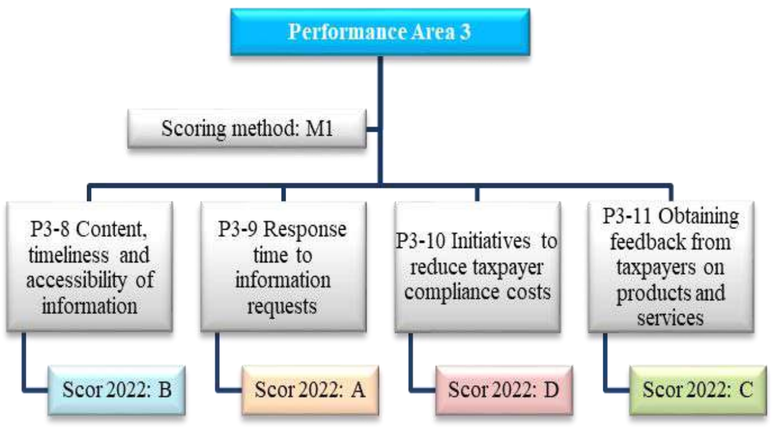
eliberată în temeiul Legii nr. 230/2022 privind dreptul de autor şi drepturile conexe, prin care se confirmă înscrierea obiectului de pe verso în Registrul de Stat al obiectelor protejate de dreptul de autor şi drepturile conexe

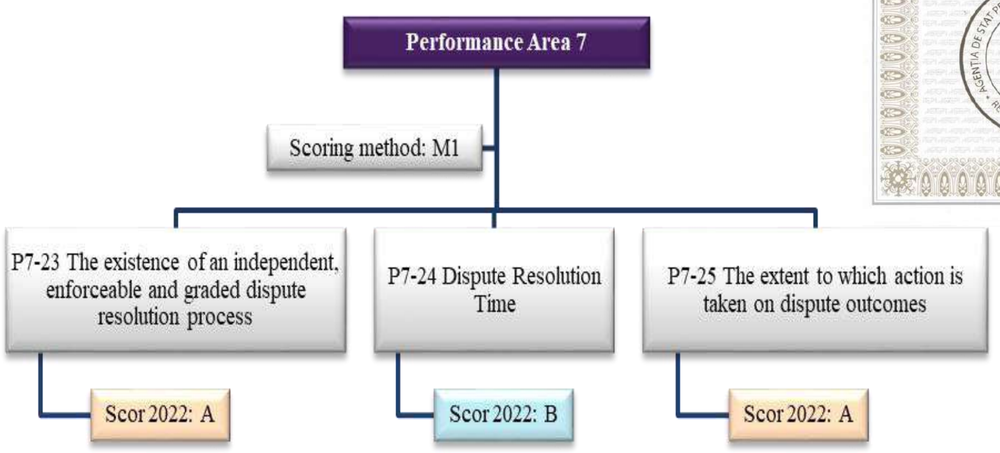
Director general

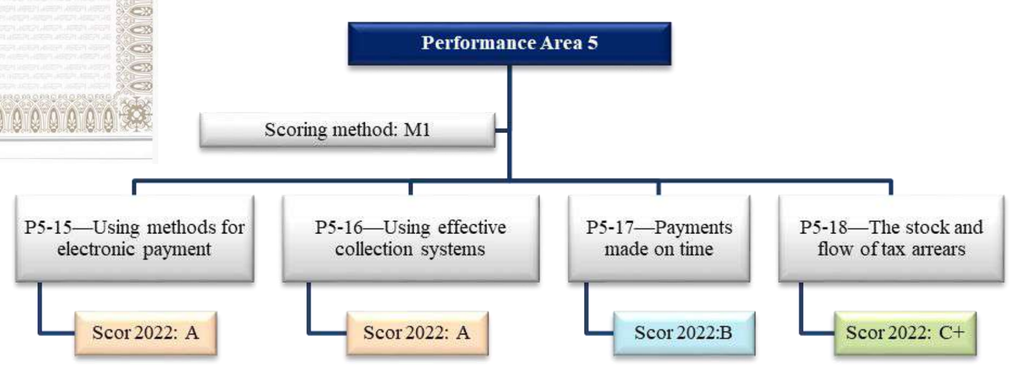
CHIȘINĂU

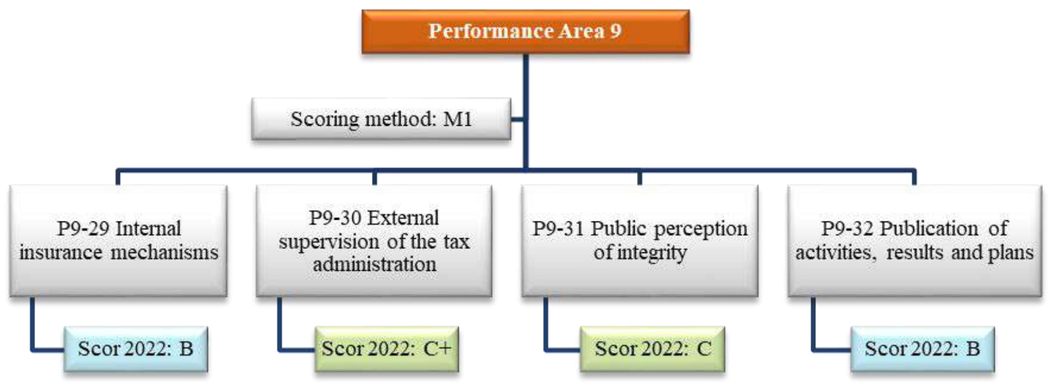


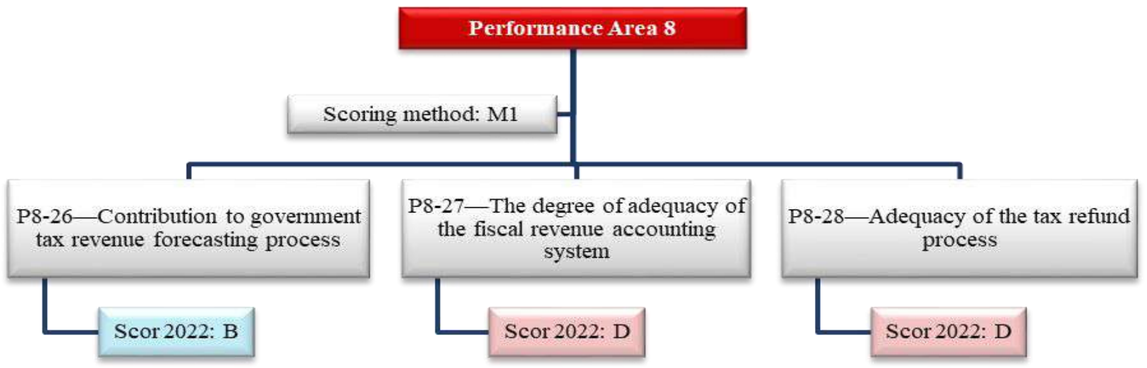












Centre for Innovation and Technological Transfer, Șargu Lilia, centru.itt@gmail.com

STUDIEREA SITUAȚIILOR ATIPICE LA NIVEL MACROECONOMIC ÎN REPUBLICA MOLDOVA PRIN APLICAREA ELEMENTELOR CERCETĂRII DE MARKETING

Patent/project number: Seria O Nr. 6473 din 08.10.2019

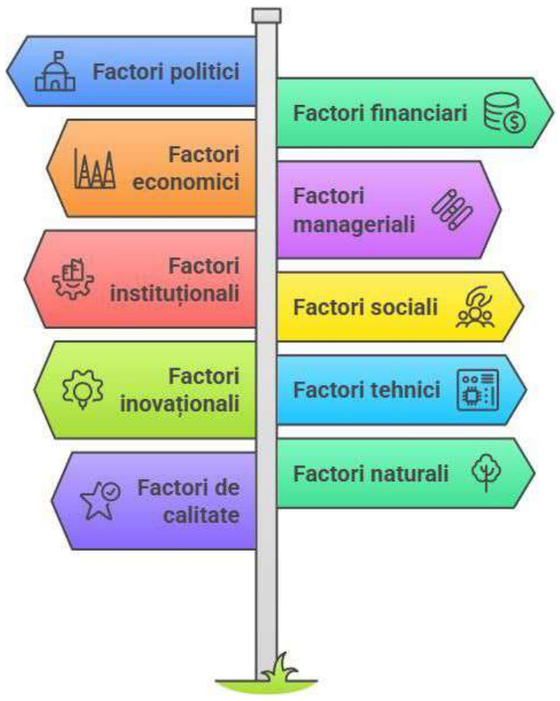
Author/s:Șargu Lilia

E

The frequent occurrence of atypical situations at the macroeconomic level that threaten long-term strategic planning shows an unstable environment of economic processes in the modern economy. Proper management of atypical situations lies in the ability to identify, classify, and study the nature and factors involved in creating these atypical situations that are increasingly common in a modern market economy. The study of non-standard situations in the Republic of Moldova represents both a scientific innovation with an innovative character and a potential incentive for the development of a new type of management - management of atypical situations. Knowledge of the characteristics of atypical situations that manifest themselves at the macroeconomic level represents a significant support in the process of effectively managing similar situations in other regions or countries of the world. The author's research is based on the competence, professionalism of the scientific and academic environment in the country, which helped the author to identify various atypical situations by importance in acting at the macroeconomic level. Thanks to this, the author was able to establish the degree of importance of factors influencing atypical situations, in accordance with the degree of their decision and in the context of effectively solving them. The importance of the innovative proposal will contribute not only to improving the process of solving atypical or similar situations, but also in the context of identifying solutions in priority segments that will ensure the reduction of atypical situations at the macroeconomic level in the future.

Aranjarea în rang a factorilor de influență a situațiilor atipice după gradul de importanță în contextul soluționării

Rangul după gradul de importanță a soluționării	Factori de influență
I	Factorii politici
II	Factorii financiari
III	Factorii economici
IV	Factorii manageriali
V	Factorii instituționali
VI	Factorii sociali
VII	Factorii inovaționali
VIII	Factorii tehnici
IX	Factorii de calitate
X	Factorii naturali



REPUBLICA MOLDOVA
Agenția de Stat pentru Proprietatea Intelectuală

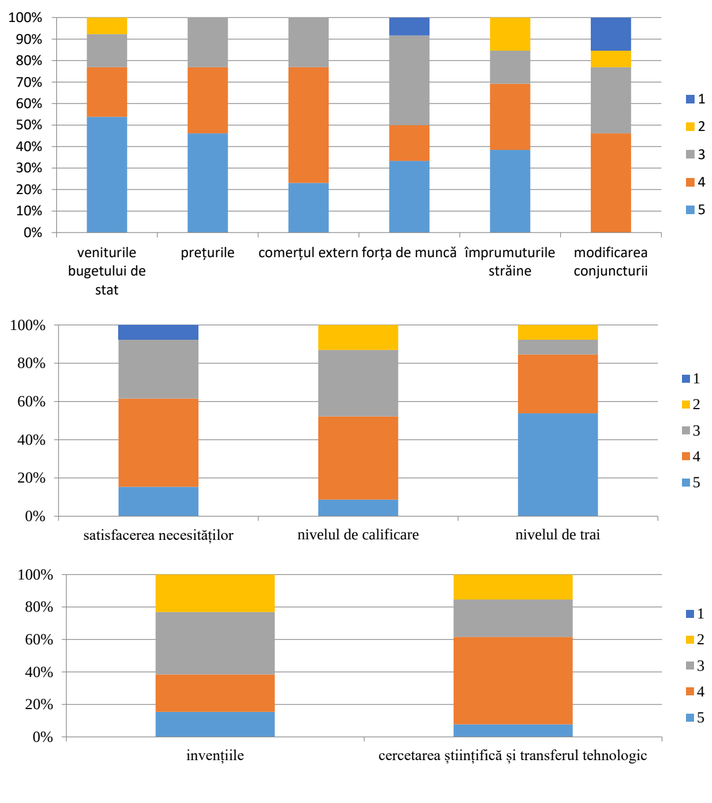
CERTIFICAT
DE ÎNREGISTRARE A OBIECTELOR DREPTULUI DE AUTOR ȘI DREPTURILOR CONEXE

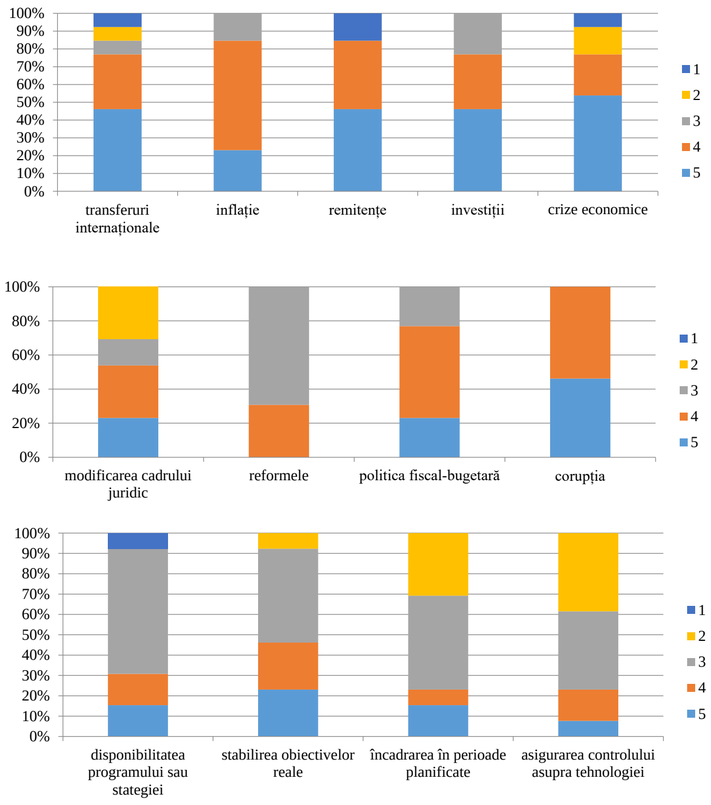
SERIA O NR. 6473
DIN 08.10.2019

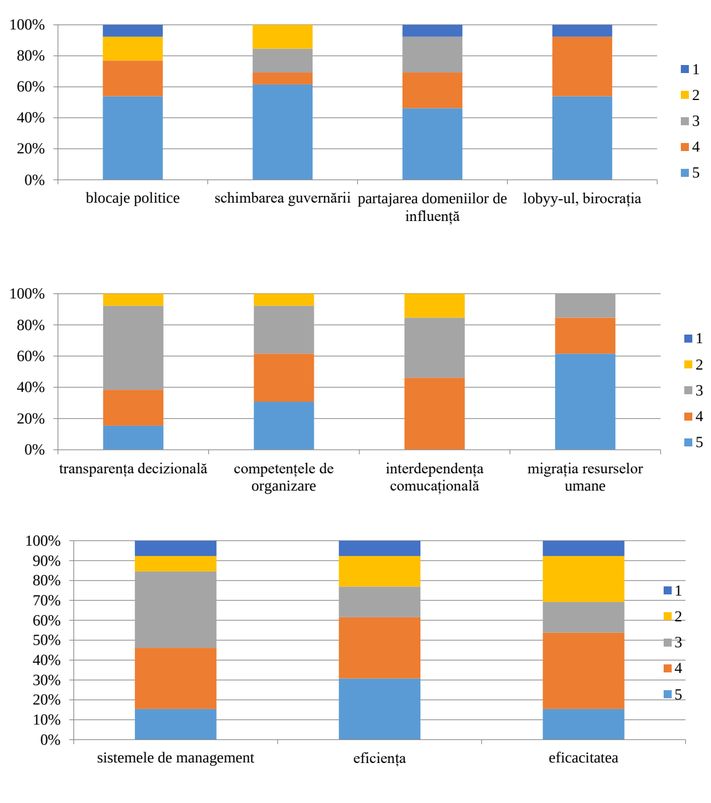
Eliberat în temeiul Legii nr.139/2010 privind dreptul de autor și drepturile conexe, obiectul de pe verso a fost înregistrat în Registrul de Stat al obiectelor protejate de dreptul de autor și drepturile conexe

Director General

CHIȘINĂU







Centre for Innovation and Technological Transfer,
Șargu Lilia, centru.itt@gmail.com

Measuring economic resilience indicators in the context of external shocks

Patent/project number: ***Project under the institutional subprogram 030101 "Strengthening the resilience, competitiveness and sustainability of the economy of the Republic of Moldova in the context of the accession process to the European Union", institutional funding, (2024-2027)***

Author/s:Angela Timuș, Viorica Popa, Cristina Ungur, Șargu Lilia

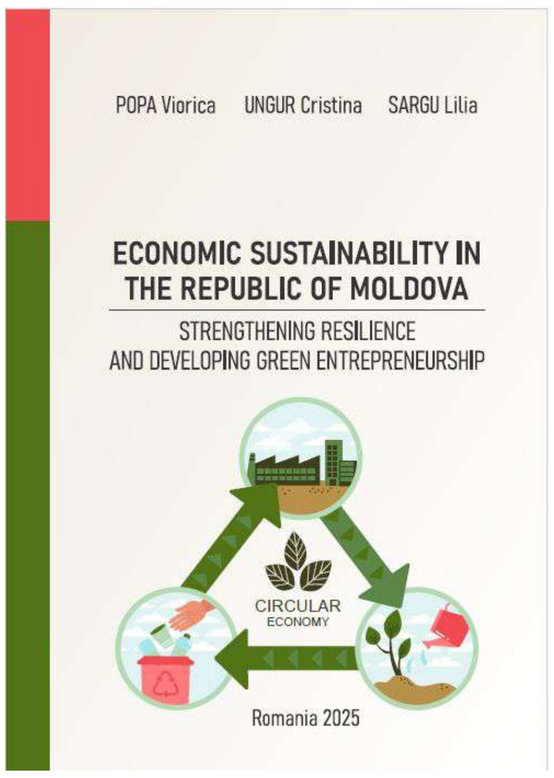
E

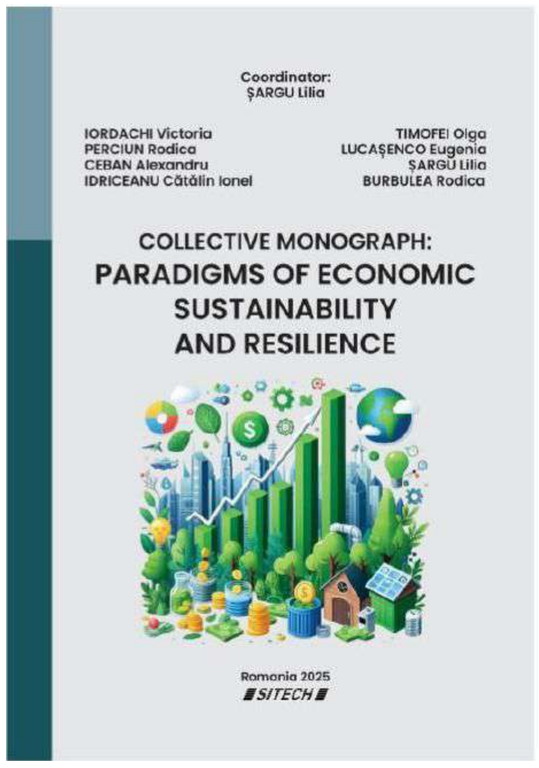
This project sets out to provide a strategic diagnosis of the resilience of the national economy of the Republic of Moldova by examining its ability to withstand and adapt to fluctuations and crises generated by external shocks such as global economic changes, international financial crises, volatility in natural resource prices, or other disruptive events. The analysis is grounded in a methodological framework for measuring strategic indicators of economic resilience, aiming not only to identify vulnerabilities but also to highlight the factors that enable rapid recovery and the continuation of sustainable long-term development.

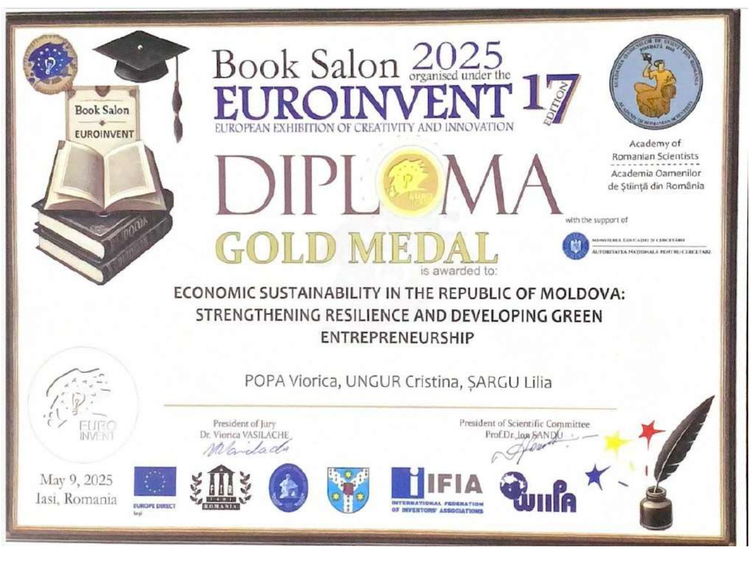
The study emphasizes the importance of resilience indicators as essential tools for assessing economic stability, adaptability, and the capacity of institutions and markets to respond effectively under stress conditions. In this regard, the research pursues the development of strategic models that integrate both theoretical insights and practical policy measures, offering a comprehensive approach to strengthening national resilience.

The central objective of the study is to evaluate the Moldovan economy through the prism of resilience, proposing tailored models that improve crisis management and adaptive capacity. These models are designed to contribute to consolidating macroeconomic stability, ensuring fiscal sustainability, and reinforcing long-term competitiveness. Moreover, the paper highlights the relevance of resilience strategies for aligning national economic policies with European integration objectives and global economic dynamics.

Through its findings, the study provides decision-makers with strategic recommendations aimed at reducing vulnerabilities, improving preparedness, and promoting sustainable economic growth. As such, the work represents a significant contribution to both the academic literature and policy practice in the field of economic resilience.







Centre for Innovation and Technological Transfer, Șargu Lilia, centru.itt@gmail.com

TRENDS IN THE ECONOMY OF THE REPUBLIC OF MOLDOVA

Macroeconomic diagnosis and substantiated support in the integration process

Patent/project number: *ISSN* 1857-3126

Author/s: National Institute for Economic Research, Academy of Economics Studies of Moldova

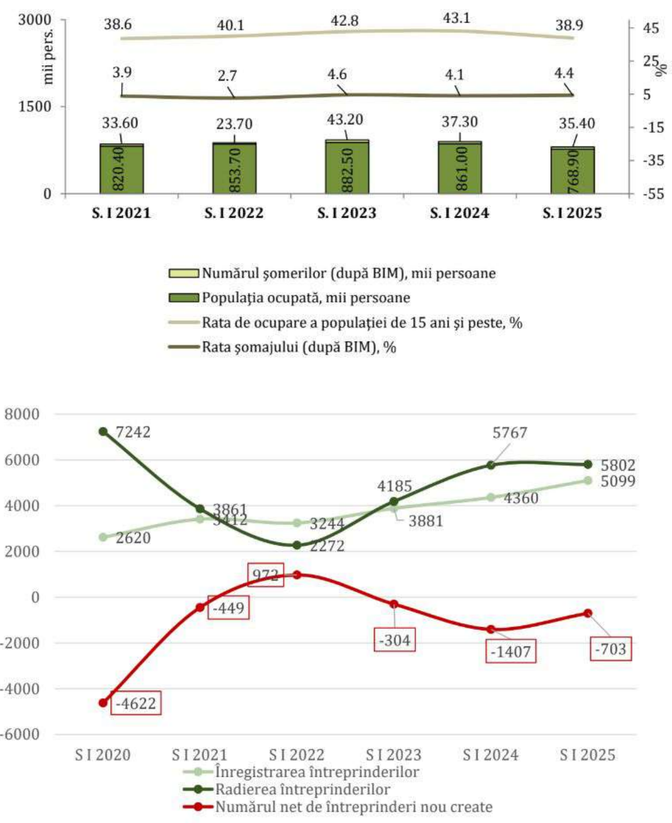
E

Purpose. Monitoring macroeconomic and sectoral developments in the economy of the Republic of Moldova, to substantiate public policy decisions and assess economic resilience in the context of the EU accession process. Methods used: comparative macroeconomic analysis; official statistical indicators (NBS, NBM); structural analysis by sectors; assessment of influencing and risk factors.

TEM TEAM

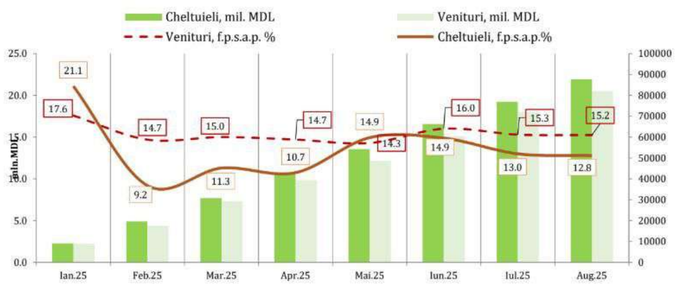
Coordinators: Alexandru Stratan, Angela Timuș, Olga TimofeiContributions: Ecaterina Heghea (Political, Economic, Social Events); Alexandru Ceban (Production); Olga Timofei (Prices, Exchange Rates, Monetary Policy); Viorica Popa (Finance); Stela Ciobu, Tatiana Iațișin (External Sector); Alexandra Novac (Business Environment); Colesnicova Tatiana, Mihail Ciobanu (Social Sector); Zinovia Toacă (Forecast 2025)

The publication is developed with the financial support of Subprogram 030101 "Strengthening the Resilience, Competitiveness and Sustainability of the Economy of the Republic of Moldova in the Context of the European Union Accession Process", institutional funding.



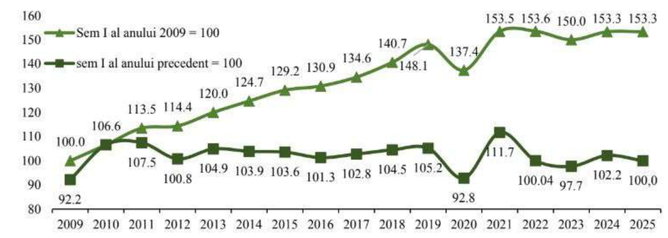
3.1. FINANŢE PUBLICE

În Sem. I 2025, veniturile bugetului public național (BNP) au însumat 60531,5 mil. MDL, ceea ce reprezintă o majorare cu 8352,6 mil. MDL f.p.s.a.p., corespunzând unei creșteri nominale de 16% f.p.s.a.p.



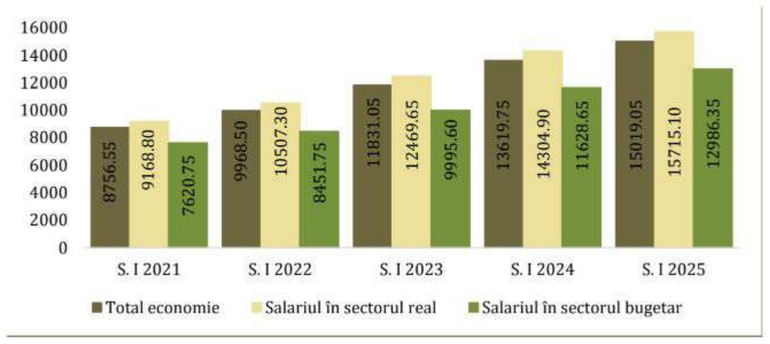
Produsul intern brut

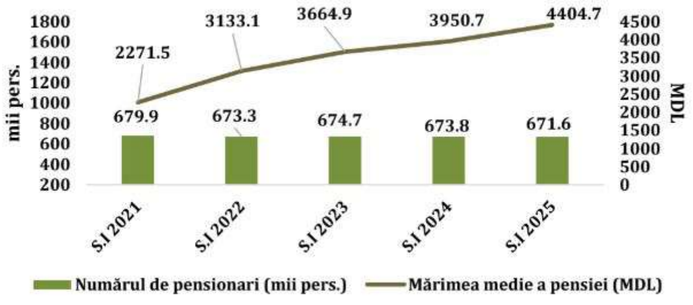
Produsul intern brut al Republicii Moldova, conform datelor preliminare, în prima jumătate a anului 2025, a atins valoarea de 155 292,9 mil. MDL, în prețuri curente de piață, poziționându-se, astfel, la același nivel comparativ cu primul semestru al anului 2024.



	Unitatea de măsură	2021	2022	2023	2024	2025
		Efectiv				Prognoza
PIB nominal	mld. MDL	242,1	274,5	300,5	323,8	**355,9**
Față de anul precedent în prețuri comparabile	%	113,9	95,4	101,2	100,1	**101,2**
Indicele prețului de consum mediu anual	%	105,1	128,7	113,4	104,7	**106,5**
Cursul mediu de schimb	lei/USD	17,7	18,9	18,16	17,8	**17,5**
Export de bunuri	mil.USD	3144	4332	4049	3555	**3489**
Față de anul precedent	%	127,5	137,8	93,5	87,8	**98,2**
Import de bunuri	mil.USD	7177	9219	8676	9065	**9778**
Față de anul precedent	%	132,5	128,5	94,1	104,5	**107,9**
Soldul negativ al balanței comerciale	mil.USD	4033	4887	4627	5510	**6288**
Producția industrială în prețuri curente	mld.lei	70,6	85,5	87,6	85,6	**90,2**
Față de anul precedent în prețuri comparabile	%	112,1	94,9	96,4	98,9	**103,0**
Producția agricolă în prețuri curente	mld.lei	48,4	41,0	41,8	41,4	**42**
Față de anul precedent în prețuri comparabile	%	157,9	70,8	124,5	85,4	**99**
Investiții în active imobilizate	mld.lei	35,4	37,1	38,4	42,1	**45,2**
Față de anul precedent în prețuri comparabile	%	109,8	88,1	99	108,8	**105,4**
Salariul nominal mediu lunar	lei	8980	10447	12209	14097	**15812**
Față de anul precedent						
nominal	%	113,1	116,3	116,9	115,5	**112,2**
real	%	102,4	70,2	90,9	105,3	**101,3**
Rata șomajului	%	3,2	4,6	4,6	4,6	**4**
Transferuri de peste hotare a mijloacelor bănești	mil. dol.	1611,23	1745,75	1627,75	1611,62	**1600**

Sursa: BNS, estimările-autorilor





Institutul Naţional de Cercetări Economice, ASEM, 2064, RM, Chişinău, Str. Ion Creangă, 45
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LEADERSHIP DEVELOPMENT STRATEGIES AND THEIR APPLICATION IN POLITICAL MANAGEMENT IN ROMANIA AND THE REPUBLIC OF MOLDOVA

Patent/project number: ***PhD Thesis***

Author/s: Culipei Laura-Cătălina

E

Scientific novelty and originality: lies in the integrated and comparative approach to political leadership development strategies in Romania and the Republic of Moldova, through a theoretical framework anchored in economics and management sciences.

Important scientific problem solved in research: the absence of a coherent framework for analyzing and implementing effective political leadership strategies linked to managerial performance and the quality of governance in Romania and the Republic of Moldova.

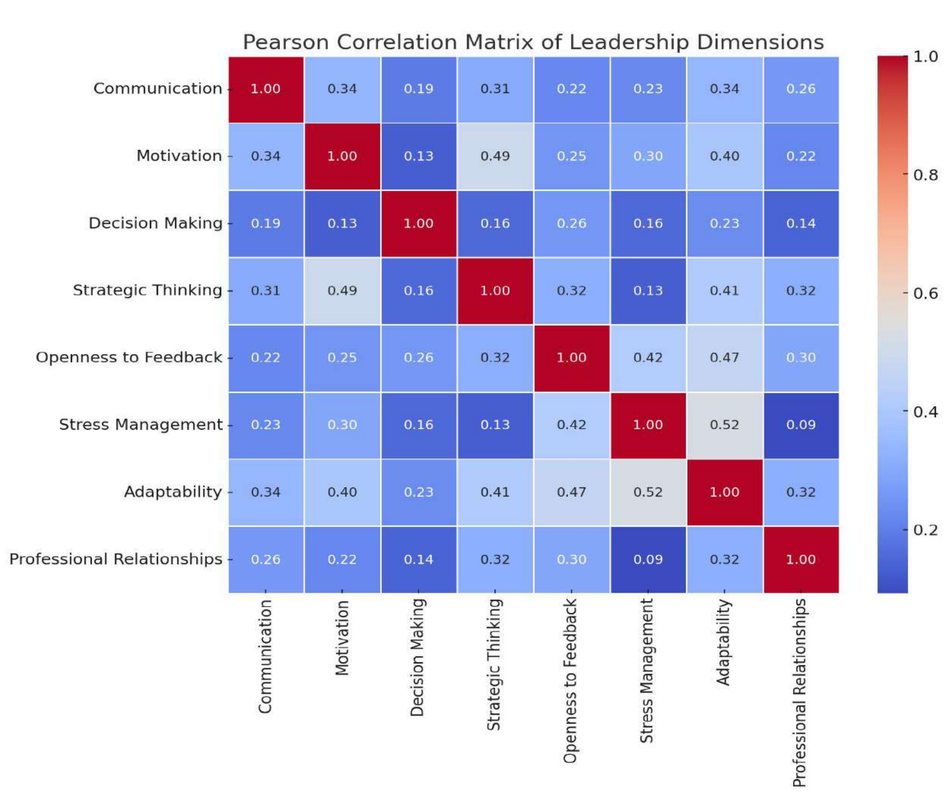
The theoretical significance of the research: consists of expanding and deepening the conceptual framework on political leadership by integrating classical and contemporary theories from social and economic sciences with the specific realities of Romania and the Republic of Moldova. The research offers a systematic and analytical approach to the concept of political leadership from the perspective of an integrated framework of strategic management, organizational efficiency, and democratic governance.

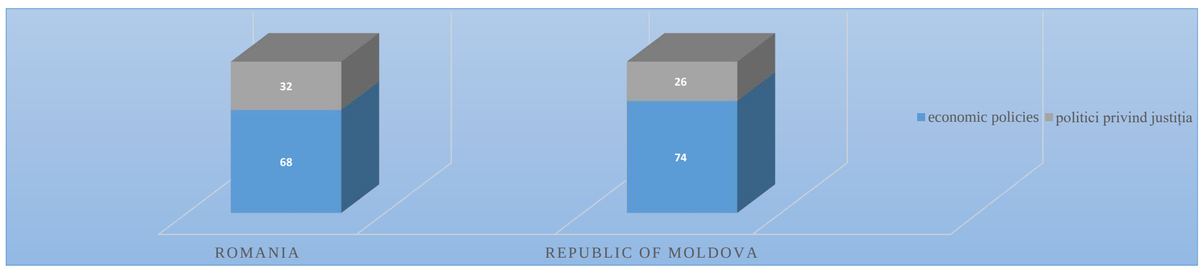
The applicative value of the paper: derives from the practical nature of the analysis carried out and the relevance of the recommendations made to political actors, public institutions, and organizations involved in the training and evaluation of political leaders. The paper is not limited to a theoretical approach, but offers concrete directions for improving decision-making and managerial processes in political parties and public administration in Romania and the Republic of Moldova.

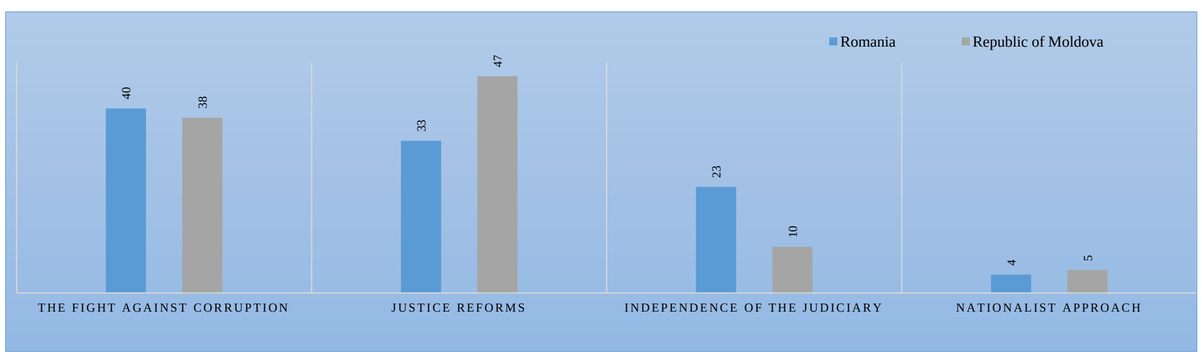
We find that Romanian citizens define effective political leadership through the ethical dimension, while those from the Republic of Moldova associate it with professional competence and administrative experience. These differences express two complementary models of governance: one oriented towards value and vision, the other towards expertise and pragmatism, but both being essential for the consolidation of sustainable and responsible political leadership.

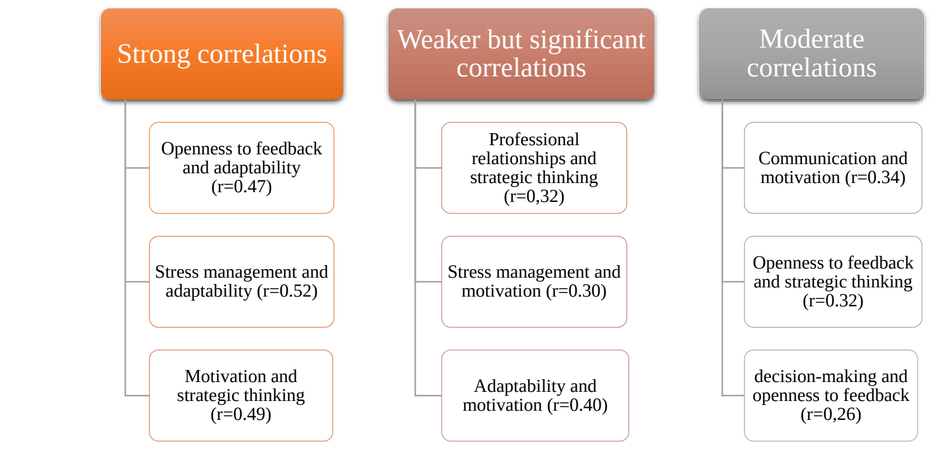
Mindset digital
Platform thinking
Co-creație
Digital ecosystems

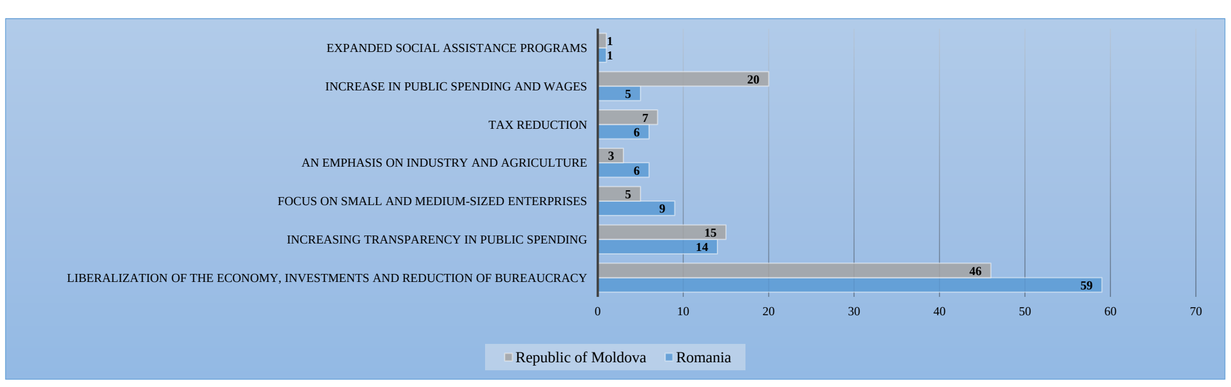
Innovation leadership
Leadership distribuit în rețele
Experiment în timp real
Volatility
Coordonare la distanță

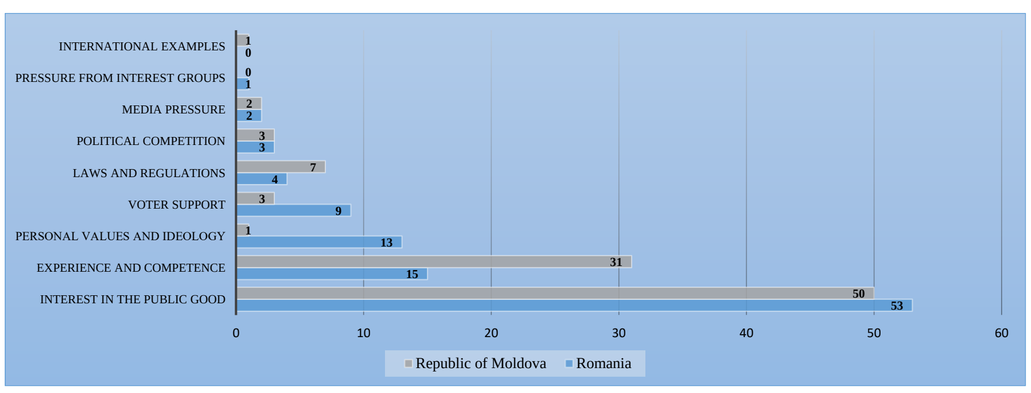












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DEVELOPMENT OF INNOVATIVE MANAGEMENT TOOLS FOR OPTIMIZING EXPORT STRATEGIES IN THE AGRICULTURAL SECTOR OF THE REPUBLIC OF MOLDOVA

Patent/project number: PhD habilitation Thesis

Author: Ulinici Andrian

E

The goal of this work is to find a way to list new management tools. These tools can help grow the amount of Moldovan farming products we sell to other places. They can also help sell to more market. The study check numbers from the government of Republic of Moldova and from big lists of trade data. It also uses reports about what to do from 2020 to 2025. The methodological framework combined comparative analysis, institutional analysis, and elements of strategic management analysis. The study reveals a transition from traditional administrative regulation to integrated management tools. These include digital export support platforms, export credit and guarantee mechanisms, cluster management models, and public-private partnership mechanisms. The results show that the effectiveness of export promotion depends not only on financial support, but also on coordination between government institutions, business associations and producers. Weak institutional coherence and limited managerial competences remain the main constraining factors.

Digital transformation covers a wide range of areas — from digital document management to complex automation of export-import operations using intelligent analytical systems. The article examines modern trends in the implementation of digital technologies in the management processes of foreign economic activity of agricultural enterprises, including the use of ERP systems, cloud services, B2B interaction platforms, CRM and TMS systems, as well as big data analysis tools and blockchain technologies.

Country	Year	DIGI	INNOV	R&D	EXPORT	SIZE	Competitiveness
Moldova	2019	0.52	8	0.05	0.18	264	4.24
Moldova	2020	0.31	2	0.06	0.57	435	2.69
Moldova	2021	0.41	5	0.05	0.41	302	3.11
Moldova	2022	0.67	3	0.04	0.59	180	2.59
Moldova	2023	0.82	7	0.02	0.13	437	3.82
Moldova	2024	0.53	5	0.03	0.22	493	3.25
Romania	2019	0.37	8	0.01	0.55	469	4.05
Romania	2020	0.56	6	0.05	0.19	240	3.38
Romania	2021	0.81	2	0.04	0.56	400	2.54
Romania	2022	0.46	5	0.05	0.58	237	3.16
Romania	2023	0.63	9	0.03	0.18	394	4.43
Romania	2024	0.74	1	0.05	0.56	90	2.23
Ukraine	2019	0.85	9	0.05	0.27	97	4.62
Ukraine	2020	0.70	8	0.03	0.38	276	3.97
Ukraine	2021	0.37	3	0.06	0.38	304	2.69
Ukraine	2022	0.56	3	0.01	0.42	101	2.20
Ukraine	2023	0.64	4	0.07	0.22	286	3.07
Ukraine	2024	0.87	7	0.03	0.18	115	3.65
Poland	2019	0.67	9	0.02	0.33	157	4.24
Poland	2020	0.84	7	0.07	0.24	332	4.30
Poland	2021	0.56	4	0.03	0.25	247	2.49
Poland	2022	0.43	3	0.03	0.22	364	2.46
Poland	2023	0.49	8	0.06	0.28	491	4.23
Poland	2024	0.47	1	0.03	0.59	269	1.93
Germany	2019	0.33	5	0.03	0.42	175	2.92
Germany	2020	0.89	7	0.06	0.48	172	4.00
Germany	2021	0.45	6	0.04	0.42	247	3.50
Germany	2022	0.78	9	0.03	0.19	398	4.45
Germany	2023	0.82	4	0.01	0.36	196	2.60
Germany	2024	0.86	8	0.04	0.57	178	4.22

Variable	Coefficient	Standard Error	t-statistic	P-value	95% CI (Lower)	95% CI (Upper)
Intercept	0.602	0.155	3.89	0.0007	0.283	0.922
DIGI	0.517	0.131	3.94	0.0006	0.247	0.788
INNOV	0.308	0.010	31.63	<0.0001	0.288	0.328
R&D	8.702	1.195	7.28	<0.0001	6.235	11.168
EXPORT	0.455	0.156	2.91	0.0076	0.133	0.778
SIZE	0.00083	0.00019	4.39	0.0002	0.00044	0.00122

Results of Econometric Modelling of the Impact of Digital Technologies on the Competitiveness of Enterprises in Moldova, Romania, Ukraine, Poland, and Germany for 2019–2024

The results of the study confirm that digital technologies are a catalyst for the development of enterprises regardless of their country of location. At the same time, the impact of digitalization is more pronounced in combination with innovation, expansion into new markets and internal development. Enterprises in Germany and Poland had the highest indicators of digital efficiency, which is associated with a high level of institutional support. In Ukraine and Moldova, digitalization was often a forced reaction to external challenges but demonstrated positive dynamics. The obtained results have practical significance for shaping national strategies for the digital transformation of entrepreneurship, digitalization is especially important for countries that are in a state of postcrisis recovery and integration into the European space. A key role in the creation of digital advantages is played by the combination of innovation and entrepreneurial potential, which includes the ability to adapt, scale, and integrate digital solutions.

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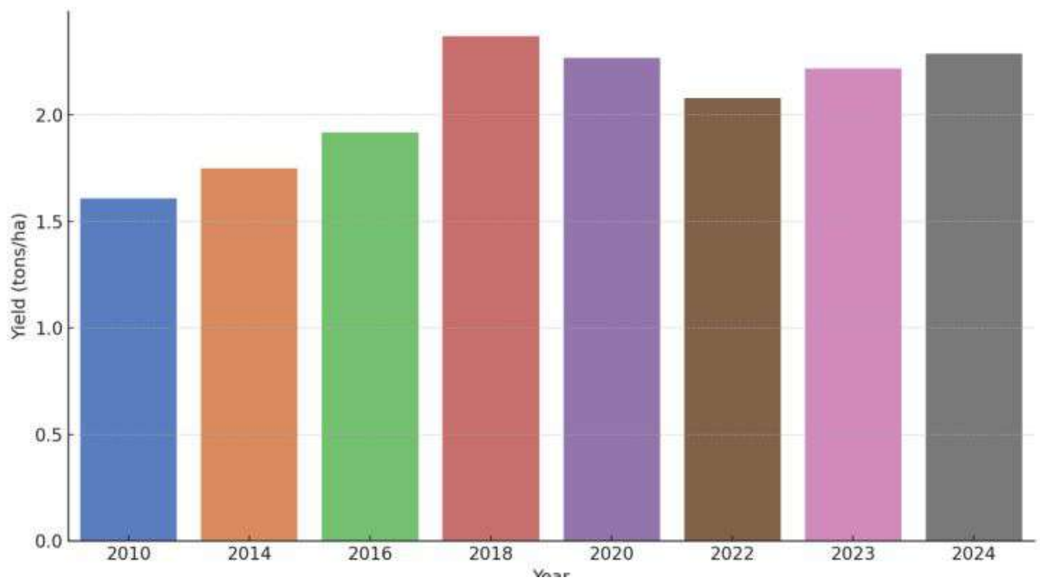

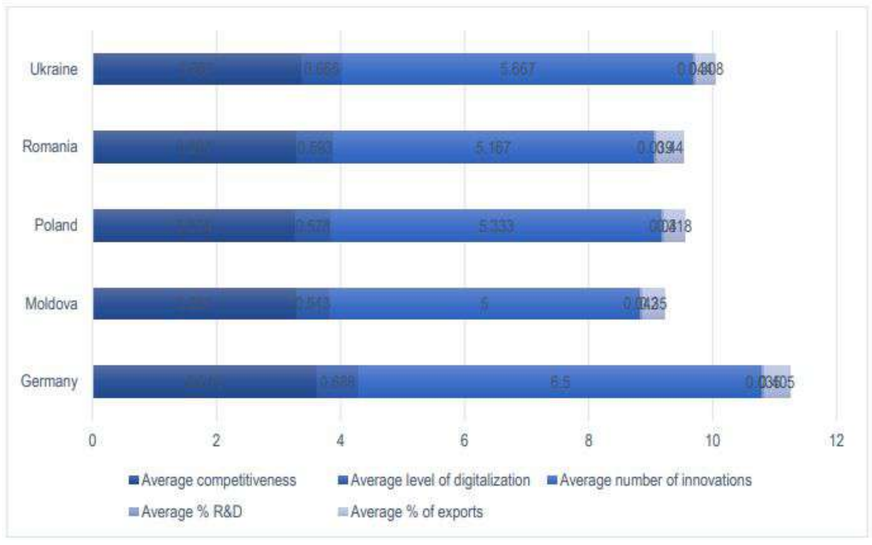

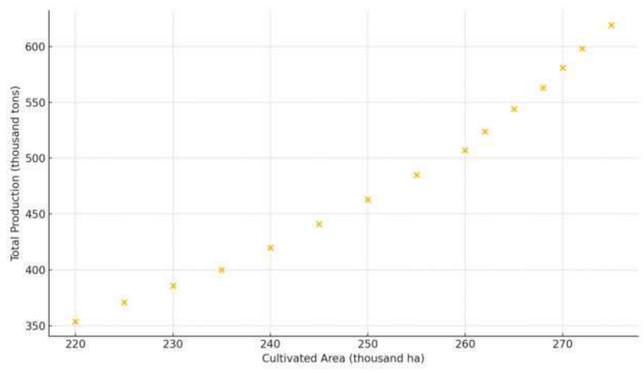

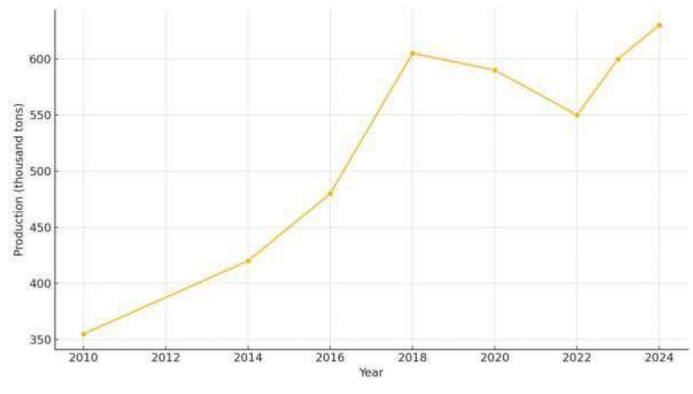

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SUSANYI HARALD-ALEXANDRU

DISCOVER TRANSYLVANIA
GUIDED BY A MEDIEVAL KNIGHT

K

Author: Harald-Alexandru SUSANYI

I'm Harald from Hunedoara and I guide in the beautiful province of Transylvania dressed in a knight templar suit. I'm studying history at the „1 December 1918" University of Alba Iulia and I'm fond of history of Transylvania and of the Corvin's family from Hunedoara.

Since 2019, I offer to my tourist groups some unique experiences, let's say „medieval experiences", managing to make history interact with them. I will not mention them here, but I invite you to discover them together.

My tours are based on emotions, because information can be easily forgotten, but emotions remains alive in our hearts for years.

Contact: ***+40770 806 840***

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SCAN ME

ACTA TECHNICA CORVINIENSIS
– Bulletin of Engineering

Research project
Author: Assoc. Prof. eng. Imre KISS, PhD

E

ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering is an international and interdisciplinary journal which reports on scientific and technical contributions and publishes invited review papers covering the full spectrum of engineering.

Every year, in four online issues (fascicules 1 - 4), ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering [e-ISSN: 2067-3809] publishes a series of reviews covering the most exciting and developing areas of engineering. Each issue contains papers reviewed by international researchers who are experts in their fields.

The result is a journal that gives the scientists and engineers the opportunity to keep informed of all the current developments in their own, and related, areas of research, ensuring the new ideas across an increasingly the interdisciplinary field.

ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering [e-ISSN: 2067-3809]

We are looking forward to a fruitful collaboration and we welcome you to publish in our ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering.

The journal's coverage will reflect the increasingly interdisciplinary nature of engineering, recognizing wide-ranging contributions to the development of methods, tools and evaluation strategies relevant to the field. Numerical modelling or simulation, as well as theoretical and experimental approaches to engineering will form the core of ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering's content, however approaches from a range of environmental science and economics are strongly encouraged.

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ANNALS of Faculty Engineering Hunedoara – International Journal of Engineering

Research project

Author: Assoc. Prof. eng. Imre KISS, PhD

ANNALS of Faculty Engineering Hunedoara – International Journal of Engineering is a free-access international and multidisciplinary publication of the Faculty of Engineering Hunedoara, which reports on scientific and technical contributions.

ISSN: 1584-2665 (printed editions, in two fascicules)
ISSN: 1584-2673 (CD-ROM edition, in two fascicules)
ISSN: 2601-2332 (online, all four fascicules)
ISSN-L: 1584-2665

The development of the international dimension of higher education and scientific research, have lead to the strengthening of direct relations with researchers from the neighboring countries and to the extension of the scientific collaborations in elsewhere in the World.
Within this context, the achievement and functioning of an interactive partnership, corresponding to the exigencies of the modernization process and connection to the European space required a re-evaluation of the contents and layout of our JOURNAL, both by adopting stricter criteria maintaining the contents of the scientific materials we publish and by changing its title, which was made in order to insure the universal accessibility of the ANNALS of Faculty Engineering Hunedoara – International Journal of Engineering.

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MICOBIOTA OF BESSARABIA

MACROMYCETES

PATENT NUMBER: ISBN 978 – 5 -88554 – 292 - 0

AUTHORS: Ștefan MANIC, Teodora MANIC

APPLICATION FIELDS: environmental protection, conservation of fungal diversiti

AIM: investigating the fungi in the mycobiota of the Republic of Moldova

SOLUTION: Volume I of the monograph "Mycobiota of Bessarabia" consists of two parts. The general part includes a description of the natural conditions of the studied territory, the history of macromycetes research in Bessarabia and diagnostic structural features of representatives of the Agaricales order.

The special part focuses on the characterization of the families and genera of the Agaricales order, the preparation of dichotomous keys for determining the families, genera and species found within the studied territory. The species, included in the first volume, are accompanied by 445 original color images. Each species entry includes synonymy, detailed macroscopic descriptions, microscopic features, bioecology, practical significance and information on the period of occurrence and frequency of spore bodies.

ADVANTAGES: The monograph edited for the first time in the republic contributes to: improving the legislation on fungal conservation; elaborating the Fungal Cadastre; and enhancing public education and awareness regarding environmental conservation and protection.

IMPLEMENTATION STAGE: Monography. The book will serve as a scientific and informational foundation for pupils, students, teachers and others involved in training programs focused on environmental education and conservation of fungal diversity.

ACKNOWLEDGMENTS: The research was supported by the project 010101"*Ex situ* and *in situ* research and conservation of fungal diversity in the Republic of Moldova"

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HR EXCELLENCE IN RESEARCH

ALL THAT GLITTERS IS NOT GOLD :
XRF Analyses of Fibulae from the barbarian populations of the Prut–Dniester region (4th century AD)

RESEARCH PROJECT NUMBER: 01.15.01

AUTHORS: Sergiu Matveev, Vlad Vornic

APPLICATION FIELDS: E - Management, Teaching methods, Books, History and Cultural studies

AIM: to determine how fibulae made of common metals were perceived in Antiquity

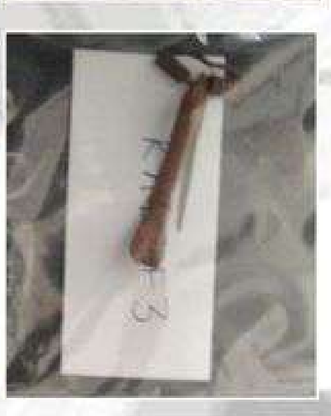
SOLUTION: Among the artefacts recovered from settlements and cemeteries belonging to the Sântana de Mureș–Černjachov culture, fibulae combine a utilitarian function—as items of dress—with a decorative one, while also offering archaeologists significant chronological value. Closely linked to the evolution of clothing fashion, they were usually made of silver, bronze, or iron. XRF analyses conducted on a set of 4th century AD bronze fibulae discovered in the Republic of Moldova have revealed the use of complex alloys based on variable combinations of copper, zinc, tin, silver, and lead, with direct implications for the chromatic appearance of the pieces. ***Cu–Zn–Sn*** alloys, where copper (approx. 79–91%) gives the alloy a reddish golden colour, show that tin tends to slightly darken the hue, generating warmer golden tones. As a result, such items could have been visually perceived as resembling gold objects. ***Cu–Zn–Sn–Ag*** alloys exhibited a warmer bronze chestnut tone, with silver and tin adding a subtle whitish metallic sheen. ***Cu–Zn–Sn–Pb*** alloys indicate a reddish golden brown shade, with lead giving the alloy a darker and more matte appearance. Overall, the analyses reveal the absence of strict standardisation in metallurgical recipes and point to varied production practices associated with different craftsmen or workshops, in the context of using recycled metal. Spectrographic analyses demonstrate that, for fibulae classified by archaeologists as "bronze", ancient craftsmen often attempted to give them hues reminiscent of precious metals.

Archaeological sites from which the samples were selected

CAJ-F4
Copper 84%
Zinc 8.5%
Tin 5,8%

computational color modeling

RAD-F3
Copper 91,15%
Zinc 6,4%
Tin 1,6%
Silver 0,92%

CAJ-F3
Copper 79,36%
Zinc 1.9%
Tin 10.15%
Silver 7.5%

computational color modeling

RAD-F4
Copper 82,6%
Zinc 5%
Tin 7,147%
Lead 4,8%

ADVANTAGES: the methods are non-invasive and repeatable; initiates a new database that can be expanded with evidence from other archaeological sites.

IMPLEMENTATION STAGE: At the laboratory level and preparing the publication.

ACKNOWLEDGMENTS: This research was supported by the *research project:* # 01.15.01

TehnoART

Author: Demeter Sorin & TTC Team

E

Techno-ART is a national competition for high school students and more.
The aim of Techno-ART is technical creativity in this sense students are invited to present their ingenious projects.
The Techno-ART competition focuses on environmental protection so we encourage students to use recycled components from scrap yard.
The participating students transform these scrap into robots, cars, statues, lighting fixtures, figurines or various installations, which leads to the development of the practical skills so necessary for their future careers.

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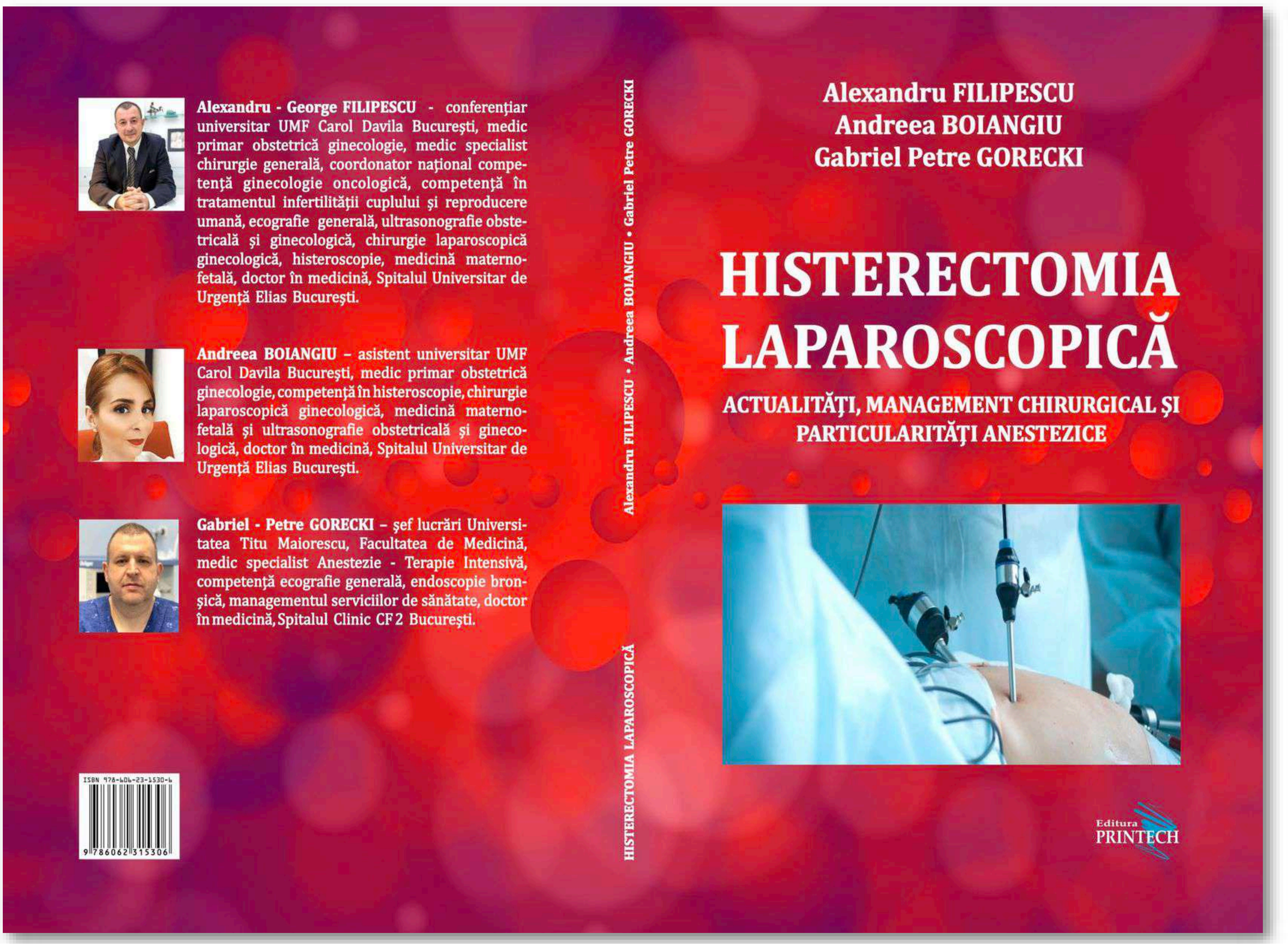
LAPAROSCOPIC HYSTERECTOMY. UP-TO-DATE, SURGICAL MANAGEMENT AND ANESTHETIC PECULIARITIES / HISTERECTOMIA LAPAROSCOPICĂ. ACTUALITĂȚI, MANAGEMENT CHIRURGICAL ȘI PARTICULARITĂȚI ANESTEZICE

Authors: Alexandru-George FILIPESCU, Andreea BOIANGIU, Gabriel-Petre GORECKI

ISBN 978-606-23-1530-6
Printech Publishing House, 2024

E

Monografia „Histerectomia laparoscopică. Actualități, management chirurgical și particularități anestezice” analizează atât problemele legate de actul chirurgical propriu-zis cât și întregul management perioperator al pacientei propusă pentru histerectomie laparoscopică. Lucrarea începe cu prezemtarea modificărilor fiziologice survenite de la naștere și până o dată cu instalarea menopauzei, trecând prin toate etapele dezvoltării femeii: perioada perinatală, pubertate, menarhă, perioada de procreație.



În continuare este realizat un scurt istoric al histerectomiei laparoscopice pe plan mondial, iar ulterior sunt prezentate clar și explicit noțiuni de anatomie chirurgicală, urmate de o descriere a instrumentarului și echipamentului chirurgical necesar pentru desfășurarea în condiții optime a intervenției chirurgicale, indicațiile operatorii și impactul acestei intervenții asupra calității vieții femeii, tehnica histerectomiei și a miomectomiei laparoscopice și principalele incidente și complicații postoperatorii. În încheiere un amplu capitol este dedicat anesteziei, managementului perioperator și analgeziei postoperatorii prezentând toate etapele pe care le parcurge o pacientă în timpul spitalizării începând cu examenul preanestezic, inducția anestezică, menținerea, trezirea din anestezie, modurile de ventilație mecanică intraoperatorie și foarte important pentru evoluția pacientei, analgezia postoperatorie adecvată.

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A PRACTICAL GUIDE FOR COACHES AND PARENTS: EFFECTIVE STRATEGIES FOR SUPPORTING CHILDREN'S DEVELOPMENT THROUGH SPORT

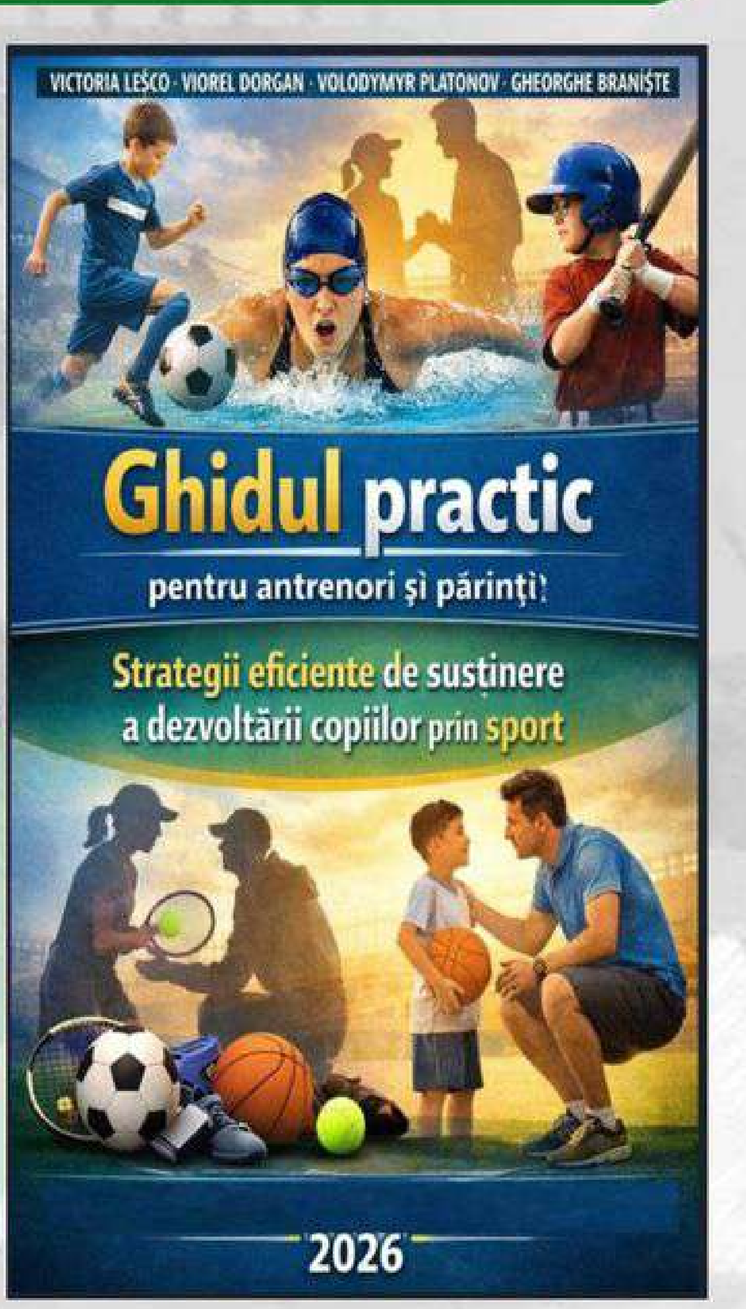
BOOK: ISBN 978-9975-68-551-1

AUTHORS: LEȘCO Victoria, DORGAN Viorel, PLATONOV Volodymyr, BRANIȘTE Gheorghe

APPLICATION FIELDS: E - Management, Teaching methods, Books, History and Cultural studies

AIM: The paper aims to outline a theoretical and applied framework intended for coaches, parents, and teachers, designed to effectively support the psychophysical and socioemotional development of children through sports activities carried out under safe conditions.

SOLUTION: The guide provides a coherent set of solutions grounded in scientific evidence and best practices in the field of children's training, including the design of age-appropriate activities and exercises tailored to children's developmental level and individual potential, the promotion of effective collaboration strategies between coaches and parents, as well as the use of case studies and practical examples to support the development of coaches' professional competencies.



ADVANTAGES: The systematic application of the guide will contribute to the harmonious development of children's psychophysical dimensions, to an increased level of motivation for engaging in sports activities, and to a higher degree of active involvement in the training process. At the same time, the guide promotes the strengthening of the parent–coach relationship, the reinforcement of cohesion within the educational community, and the promotion of an active and healthy lifestyle, sustainably supported over the long term.

IMPLEMENTATION STAGE: The implementation process of the guide will be carried out through the integration of the proposed strategies into training sessions, with activities and exercises adapted to the abilities, needs, and individual characteristics of children. The active involvement of parents in practical activities and games will represent an essential element in facilitating cooperation and strengthening relationships between families and coaches. Continuous monitoring of children's progress will allow for the adjustment of educational interventions and the optimization of psychophysical and socio-emotional development outcomes. In addition, the guide's recommendations can be integrated into professional training programs for coaches, contributing to the development of their competencies and to the creation of a safe, effective, and child-centered educational and sporting environment.

ACKNOWLEDGMENTS: This research was supported by the research project: 25.80012.0807.61SE

Motivations and migration trends of young people from the Republic of Moldova and Turkey

Project:: **Youth Emigration: Motivations, Trends, and Future Prospects in Moldova and Turkey with an Adaptive Predictive System, 25.80013.0807.03TR**

Authors: **Maria DIACON, Victor JUC, Victoria LISNIC, Mihail POTOROACĂ**

E

Through this work, dedicated to youth migration, the authors identify the motivations and trends that underlie the decision to emigrate abroad. Young people emigrate due to the lack of opportunities at home, as they are in search of new perspectives abroad. The factors that generate migration among young people are closely related to the identification of better educational opportunities, paid jobs that would contribute to reducing the risks of poverty. The lack of attractive jobs for young people, low incomes and increased risks of poverty are caused by limited economic opportunities, which prevent young people, especially vulnerable groups, from achieving their personal and professional aspirations. The demographic forecast for the Republic of Moldova indicates a continuous reduction in the population in the coming decades, fueled by massive emigration, low birth rates and accelerated aging.

All scenarios demonstrate an increase in the share of elderly people, in parallel with a decrease in the proportion of young people. This development generates an imbalance between generations and a higher dependency ratio, which means that the economically active population segment will have to support an increasing proportion of dependent people, including children and the elderly. The lack of specialized human resources directly affects the local labor market, limiting the capacity for innovation and slowing down the pace of economic growth, which puts additional pressure on the country's social and economic system.

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HR EXCELLENCE IN RESEARCH

THE ROLE OF JUSTICE IN THE ESTABLISHMENT OF THE RULE OF LAW

ISBN 978-9975-175-65-4

AUTHOR: Gheorghe COSTACHI

APPLICATION FIELDS: Legal Sciences.

AIM: Analysis of the role of justice in the process of establishing the rule of law.

SOLUTION: A multi-aspect monograph in the field was developed. The monograph is structured into three distinct parts and provides a comprehensive doctrinal and theoretical analysis of justice as a fundamental pillar in the establishment and consolidation of the rule of law in contemporary society.

Part I – *The Rule of Law as a Supreme Value in Contemporary;*

Part II – *Justice in the Contemporary Rule of Law;*

Part III – *Constitutional Justice in the Contemporary Rule of Law.*

ADVANTAGES: For the first time, such a comprehensive monograph was developed in the Republic of Moldova. Through its extensive research (1071 pages), the monograph contributes to the theoretical consolidation of the concept of the rule of law and provides a systematic framework for understanding the role of justice and constitutional review mechanisms in safeguarding democratic order and fundamental rights.

IMPLEMENTATION STAGE: Scientific support for specialists in the field and students.

Opportunity
CORNELIUGROUP Research-Innovation Association
Creation
INVENTCOR
Realization
Power of Creative Mind
Deva ROMANIA

MOLDOVA STATE UNIVERSITY
Institute for Legal, Political and Sociological Research,
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THE SCIENTIFIC FOUNDATION OF THE RULE OF LAW

A THREE-VOLUME MONOGRAPH

ISBN 978-9975-175-65-4

AUTHOR: Gheorghe COSTACHI

APPLICATION FIELDS: Legal Sciences.

AIM: Elaboration of the basic principles of the scientific foundation of the rule of law.

SOLUTION: This three-volume monograph provides a comprehensive and systematic scientific foundation of the rule of law, examined through its socio-human, normative and organizational dimensions. The work advances an integrated theoretical framework aimed at clarifying the structural components, functional mechanisms and value-based foundations of the modern rule of law.

Volume I develops the socio-human dimension, emphasizing the role of legal science and jurists as foundational actors in shaping the rule of law.

Volume II addresses the normative dimension, focusing on the interrelation between law, legislation and legal order, the constitutional regime, legality and legal certainty, as well as the formative role of legal culture and legal education in consolidating the rule of law.

Volume III examines the organizational dimension, offering an in-depth analysis of sovereignty, democracy, and the institutional architecture of public power.

ADVANTAGES: Through its extensive research (3580 pages), the monograph contributes to the theoretical consolidation of the rule of law as a multidimensional constitutional paradigm and provides a coherent doctrinal basis for understanding the organization, limitation and responsibility of public power in a democratic society.

IMPLEMENTATION STAGE: Scientific support for specialists in the field and students.

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HR EXCELLENCE IN RESEARCH

JUSTICE AND HUMAN RIGHTS IN THE RULE OF LAW

ISBN 978-5-85748-255-1

AUTHOR: Gheorghe COSTACHI

APPLICATION FIELDS: Legal Sciences.

AIM: Examining the relationship between justice and human rights in the rule of law.

SOLUTION: This monograph provides a comprehensive and interdisciplinary analysis of the relationship between three fundamental pillars of the modern constitutional order: the rule of law, human rights and justice. The study advances a systematic and teleological approach to understanding how these interdependent concepts determine the legitimacy of public power and the quality of constitutional democracy.

The first part examines the rule of law as the fundamental guarantee of human rights, addressing constitutional supremacy, separation of powers, legality, constitutionalism, legitimacy and the formative role of legal culture. The second part analyzes human rights as the supreme value and finality of state authority, focusing on human dignity, typology of fundamental rights, constitutional limitations, access to justice, fair trial guarantees and the interdependence between individual security and legal certainty. The third part explores justice as the essential institutional mechanism for the effective protection of rights, examining judicial organization, quality and uniformity of jurisprudence, transparency, specialization of judges, constitutional justice and individual access to constitutional review.

ADVANTAGES: The monograph integrates conceptual, normative, historical, comparative and jurisprudential analysis, offering both a solid theoretical synthesis and practical directions, including legislative improvement proposals. It contributes to the doctrinal consolidation of constitutional democracy and to strengthening judicial protection of fundamental rights in the Republic of Moldova.

IMPLEMENTATION STAGE: Scientific support for specialists in the field and students.

GRAPEVINE IN THE DNIESTER – PRUT INTERFLUVE

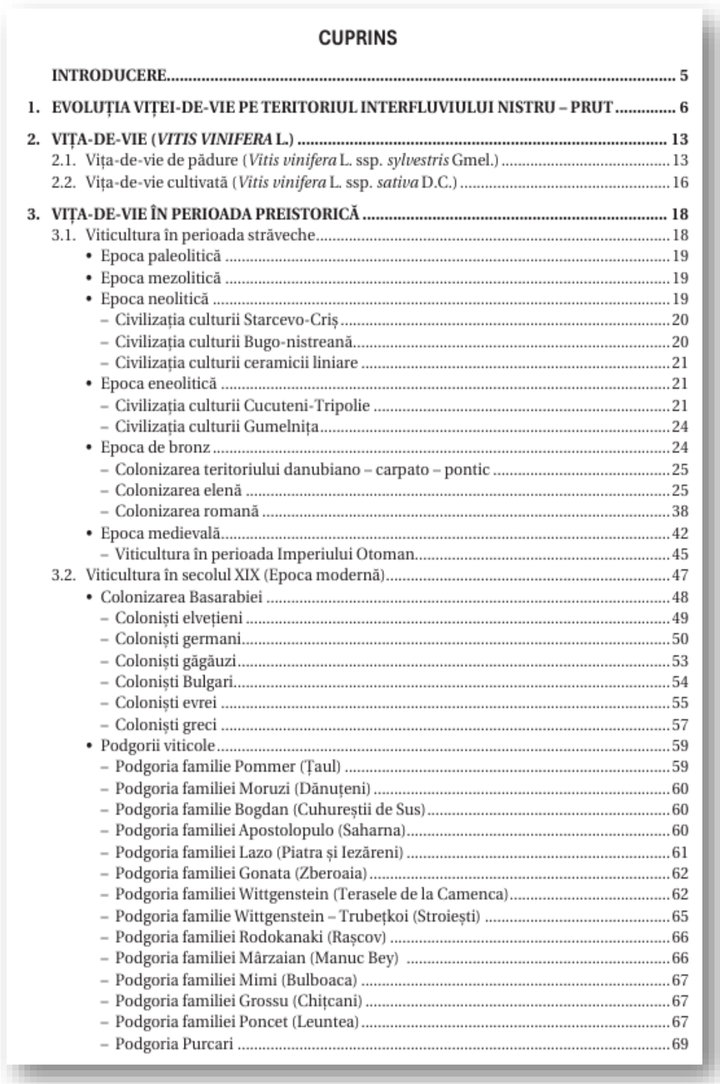
ISBN 978-5-85748-147-9. Chisinau, 2025. 168 p.

E

Alexandrov Eugeniu

Institute of Genetics, Physiology and Plant Protection of the State University of Moldova

The history of grapevine cultivation in the Nistru–Prut interfluve reflects the evolution of human society alongside the climatic, economic, and cultural transformations of the region. Paleobotanical evidence attests to the presence of the genus Vitis since the Upper Cretaceous, while discoveries in Sarmatian (Miocene) deposits at Naslavcea and Bursuc confirm the existence of fossil species such as Vitis teutonica, V. moldavica, and others, demonstrating the continuity and diversity of genotypes in this area. Archaeological research indicates the use and likely cultivation of grapevine as early as the Criș-Sacarovca and Cucuteni-Tripolye cultures, with carbonized seeds and seed imprints on pottery suggesting knowledge of grape processing. In Antiquity, Greek colonization and later Roman expansion in the northern Black Sea basin stimulated viticulture through the introduction of advanced techniques and valuable cultivars. During the Middle Ages, invasions by nomadic peoples led to the decline of vineyards; however, the spread of Christianity strengthened the role of wine in spiritual and economic life. In the period of the medieval Moldavian state, viticulture became a priority economic sector, and local wines gained regional recognition. The Ottoman period and subsequently the annexation by the Russian Empire (1812) marked new stages of development, including European colonization and diversification of grape varieties. The phylloxera crisis of the late nineteenth century prompted technological modernization through the use of American rootstocks. In the twentieth century, varietal regulation, the delimitation of viticultural regions, and the implementation of PDO/PGI systems consolidated the vitivinicultural identity of the Republic of Moldova. Today, genetic improvement through complex interspecific hybridization remains the main strategy for developing adaptable and productive cultivars capable of meeting contemporary pedoclimatic challenges.



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European Union Education and Training Policy

Project: **publication/monography**

Author: **Maria DIACON**

E

The monography is devoted to the analysis of the contents, objectives and purposes of the European Union's educational and vocational training policy, adapted and implemented by relevant institutions in the Member States and third countries.

The first chapter contains historiographical aspects of the evolution of the ideas of European unification, through the analysis of the philosophical foundations, institutional coordinates, approaches to the contents of the European education and vocational training policy.

The second chapter includes the analysis of the policies and programs of the European Union in the field of research and education and the priorities of the Community educational policy, presented through programs and good practices for the Republic of Moldova.

The third chapter is devoted to the analysis of the support for vocational education and training in Europe and analyzes the global vision for vocational education and training.

The monography is intended for all those who show interest in the educational and vocational training policy of the European Union.

Maria Diacon, mariadiacon@yahoo.com +37369966997

THE PARADIGM OF DEVELOPING EMOTIONAL INTELLIGENCE IN PRIMARY SCHOOL STUDENTS

ISBN 978-606-568-568-0

SANDA Olguța, BOROZAN Maia, ȚURCAN Lilia

E

The monograph addresses a very topical issue in that the problem of developing emotional intelligence in young students (in the Republic of Moldova, in Romania and in the world) is insufficiently investigated. From these considerations, the authors justify the need to study and determine the psychopedagogical foundations of the development of emotional intelligence in primary school students.

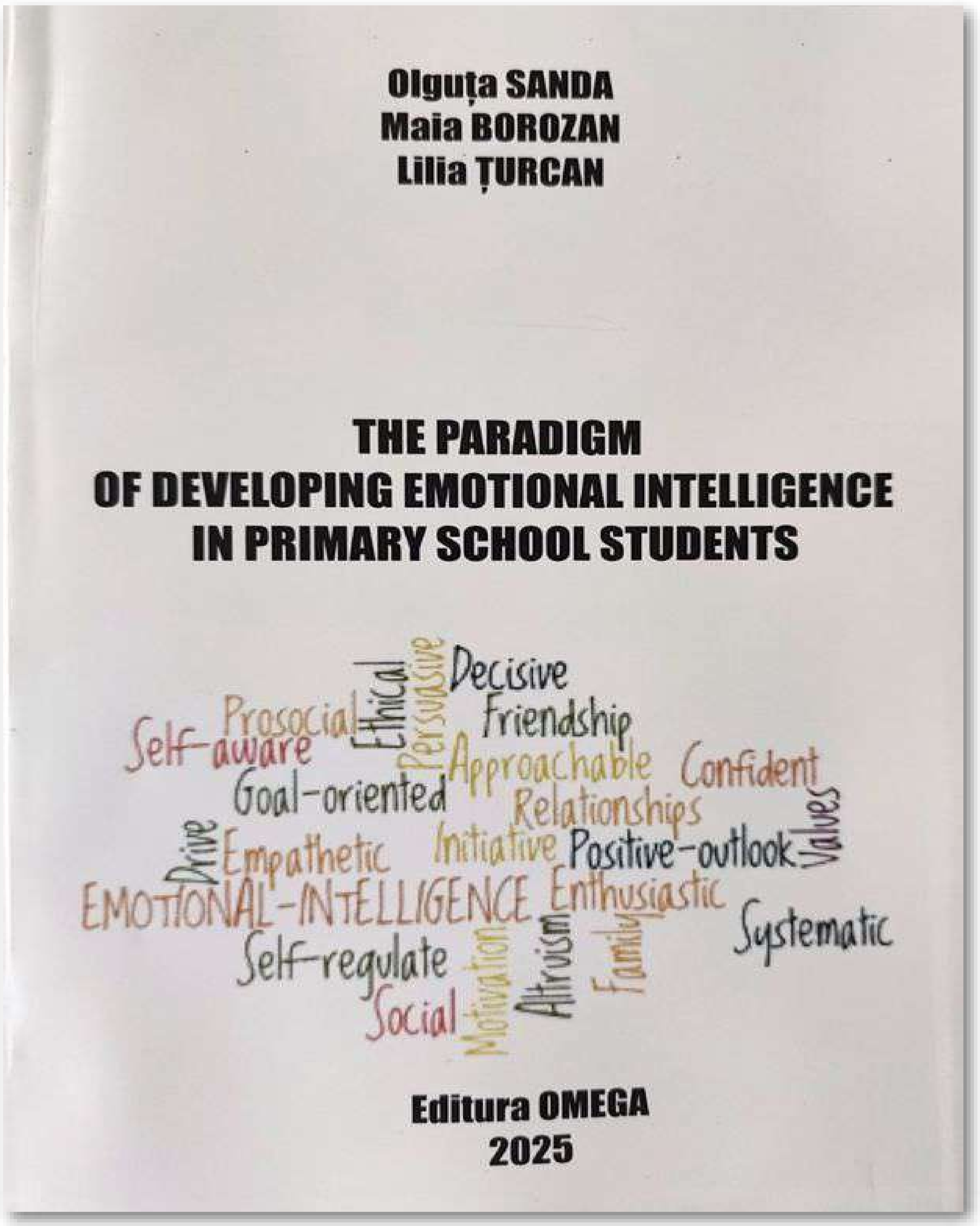
Organized in three chapters, the research concept described in the monograph reflects a systemic vision on the problem of developing the emotional intelligence of young students.

Chapter 1 of the approach to scientific knowledge of the meaning of the term emotional intelligence in specialized literature, presents the analysis of the historical evolution of emotional intelligence through the chronological systematization of the relevant theoretical contributions to the affirmation of the model of education based on emotional intelligence, the description of the particularities of affective development at early school age, the evocation of the educational implications of the emotional culture of teachers on the affective development process of primary school students.

Chapter 2 contains the scientific description of an element of scientific novelty - The mechanisms of developing the emotional intelligence of students in primary education: the mechanism of self-motivation for student learning and the mechanism of emotional discipline. The emotional culture of teachers constitutes a premise in the affective development of students and for these reasons the authors describe the pedagogical experiment of evaluating the levels of emotional intelligence of students and present the diagnosis of the degree of preparation of teachers for the emotional education of students.

Chapter 3 of the monograph is original and innovative through the new scientific values created: the psycho-pedagogical foundations of emotional education, The pedagogical model for developing the emotional intelligence of primary school students in the context of the school-family partnership, The mechanism of developing the emotional intelligence of students in primary education.

Through the scientific conclusions and methodological recommendations for teachers regarding education for emotional development and mental health in the perspective of increasing the emotional intelligence of primary school students, the authors of the monograph make significant theoretical-applicative contributions to the affirmation of Pedagogy of emotional culture as a science of education with the specific object of study - the education of human emotionality.



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Personality Psychology

Patent/project number: **ISBN 978-9975-48-323-0.**
ISBN 978-9975-48-324-7 (PDF).

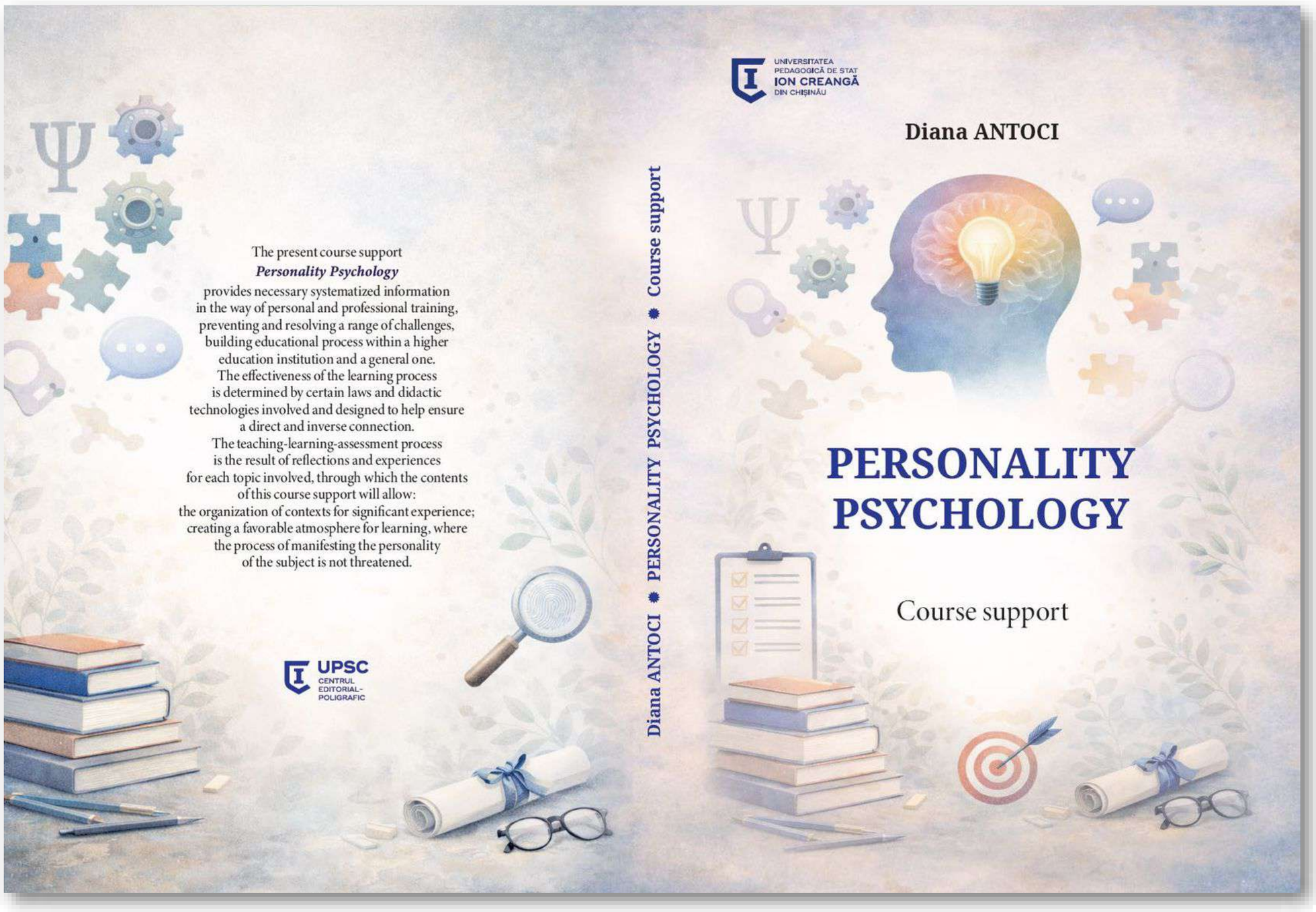
Author/s: **Diana ANTOCI**

The work Personality Psychology (2025) represents a rigorously structured course support, designed for initial and continuing training in the field of personality psychology. The volume comprises 285 pages and 17 main chapters (with related subchapters), organized into two complementary parts: theoretical foundations and practical applications.

The first part offers a systematic analysis of the major explanatory paradigms of personality: psychoanalytic (Freud, Jung, Horney, Erikson), behaviorist (Thorndike, Watson, Skinner, Bandura), humanistic (Maslow, Rogers, May), biological (Eysenck), trait theory (Allport), factor model (Cattell), cognitive approach (Kelly), as well as Eastern European contributions (Leontyev, Rubinstein, Ananiev, Uznadze, etc.).

The second part capitalizes on these theoretical frameworks through applications regarding personality assessment, self-knowledge, psychodynamic therapies, value development and structural models of personality.

The innovative element lies in the comparative integration of Western and Eastern European perspectives into a coherent system, with self-instructional tools and a conceptual glossary. The work supports the development of critical thinking, self-reflection, and applied psychological analysis skills.



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ABORDĂRI STE(A)M ÎN EDUCAȚIE ȘI CERCETARE

STE(A)M APPROACHES IN EDUCATION AND RESEARCH

ISBN 978-9975-48-226-4

CAZACIOC Nadejda, COROPCEANU Eduard

E

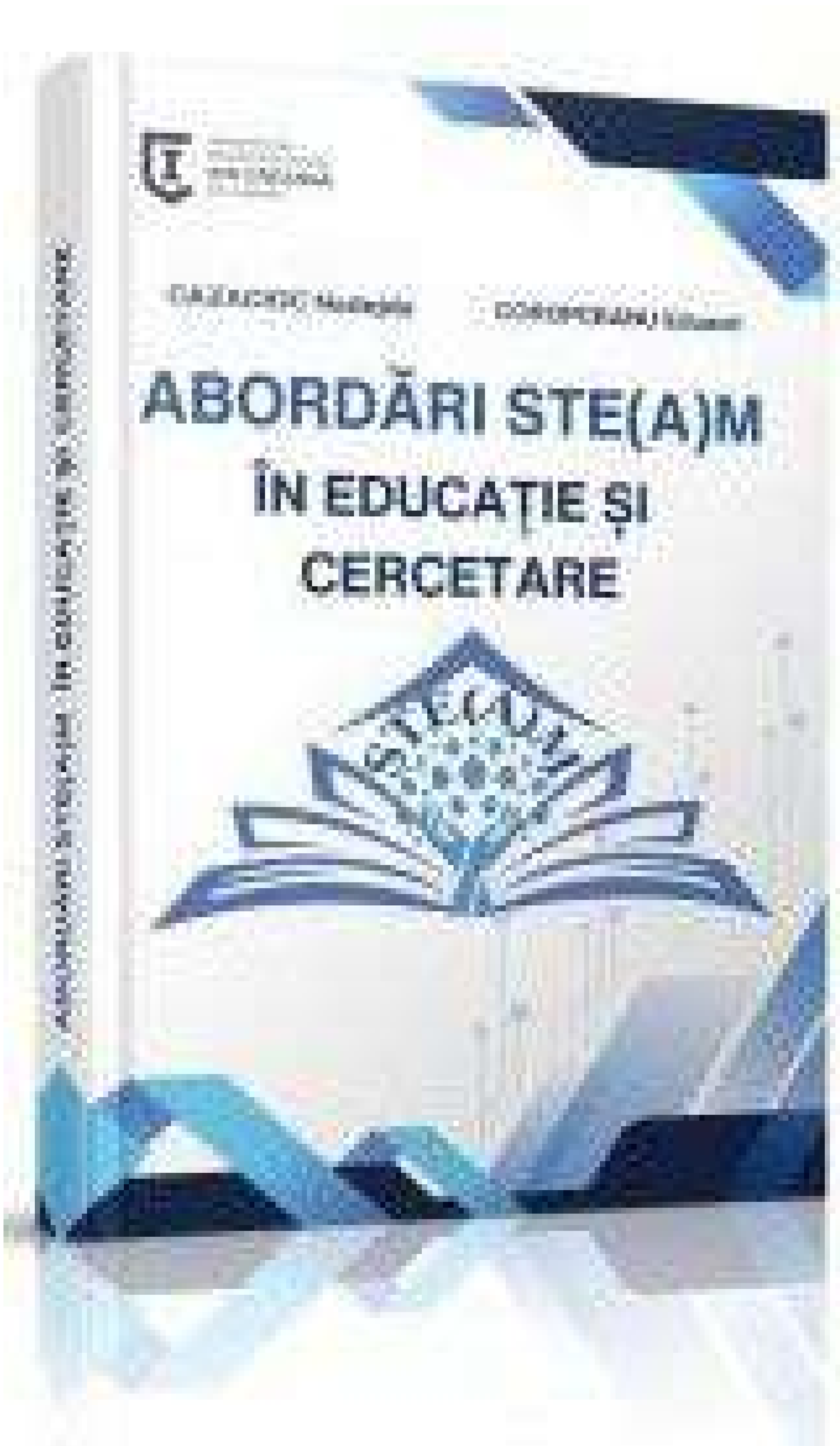
The paper "STE(A)M Approaches in Education and Research" aims to promote the STEAM concept in the educational process and the organization of scientific activities with the aim of carrying out a complex analysis of the analyzed topics. The work consists of 4 chapters.

In Chapter I – *Conceptual landmarks in the STE(A)M approach*, the evolution and importance of the fundamental components of the STE(A)M approach is analyzed, focusing on the development path of this concept worldwide.

Chapter II – Methodological aspects of implementing the STE(A)M educational concept in education – describes a set of practical tools for organizing and carrying out a didactic approach focused on STE(A)M education, including in extracurricular activities and in promoting ecological culture.

Chapter III – STE(A)M Approaches in Research – analyzes the interdependence between STE(A)M education and scientific research, highlighting how this didactic concept facilitates the integration of education, research and entrepreneurship through innovative projects.

Chapter IV – Practical models of the STE(A)M approach in education – aims to provide concrete examples of applying the STE(A)M concept in various educational contexts: from didactic projects and problem-based learning to experimental and extracurricular activities.



Contact: ecoropceanu@gmail.com

Modificări ale calității vieții după chirurgie pancreatică

CHANGES IN QUALITY OF LIFE AFTER PANCREATIC SURGERY

Magdalena-Bianca Tone, Daniel Cochior, Valeriu-Gabi Dincă, Gabriel Petre Gorecki

Anul 2024 - ISBN: 9786066875240

Studiu prospectiv pe 113 pacienți (2014-2020)

Context

Pancreatita cronică este asociată cu durere severă și tulburări digestive, afectând semnificativ calitatea vieții pacienților.

Metode

Studiu prospectiv (2014–2020) pe 113 pacienți cu patologie pancreatică benignă, tratați chirurgical la Spitalul Clinic CF2. Analiza statistică a utilizat regresia liniară simplă.

Rezultate și concluzii

✓ameliorarea simptomelor postoperatorii

✓îmbunătățirea capacității de desfășurare a activităților zilnice

✓rolul important al suportului social în recuperarea pacienților

✓importanța monitorizării complicațiilor postoperatorii

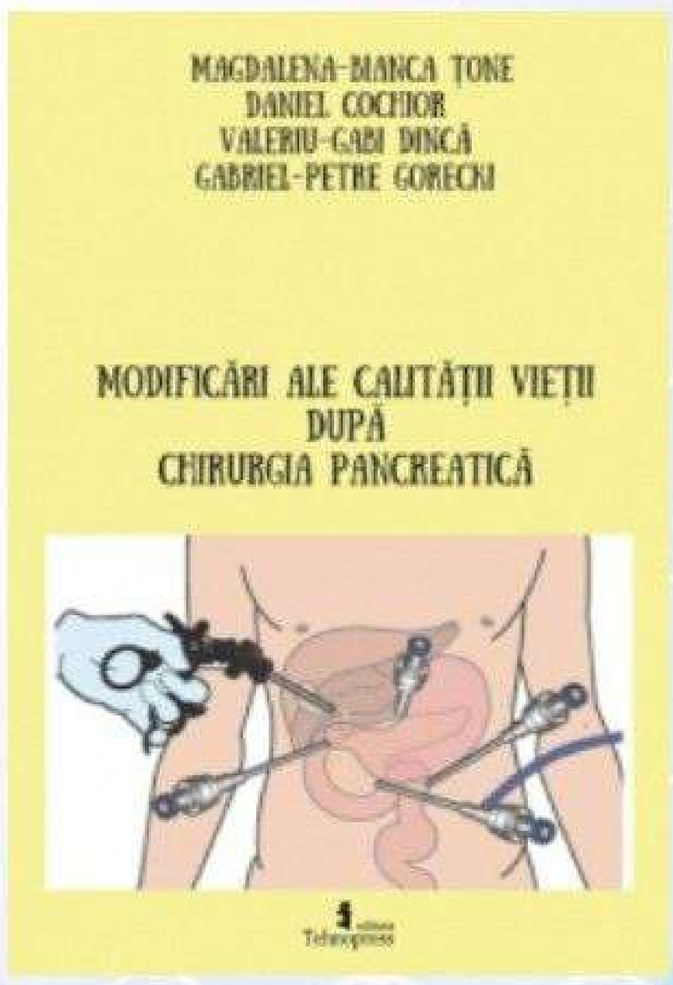


Fig. 1–3. Imagistică CT abdominală evidențiind modificările pancreatice asociate pancreatitei cronice

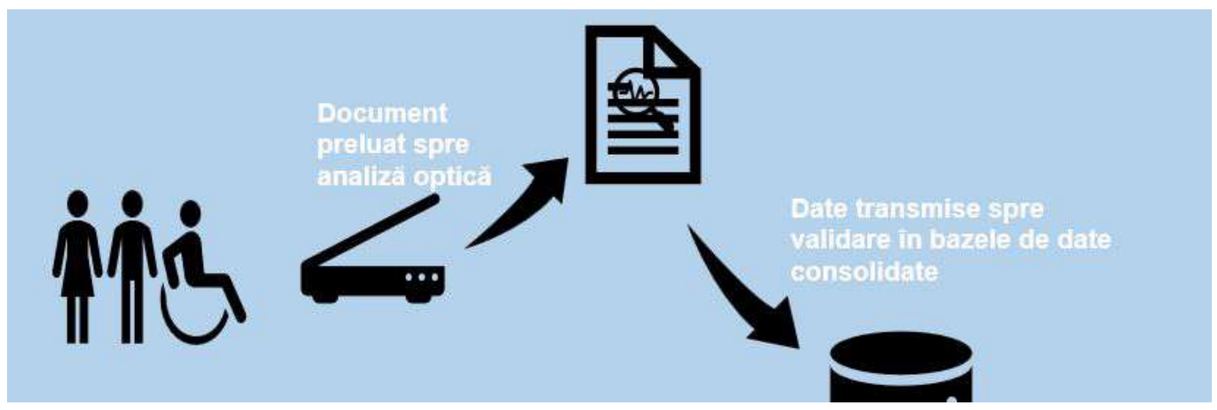
Innovative solutions in the digitalization of public services offered by the national fiscal administration agency

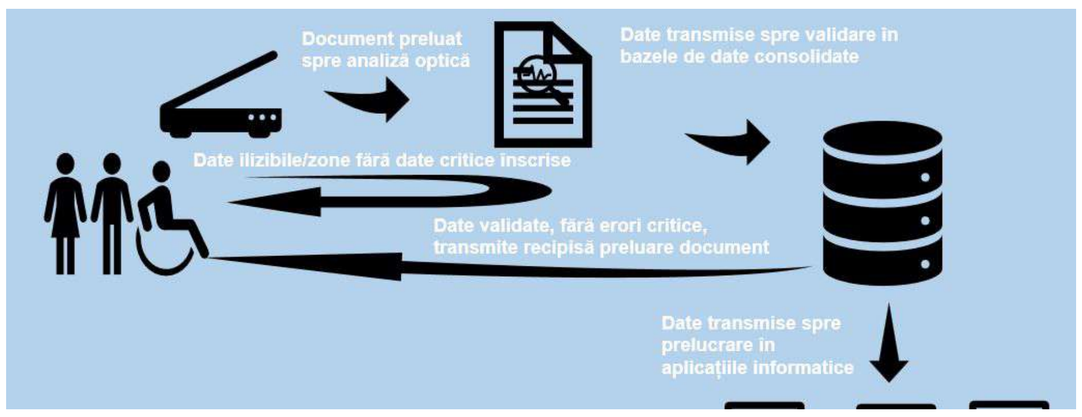
Patent/project number: UNSTPB 1/2025

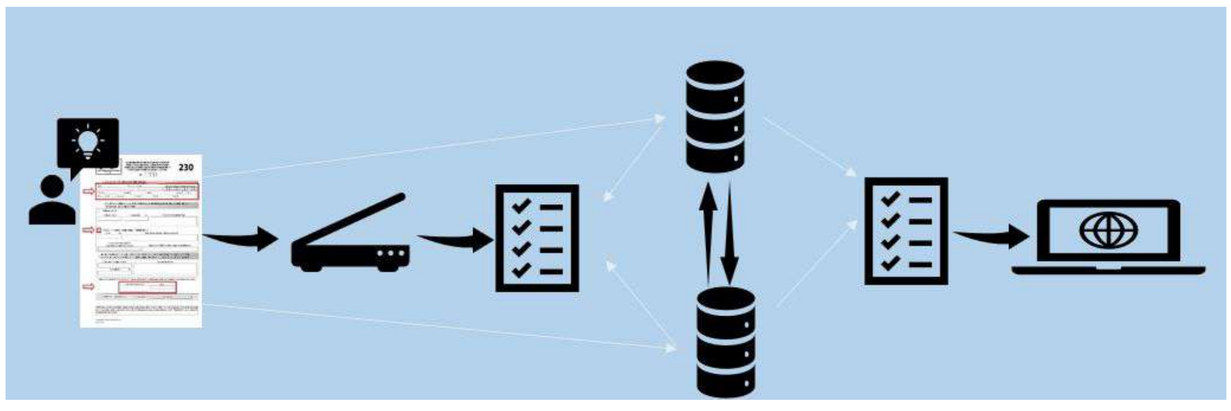
Authors: Semenescu Augustin, Marcu Dragos Florin, Costoiu Mihnea Cosmin, Petcu Stefan Florin, Florea Bogdan

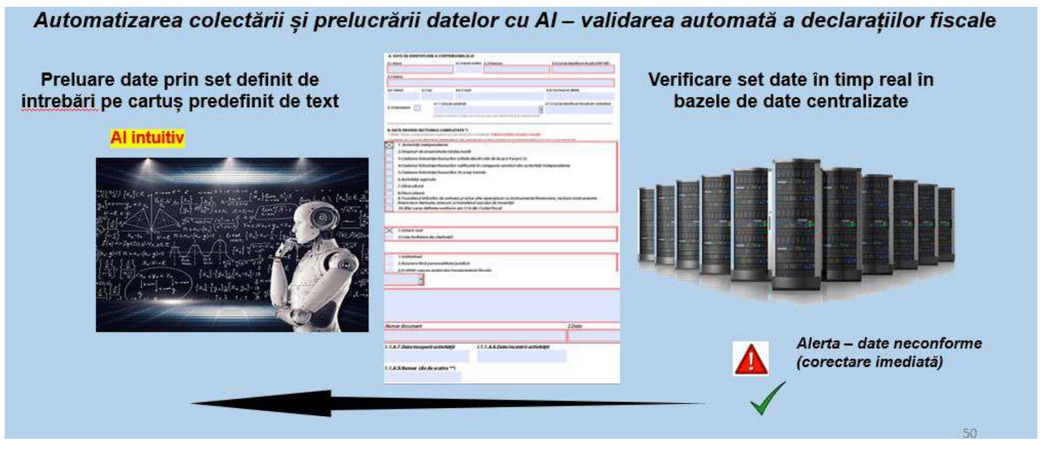
E

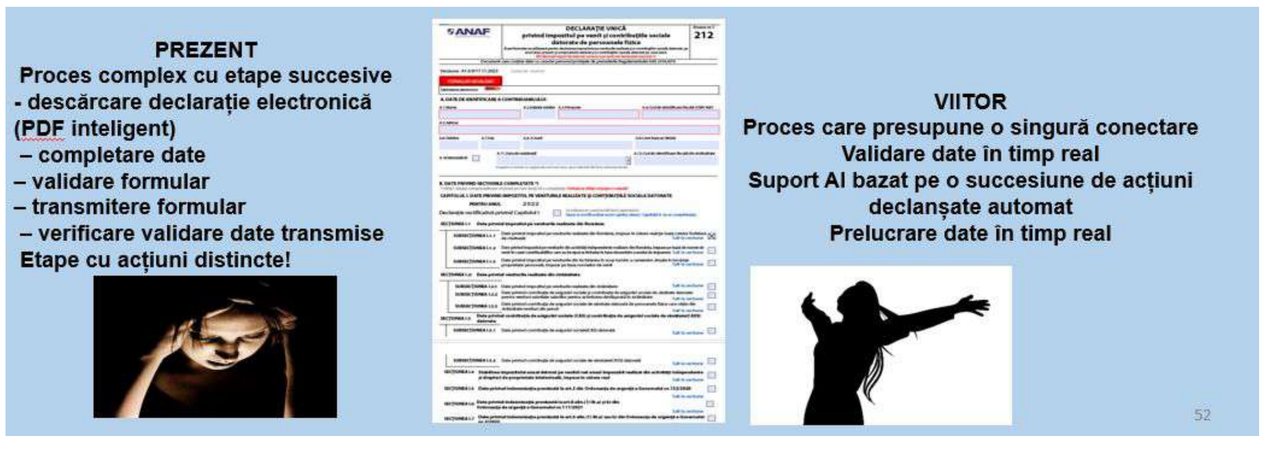
Modernizing the technical infrastructure, adopting efficient models of fiscal administration and adapting them to the specifics of society (education, degree of use of electronicmeans of communication) essentially represents a policy of openness and transparency of activity. The marketing of public services must have at its core the orientation towards citizens, the activity of public institutions must also have as its purpose the efficient satisfaction of the demands of the community and performance in the administration of the general interest. Although the public system is outside a "direct competitive market" having an absolute and intangible monopoly on certain segments of activity (public order, fiscal administration, national defense), a broad transformation through institutional reform is observed. The issue of identifying innovative solutions in the digitalization of public services offered by the National Agency for Fiscal Administration regarding communication by electronic means between taxpayers and ANAF requires continuous and analytical research and development activity, aimed at: Optimization and automation of administrative and fiscal processes; Increasing the cybersecurity of ANAF systems; Integration of emerging technologies; Improving the user experience of electronic platforms; Streamlining the process of collecting taxes and duties; Integration with other institutions and harmonization of data; Evaluation of the managerial impact on the implementation of digital solutions; Comparative analysis of international electronic fiscal systems.











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Telemedicine Education Advancement Through Micro-credentials
Insights from the Erasmus+ TEAM project

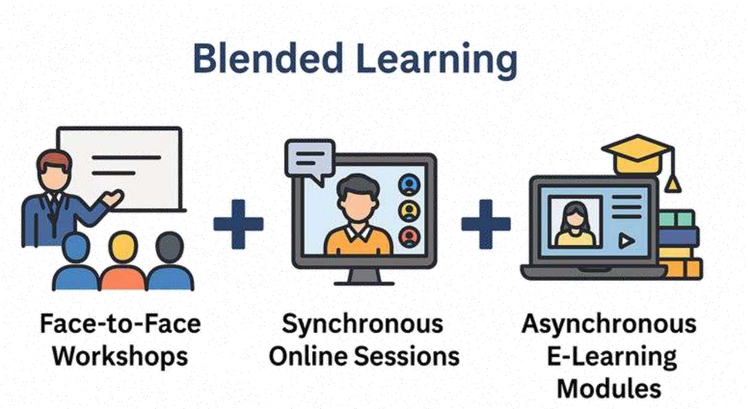
Project: 2023-1-SI01-KA220-HED-000165481
Mircea Adrian Focșa, Virgil Rotaru

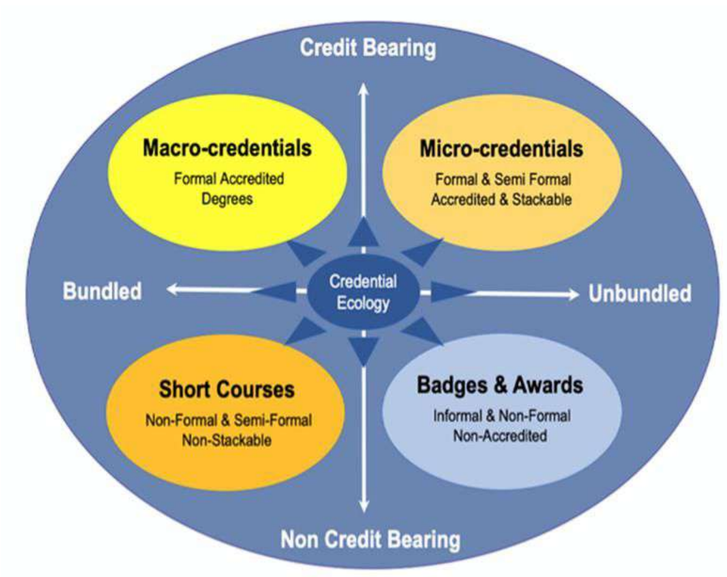
The Erasmus+ TEAM project introduces an innovative educational model for telemedicine, built on stackable micro-credentials and modular digital learning. The project's novelty lies in combining ECTS-recognised certificates with digital badges within a flexible, competency-based framework aligned with the European Qualifications Framework (EQF). This hybrid recognition system bridges formal university education and lifelong professional development.

The curriculum comprises 8 structured modules, each divided into three progressive units that integrate theoretical foundations, applied case studies, digital tools, and self-assessment mechanisms. The model enables personalised learning pathways for healthcare professionals, medical students, and healthcare administrators.

A cross-border pilot of Module 4 (Legal and Regulatory Frameworks in Telemedicine) involved 60 Romanian and 20 Greek students from Timisoara and Athens, validating workload calibration (0.5 ECTS), learning outcomes, and international transferability. The project further developed a Telemedicine Digital Warehouse, supporting reusable digital resources and scalable deployment across institutions.

TEAM represents an innovative, scalable solution for modernising digital health education and accelerating telemedicine integration across European healthcare systems.





TEAM contributes to shaping a coherent European approach to digital health education by providing a policy-aligned, future-ready training framework. The project supports harmonisation of competencies across borders and facilitates mutual recognition of digital health skills. By promoting interoperability, academic–industry collaboration, and continuous upskilling, TEAM strengthens the foundations for a resilient and digitally competent healthcare workforce. Its framework can inform future national and European strategies for integrating telemedicine and digital innovation into mainstream healthcare systems.

Explore the TEAM courses online https://app.team-project.eu/

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Erasmus+

"Digital Youth Wellness" was an Erasmus+ Youth Exchange co-funded by the European Union. During the 8 days of the project, 36 participants (including group leaders) from Romania, Bulgaria, Czechia, Hungary, and North Macedonia came to gain the knowledge, skills, and motivation to use digital tools/platforms better while also maintaining a healthy relationship with technology.

Co-funded by the European Union

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CORNELIUGROUP
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E

BRAND IDENTITY STRATEGY IS ARCHITECTURE.

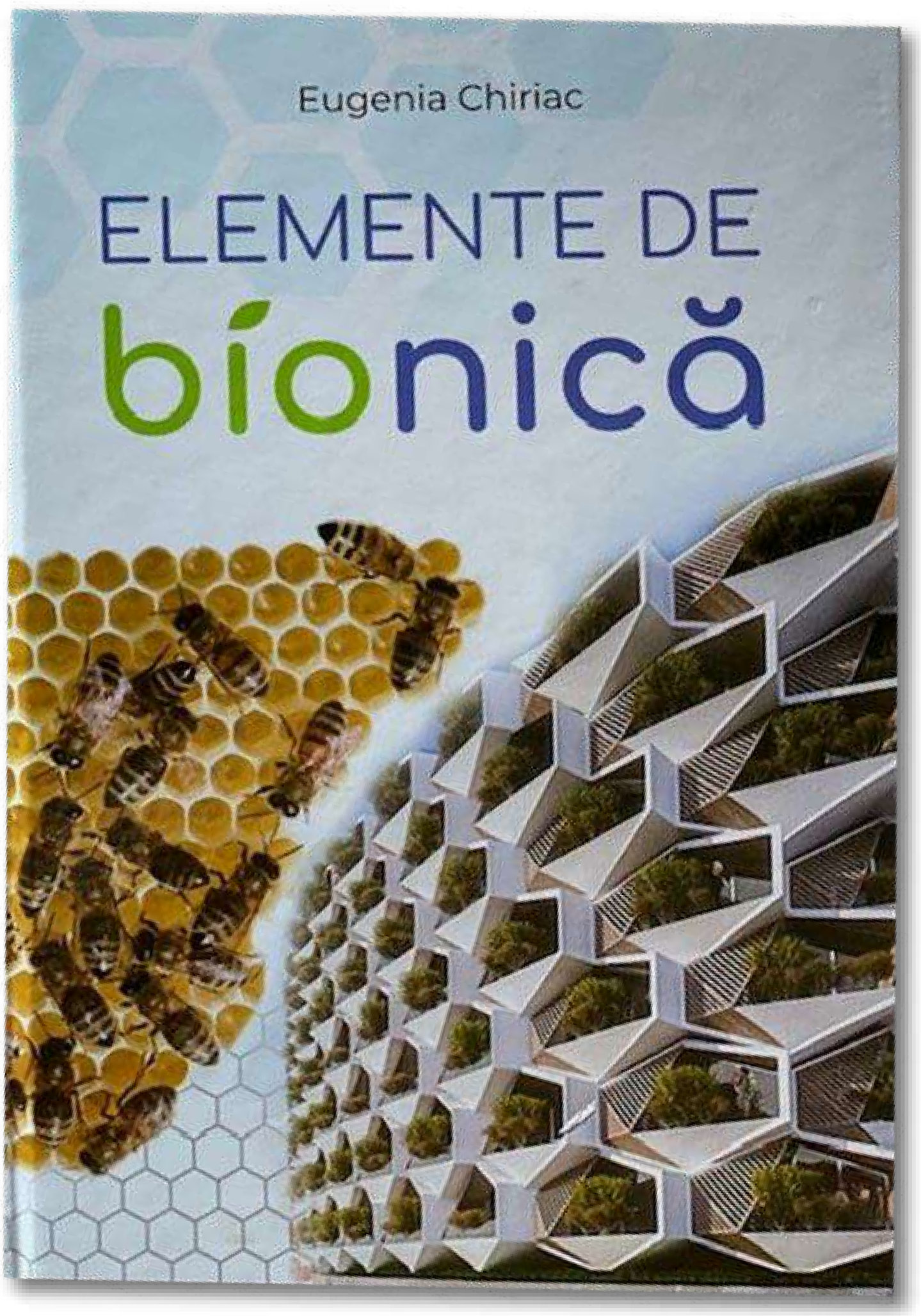
Cappelli Identity Design:
Creating impactful brands through geometric precision and strategic intuition.

ELEMENTE DE bionică

Author: Eugenia Chiriac, coordonator științific - Liubomir Chiriac

E

Currently, both natural and real sciences have experienced an impetuous development that has materialized through transfers of ideas, concepts, applications from the field of biology to that of technique and technology. At the same time, some interference sciences have also emerged, such as: biochemistry, biophysics, bioengineering, biochemistry, biocybernetics, biomathematics, etc. These sciences also include bionics, a relatively young discipline that draws inspiration from the structures, functions and processes characteristic of living organisms, in order to transpose them into practice, as technical or technological solutions. This requires learning strategies that integrate knowledge and research skills from biology, along with other disciplines, which complement each other and are based on rediscovery and reinvention, originality and creativity in thinking, aiming at the conscious and efficient acquisition of notions from the disciplines studied, and the practical application of modeling skills of structures and processes characteristic of living beings.



The manual contains examples of bionic research of flora and fauna from the most renowned research centers and universities in the world that have had and continue to have an impact on the progress of human development. At the same time, the work aims to: familiarize students with the achievements in the field of bionics, based on the interaction of biological disciplines and modern technologies, as well as with the achievements of bionics that are increasingly used in various fields of human activity.

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UNIVERSITATEA PEDAGOGICĂ DE STAT ION CREANGĂ DIN CHIȘINĂU

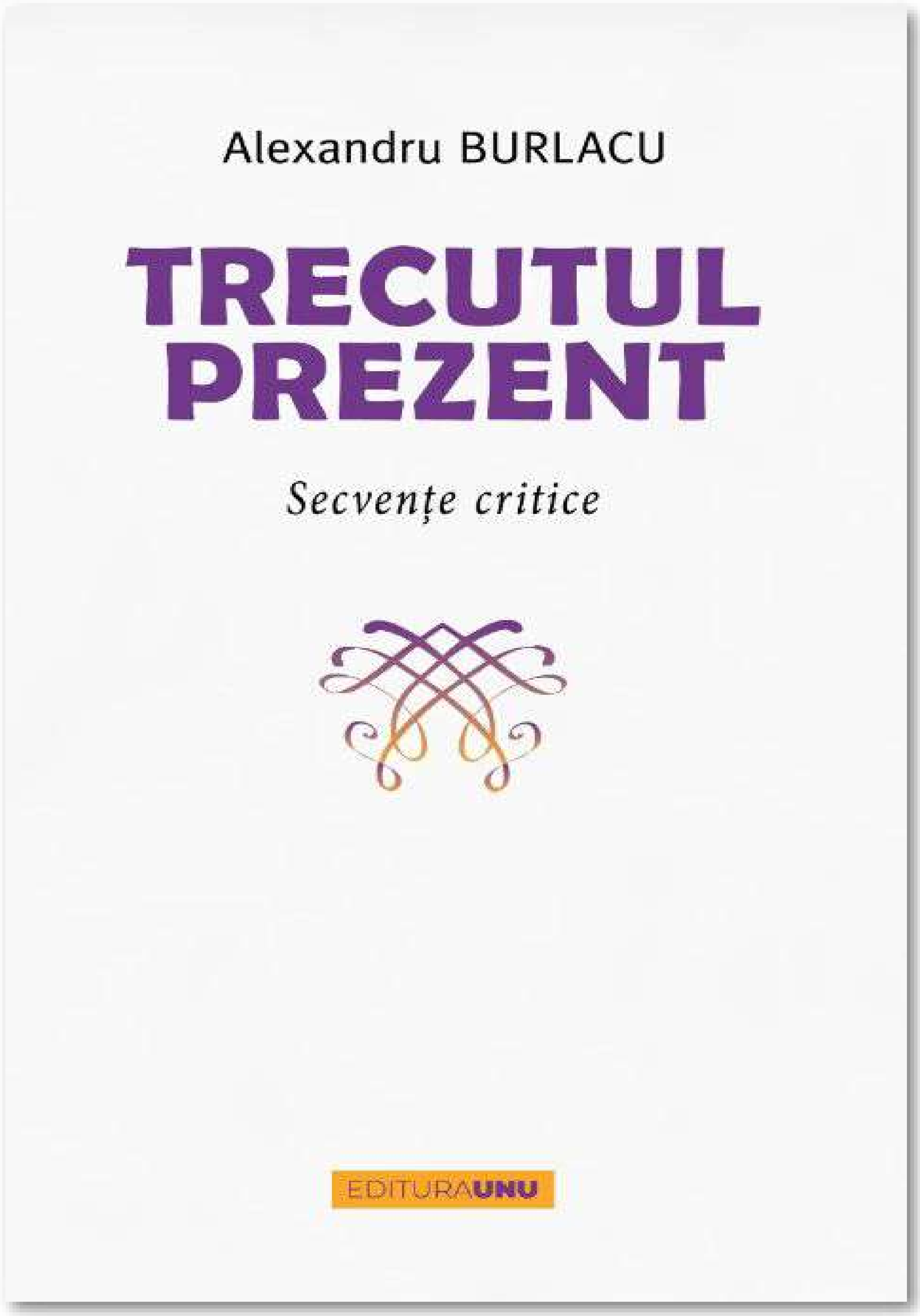
TRECUTUL PREZENT SECVENȚE CRITICE

BURLACU ALEXANDRU

E

Trecutul prezent însumează aproape patru decenii de preocupări literare ale profesorului de teorie și istorie literară și criticului Alexandru Burlacu. Ambele paliere ale activității sale se revăd, într-o interdependență benefică, în textele incluse în această carte. Criticul literar, sistematizator și catalogator de perioade, procese, fenomene și nume literare, găsește în teorie și istoria literaturii instrumente care îi oferă perspective inedite și sprijinul pentru o argumentare solidă a punctelor sale de vedere. Este o cale pentru realizarea unor „texistențe" memorabile.

The past and present sum up almost four decades of literary preoccupations of the professor of literary theory and history and critic Alexandru Burlacu. Both levels of his activity are seen again, in a beneficial interdependence, in the texts included in this book. The literary critic, systematizer and cataloger of periods, processes, phenomena and literary names, finds in the theory and history of literature tools that offer him new perspectives and the support for a solid argumentation of his points of view. It is a path to achieving memorable "textistences".



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MDIR Constructor 3.0

(software for creating interactive textbooks)

Certificate of Copyright and Related Rights, AGEPI Moldova *(*Series: PC (computer program),

Nr**: 7906,** *registration date 27.03.2024)*

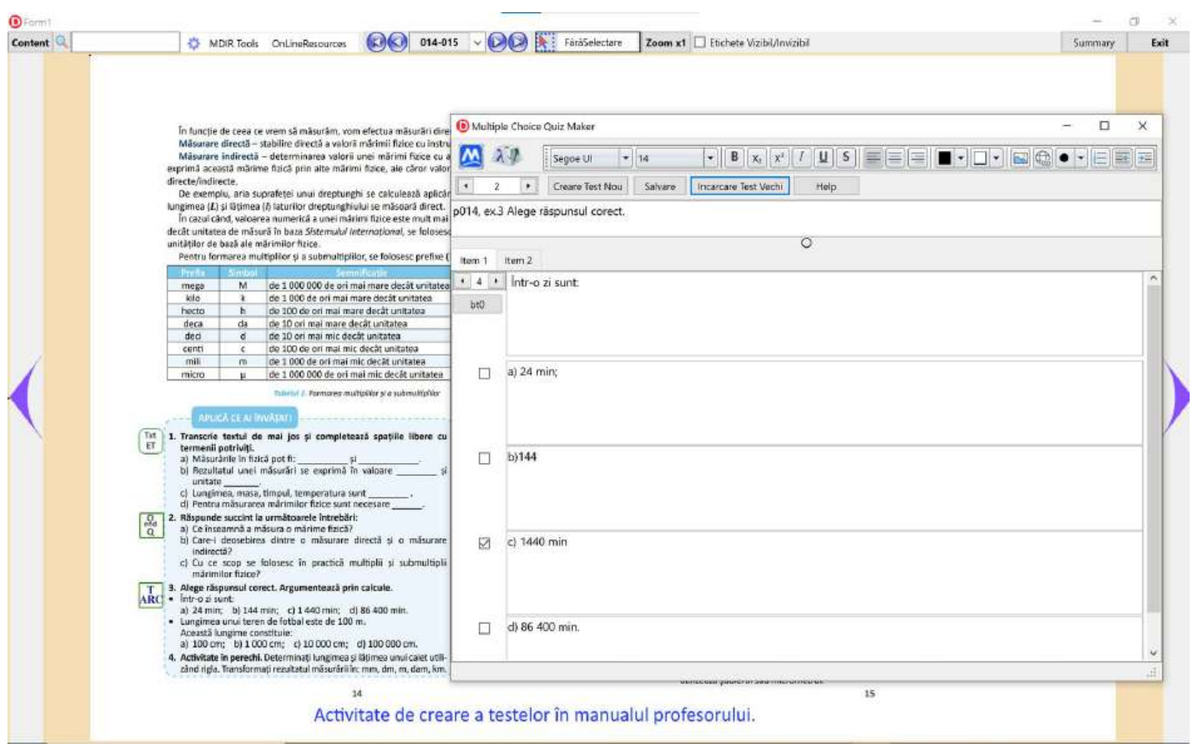
Autori: Nicolae Balmuș, Tatiana Croitor

E

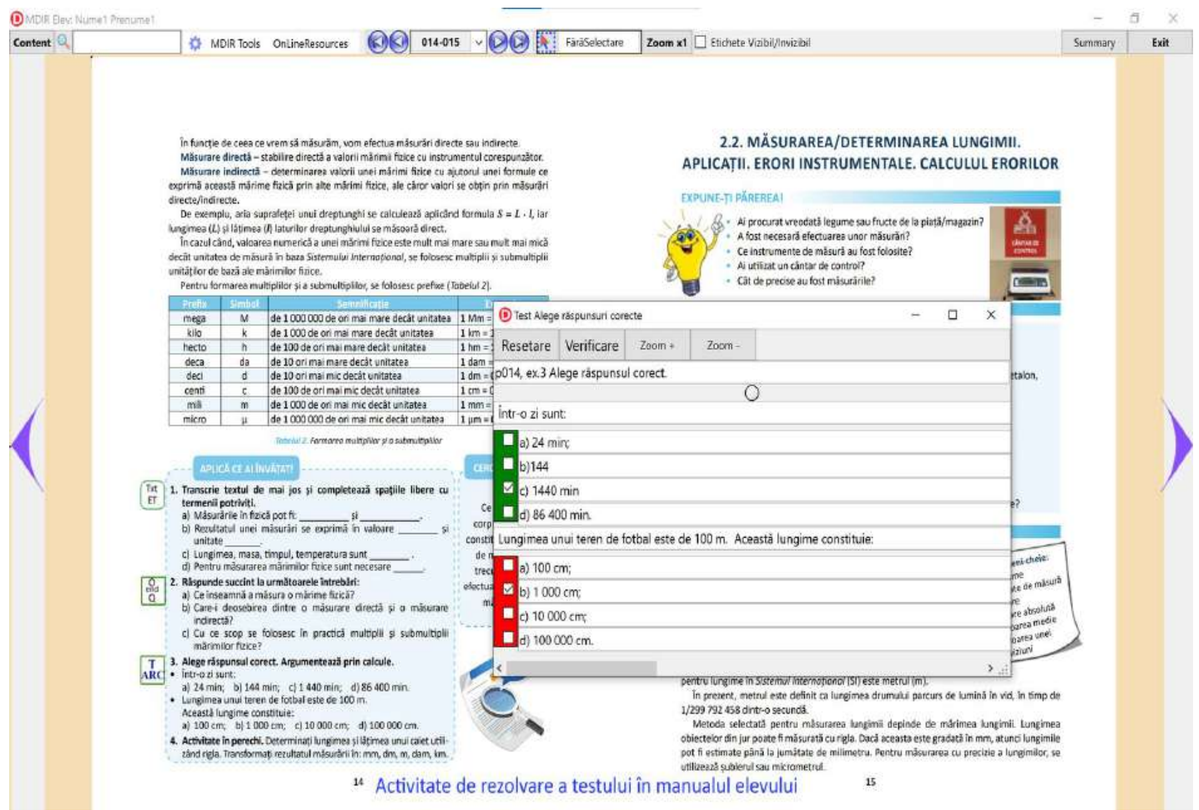
MDIR Constructor 3.00 is an upgraded version of MDIR Constructor 2.00 software, which was created in the Delphi 11 (FMX) integrated development environment using TMS SOFTWARE and WinSOFT tools. This software allows users to create interactive digital textbooks of their own design for a variety of academic subjects based on a *.pdf file.

Version 3.00 of the application includes new features like improved design, new learning and knowledge testing activities, multilingual interface translation options, an integrated robot for voice reading, a new algorithm for placing resources on textbook pages and fields, and a new algorithm for creating student textbooks that teachers can password protect. Version 3.00 of the student textbook allows for the addition of student-designed resources to the fields of the manual. These resources can include audio/video sequences, images, documents, notes, and programming activities created in a variety of programming languages, including Pascal, Delphi, C++, Python, and Scratch

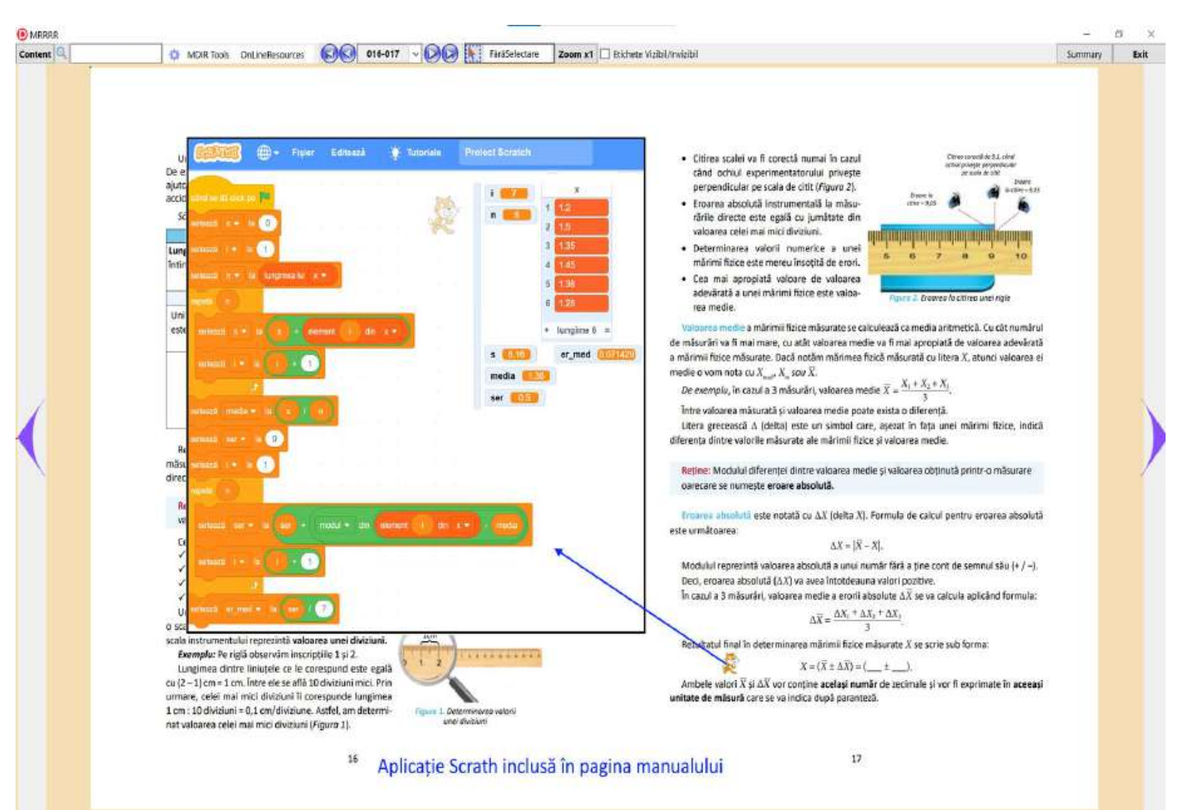
Interfața și meniurile principale MDIR Constructor 3.0



Activitate de creare a testelor în manualul profesorului.



Activitate de rezolvare a testului în manualul elevului



Aplicație Scrath inclusă în pagina manualului

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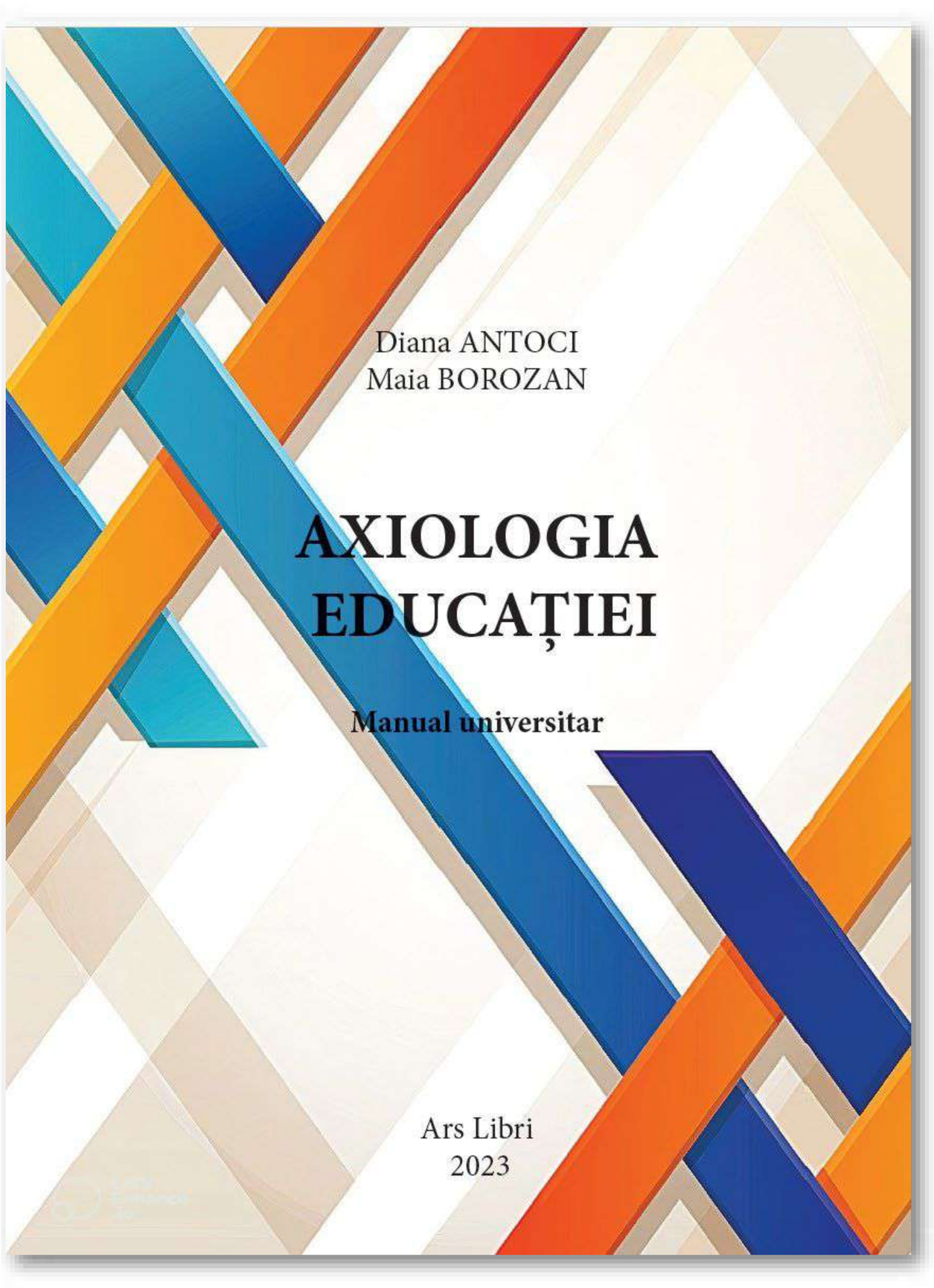
AXIOLOGY OF EDUCATION
(AXIOLOGIA EDUCAȚIEI)

Patent/project number: ISBN 978-606-36-2430-8
Author/s: Diana ANTOCI, Maia BOROZAN

E

The university textbook is provided for the study discipline "Axiology of education" being a fundamental course in the professional training of teaching staff, which contributes to the formation of a general vision on the philosophical evolution of pedagogical thinking regarding the complex issue of values. "Axiology" ensures the in-depth foray into the knowledge of the theory of values necessary for the understanding of pedagogical values and educational innovation processes from an axiological perspective. The practical importance of the Axiology of education results from the fact that in a constantly changing society, understanding the meaning and internalizing the fundamental values become essential in education. The strategic approaches designed in the course will favor the promotion of professional responsibilities and respect in the educational environment.



The university textbook, a didactic work developed in accordance with the principles of the philosophy of pedagogical science, is made up of 4 chapters and provides informative support regarding the fundamental elements of the axiology of education as a university study discipline, addresses the specific basic notions, includes autonomous learning activities and self-assessment, assignments for independent study, glossary of terms, bibliographic references and annexes corresponding to the 4 course units. own professional referential.

The university textbook "Axiology of education" is intended for university teaching staff for use in the process of initial professional training of future pedagogues in higher education, constituting a benchmark for students, master's students, doctoral students and researchers in the field of education sciences. The theoretical content and practical activities can serve as support in the continuous professional training of teachers, concerned with the development of the axiological referential of the students and their own professional referential.

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STUDY OF USEFUL PROPERTIES OF SOME COORDINATION COMPOUNDS CONTAINING OXIME LIGANDS

ISBN 978-3-9402237-24-8

Authors: **COROPCEANU Eduard, CILOCI Alexandra, ȘTEFÎRȚĂ Anastasia, BULHAC Ion**

E

The synthesis of a series of coordination compounds of Co(III), Cu(II), Zn(II) with various organic ligands containing oxime, carboxylic, pyridine, amine functional groups was carried out, which exhibit stimulating effects on physiological processes in crop plants, fungi, algae, etc. The composition and structure of the new compounds were studied using contemporary physical analysis methods (IR, UV-Vis, NMR spectroscopy, X-ray diffraction, etc.). The use of organic molecules with various electron-donating atoms (N, O, S) and with a wide variety of geometric configurations has allowed the assembly of coordination compounds with novel structures and properties.

When introducing synthesized coordination compounds into the nutrient media of fungi from the genera *Aspergillus, Alternaria, Botrytis, Fusarium, Penicillium, Rhizopus, Mucor, Sporotrichum, Trichothecium, Sclerotinia, Chaetomium* and *Trichoderma,* positive results were obtained in increasing biomass productivity, enhancing enzymogenetic processes, shortening the technological cycle period, etc.

Contact: coropceanu.eduard@upsc.md

SERBIAN-HUNGARIAN BILATERAL COOPERATION FOR THE YEARS 2025-2026:

"Structural optimization of additively manufactured cellular titanium implant using artificial intelligence"

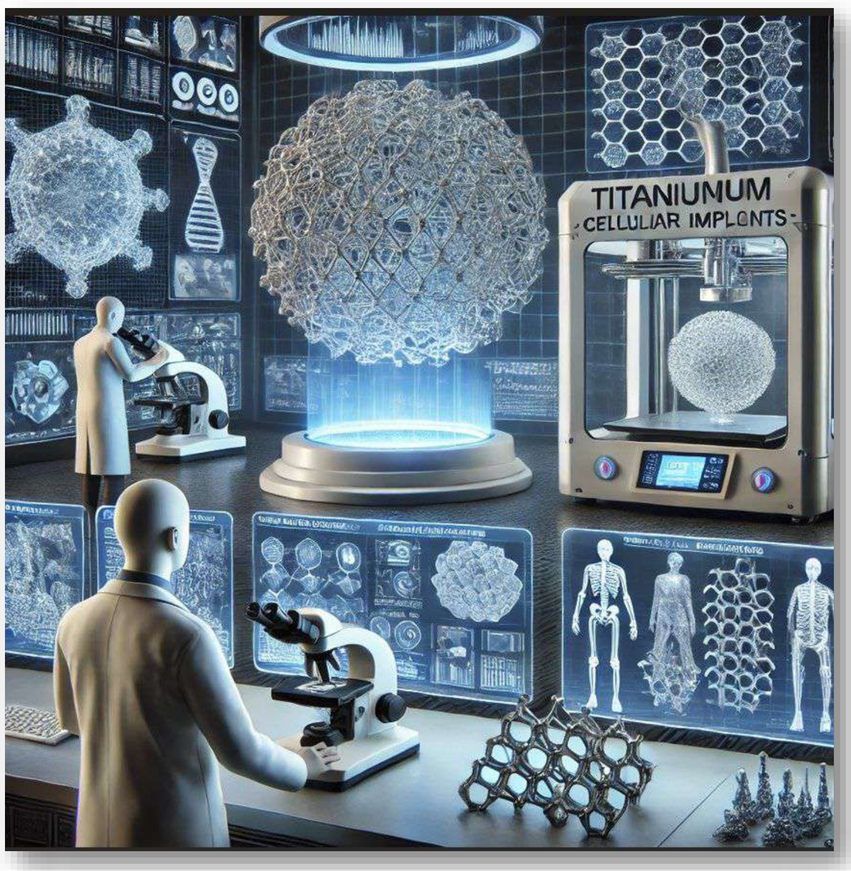
E

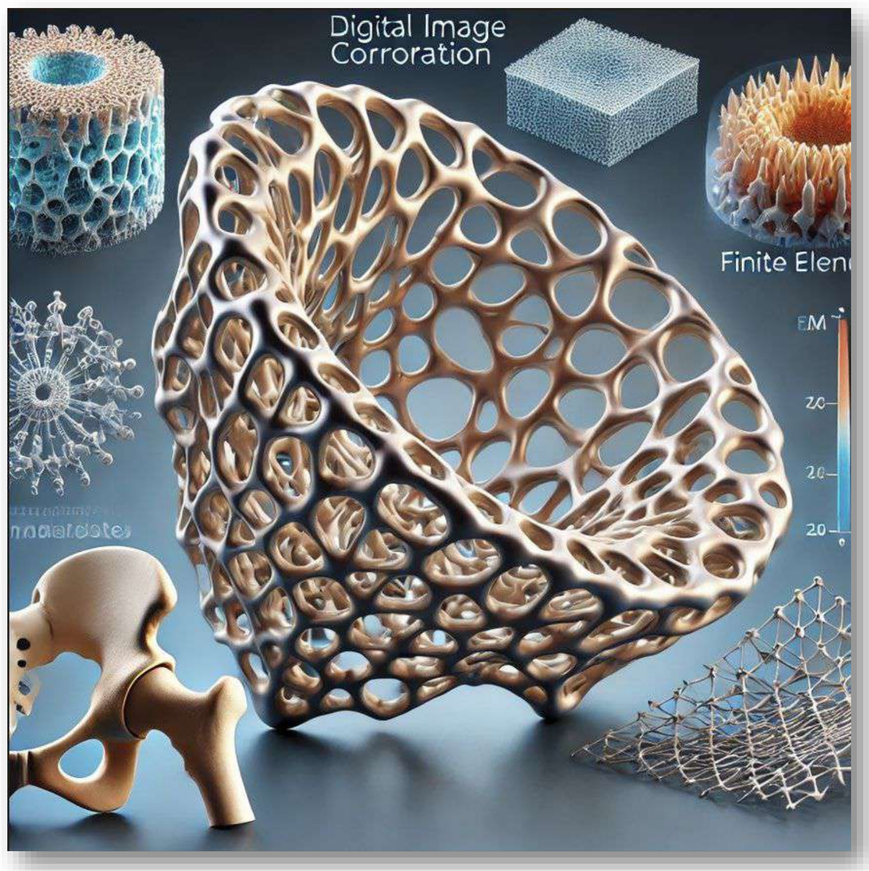
Author/s: Principal Investigators:

Nataša Trišović, Serbia; Tamas Mankovits, Hungary

Institution/Country: University of Belgrade, Serbia, University of Debrecen, Hungary

The artificial development of cellular structures has been a subject of research for decades, drawing inspiration from naturally occurring structures such as bone, wood, and sea sponges. These structures continue to attract significant interest due to their exceptional physical and mechanical properties. While metallic cellular structures have been produced for a long time, the advent of additive manufacturing has introduced new possibilities for their design and fabrication. Despite the technological advancements, several challenges remain, particularly in characterizing these structures and determining their mechanical behavior under different loading conditions, both experimentally and numerically. One of the key areas of interest is the development of patient-specific implants, which offer significant advantages over standard implants. Titanium implants, produced via 3D printing and designed with strategically open cellular structures based on medical considerations, can improve osseointegration and better match the mechanical properties of bone. Currently, titanium 3D printing technology is available, but the integration of cellular structures into human implants is still in progress. A major obstacle is the lack of comprehensive knowledge regarding the mechanical properties of these structures and the complexities of finite element modeling due to their intricate geometries. For the past four years, a research team from the University of Debrecen has been actively engaged in titanium 3D printing, developing various cellular structures for biomedical applications. Within the framework of the successful GINOP project "Research on Implant Osteosynthesis and Development of Trabecular Structures Using Additive Manufacturing", they have optimized their 3D printing process to achieve high precision manufacturing. On the Serbian side, researchers have conducted a comprehensive analysis of titanium alloys used in biomedical applications, focusing on artificial joint implants and fixation plates.





Their study emphasizes fracture mechanics, specifically fatigue crack initiation and propagation. The research includes both experimental and numerical investigations, examining the mechanical behavior of fixation plates and hip replacement implants. Experimental studies utilized standard mechanical testing methods combined with Digital Image Correlation (DIC), while Finite Element Method (FEM) simulations were employed to enhance predictive modeling.

A key challenge in this research is the difficulty of 3D printing small cell sizes, which leads to geometric discrepancies between the printed samples and their CAD models, complicating numerical simulations. Addressing these challenges is essential for advancing the field and bringing titanium cellular implants closer to clinical application.

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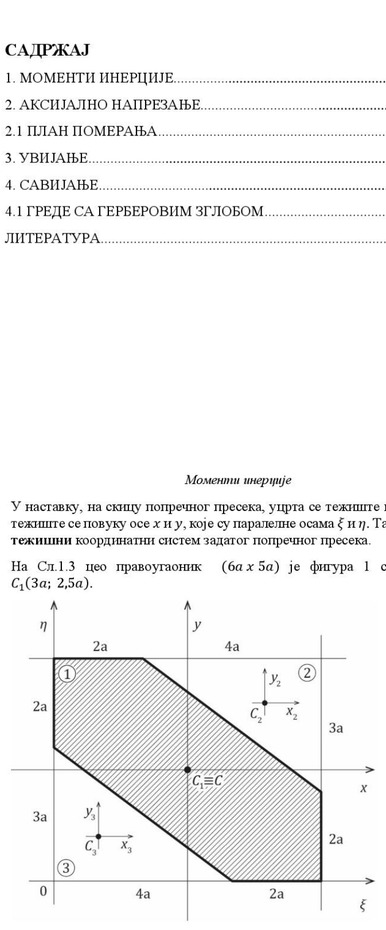
Strength of Materials – Comprehensive Workbook

Patent/project number: ISBN 978-86-6060-074-7

Authors: Ana Petrović, Milorad Milovančević, Momčilo Dunjić

It's a comprehensive workbook written to be used by students attending course of a Strength of Materials (1st year of Bachelor Studies at the Faculty of Mechanical Engineering, University of Belgrade). It contains over 50 problems solved in detail, using over 200 sketches to illustrate the problem and its solutions, and uncountable number of equations. It is divided in four main Chapters: Moments of Inertia, Axial Loading, Torsion, and Bending.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Моменти инерције

У наставку, на скицу попречног пресека, уцрта се тежиште пресека, кроз тежиште се повуку осе x и y, које су паралелне осама ξ и η. Тако је добијен **тежишни** координатни систем задатог попречног пресека.

На Сл.1.3 цео правоугаоник $(6a \times 5a)$ је фигура 1 са тежиштем $C_1(3a; 2{,}5a)$.

Слика 1.3 Замишљени попречни пресек неког гредног носача

Универзитет у Београду

Ана Петровић Милорад Милованчевић

Момчило Дуњић

ОТПОРНОСТ МАТЕРИЈАЛА

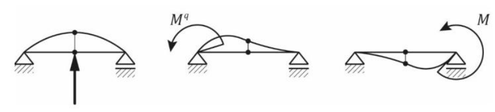
ЗБИРКА ЗАДАТАКА

СА ДЕТАЉНИМ УПУТСТВИМА ЗА ЊИХОВО РЕШАВАЊЕ

Машински факултет

Београд, 2022.

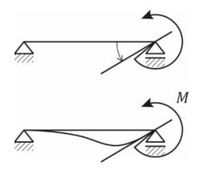
$$f_N = -\frac{1}{48}\frac{F(2l)^3}{EI} - \frac{\left(\frac{ql^2}{2}\right)(2l)^2}{16EI} + \frac{(ql^2)\cdot(2l)^2}{16EI} = \frac{ql^4}{EI}\left(-\frac{1}{6} - \frac{1}{8} + \frac{1}{4}\right) = -\frac{1}{24}\frac{ql^4}{EI}$$



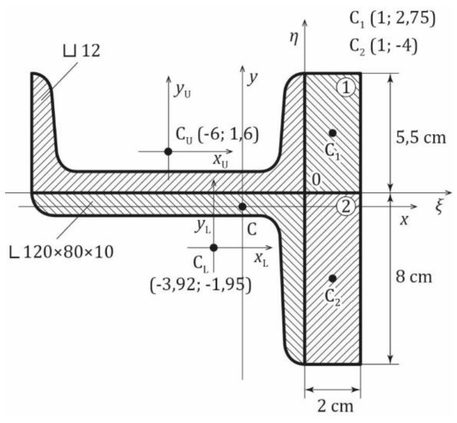
Слика 4.40 Еластична линија савијене греде под дејством задатог оптерећења

Што се тиче момената над ослонцима, у таблицама дато је померање тачке на средини распона по апсолутној вредности, па је неопходно погледати претходне скице и одредити одговарајући предзнак тог померања.

Момент тежи да заротира греду око тачке ослоница у којој делује (Сл. 4.41), па је еластична линија савијене греде приказана скицом, а у складу са тим су одређени предзнаци угиба у изразу за угиб тачке N.



Слика 4.41 Еластична линија савијене греде под дејством момента



Слика 1.34 Замишљени попречни пресек неког гредног носача

$$A = 17|_U + 19{,}1|_L + 2\cdot 13{,}5|_{1,2} = 63{,}1\ \text{cm}^2$$

$$\xi_C = \frac{\sum(A_i\xi_{Ci})}{\sum A_i} = \frac{17(-6)|_U + 19{,}1\cdot(-3{,}92)|_L + 27\cdot(1)|_{1,2}}{63{,}1} = -2{,}37\ \text{cm}$$

$$\eta_C = \frac{\sum(A_i\eta_{Ci})}{\sum A_i} = \frac{17(1{,}6)|_U + 19{,}1\cdot(-1{,}95)|_L + (55{,}2)\cdot(2{,}75)|_1 + (8\cdot 2)\cdot(-4)|_2}{63{,}1} = -0{,}695\ \text{cm}$$

Приликом уцртавања тежишта попречног пресека, треба водити рачуна о томе да је дебљина ребра L профила $1\ \text{cm}$, а η координата тежишта целог попречног пресека је $-0{,}695\ \text{cm}$, па треба пажљиво уцртати тачку која означава тежиште „унутар" ребра L профила.

У наставку прорачуна се „локално" примењује Штајнерова теорема, као и таблични подаци:

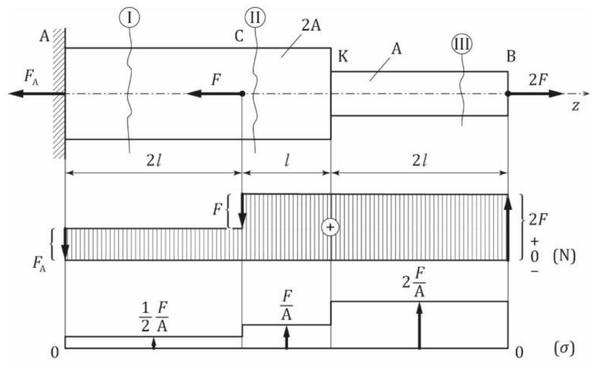
2. АКСИЈАЛНО НАПРЕЗАЊЕ

Издужење штапа оптерећеног аксијалном силом је сразмерно сили која делује на крај штапа и дужини штапа, а обрнуто сразмерно Јанговом модулу еластичности (карактеристика материјала) и површини попречног пресека штапа: $\Delta l = \frac{Nl}{EA}$.

Нормални напон код аксијалног напрезања константантан је по поречном пресеку. Нормални напон се добија тако што се сила у пресеку, у којем се тражи напон, подели површином попречног пресека: $\sigma = \frac{N}{A}$.

У наредним задацима разматрају се танки штапови (дужина штапа је бар 10 пута већа од највеће димензије попречног пресека), а скице су због прегледности нацртане увећано.

Задатак 2.1 Степенасти штап кружног попречног пресека, оптерећен је као на скици. Одредити померање пресека B. Одредити померање пресека K. Нацртати дијаграм аксијалних (подужних) сила. Одредити највећи нормални напон.



Слика 2.1 Поставка задатка, аксијално напрегнут степенасти штап

3. УВИЈАЊЕ

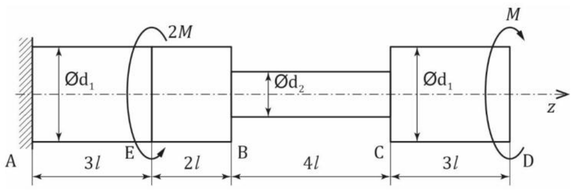
Постоји одређена аналогија између израза за напон и деформацију код аксијалног (подужног) напрезања и увијања (торзије). Код аксијалног напрезања нападна величина у пресеку је аксијална сила N, а код увијања то је момент увијања (момент торзије) M_t. Код аксијалног напрезања је утицајна физичка карактеристика материјала била Јангов модул елеастичности E, а код увијања је то модул клизања G. Значајна карактеристика попречног пресека код аксијалног напрезања је површина попречног пресека A, а код увијања **штапова кружног и прстенастог попречног пресека** су то поларни момент инерције I_0 и поларни отпорни момент W_0:

$$\Delta l = \frac{Nl}{EA} \qquad \theta = \frac{M_t\cdot l}{G\cdot I_0}$$

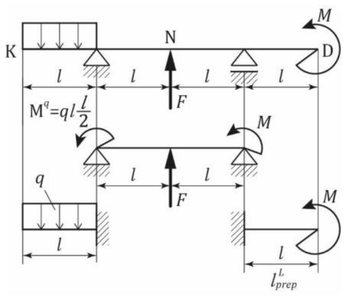
$$\sigma = \frac{N}{A} \qquad \tau = \frac{M_t}{W_0} = \frac{M_t}{I_0}\cdot\rho_{max}$$

Расподела напона код увијања по попречном пресеку зависи линеарно од потега-променљивог полупречника ρ кружног пресека, који је у распону $0 \le \rho \le r$, $2r = d$ (односно, $2R = D$). Тако је у тежишту пресека напон једнак нули, а на ободу пресека је највећи.

Задатак 3.1 Нацртати дијаграм момента увијања. Одредити потребне пречнике вратила на основу вредности допуштеног тангенцијалног (смичућег) напона τ_d. Одредити углове увијања пресека E и D (θ_E и θ_D). Дато је: $\frac{d_1}{d_2} = 2$, $l = 20\ \text{cm}$, $\tau_d = 5\ \frac{\text{kN}}{\text{cm}^2}$, $M = 50\ \text{kNcm}$, $G = 8080\ \frac{\text{kN}}{\text{cm}^2}$.



Слика 3.1 Поставка задатка, челично вратило оптерећено моментима увијања



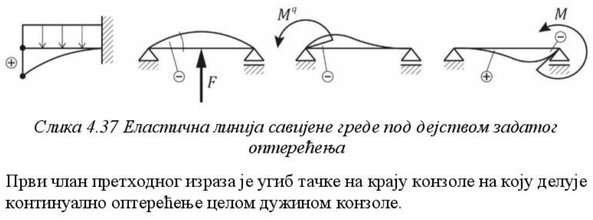
Слика 4.36 Греда са препустима оптерећена моментом, силом и континуалним оптерећењем, припрема за израчунавање угиба

Приликом израчунавања угиба тачке K на левом препусту посматрају се средња скица и скица у доњем реду лево (оптерећење са десног препуста утиче преко момента M редукованог на ослонац B):

$$f_K = f_K^{konz} - \left(\sum\alpha\right) l^L_{prep}$$

$$= \frac{ql^4}{8EI} - l\cdot\left[-\frac{(ql)\cdot(2l)^2}{16EI} - \frac{\left(\frac{ql^2}{2}\right)\cdot(2l)}{3EI} + \frac{(ql^2)(2l)}{6EI}\right]$$

$$= \frac{ql^4}{EI}\left(\frac{1}{8} + \frac{1}{4} + \frac{1}{3} - \frac{1}{3}\right) = \frac{3}{8}\frac{ql^4}{EI}$$



Слика 4.37 Еластична линија савијене греде под дејством задатог оптерећења

Први члан претходног израза је угиб тачке на крају конзоле на коју делује континуално оптерећење целом дужином конзоле.

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University of Belgrade
Faculty of Mechanical Engineering

MECHANICAL POWER TRANSMISSIONS
Problems with Solution

Book, Publisher: Faculty of Mechanical Engineering, University of Belgrade, Serbia

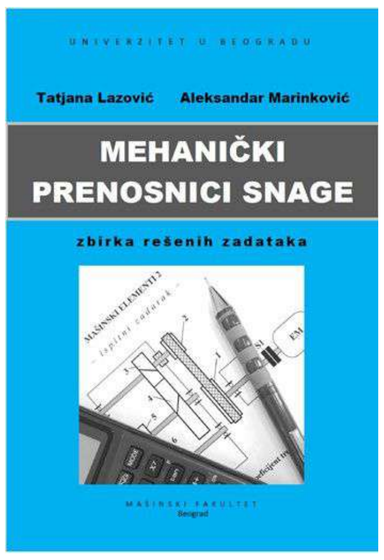
Authors: Tatjana Lazović, Aleksandar Marinković

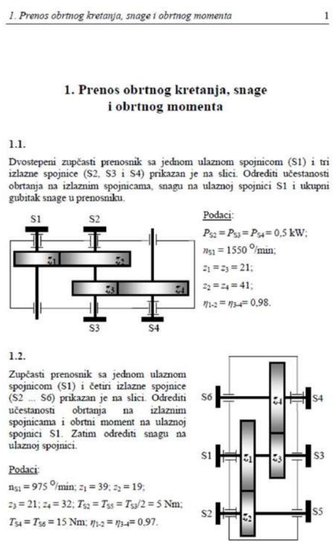
E

Mechanical Elements 2 is a mandatory subject in the curriculum of the Mechanical Engineering study program of Bachelor Academic Studies at the Faculty of Mechanical Engineering, University of Belgrade. The subject is attended by all students of the second year of bachelor academic studies, in the fourth semester. The fields of machine elements theory covered by the course of Machine Elements 2 are **MECHANICAL POWER TRANSMISSIONS**: spur and helical gears, bevel gears, worm gears, belt and chain drives, couplings.

Solving practical problems is the primary method for assessing the theoretical knowledge acquired in elements of Mechanical Power Transmissions. At FME Belgrade, the final exam consists of solving tasks—original, realistic problems. To successfully complete the exam, students need to practice throughout the semester. They can solve tasks independently only if they use a collection of exercises for training. Therefore, in addition to textbooks and manuals for project realization, it is essential that students also have a book of solved problems.

The book (206 pages) is methodologically organized into four parts:
I - "small" tasks (23 tasks on 42 pages), grouped in chapters: Power, torque and rotation transmission - 3 tasks; Cylindrical geaRs - 7 tasks; Bevel gears - 3 tasks; Worm gears – 3 tasks; Belt drives - 5 tasks; Chain drives - 1 task; Couplings – 1 task.
II – Tasks solution (30 pages): the solution procedure, solutions of individual steps of the solution procedure are partially given, and the data took from the corresponding tables are also shown.
III - Combined complex problem. Each of them partially or fully covers the Mechanical Elements 2 course (19 solved problems on 137 pages). The solving procedures with the results are shown in detail, with reference to the tables from which the data were taken, with illustrations and the necessary explanations.
IV - 24 tables, and 9 pictures with data and diagrams needed to solve the tasks (20 pages)




1. Prenos obrtnog kretanja, snage i obrtnog momenta

1. Prenos obrtnog kretanja, snage i obrtnog momenta

1.1.

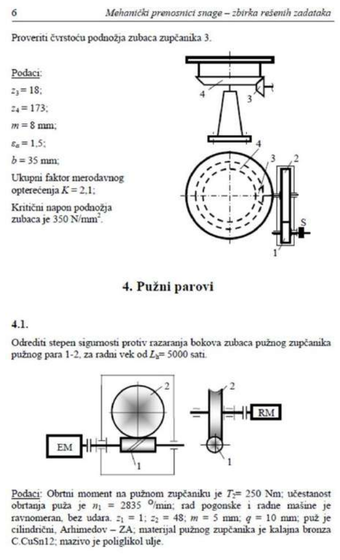
Dvostepeni zupčasti prenosnik sa jednom ulaznom spojnicom (S1) i tri izlazne spojnice (S2, S3 i S4) prikazan je na slici. Odrediti učestanosti obrtanja na izlaznim spojnicama, snagu na ulaznoj spojnici S1 i ukupni gubitak snage u prenosniku.

Podaci:
$P_{S2} = P_{S3} = P_{S4} = 0{,}5$ kW;
$n_{S1} = 1550$ °/min;
$z_1 = z_3 = 21$;
$z_2 = z_4 = 41$;
$\eta_{1\text{-}2} = \eta_{3\text{-}4} = 0{,}98$.

1.2.

Zupčasti prenosnik sa jednom ulaznom spojnicom (S1) i četiri izlazne spojnice (S2 ... S6) prikazan je na slici. Odrediti učestanosti obrtanja na izlaznim spojnicama i obrtni moment na ulaznoj spojnici S1. Zatim odrediti snagu na ulaznoj spojnici.

Podaci:
$n_{S1} = 975$ °/min; $z_1 = 39$; $z_2 = 19$;
$z_3 = 21$; $z_4 = 32$; $T_{S2} = T_{S5} = T_{S3}/2 = 5$ Nm;
$T_{S4} = T_{S6} = 15$ Nm; $\eta_{1\text{-}2} = \eta_{3\text{-}4} = 0{,}97$.


6 Mehanički prenosnici snage – zbirka rešenih zadataka

Proveriti čvrstoću podnožja zubaca zupčanika 3.

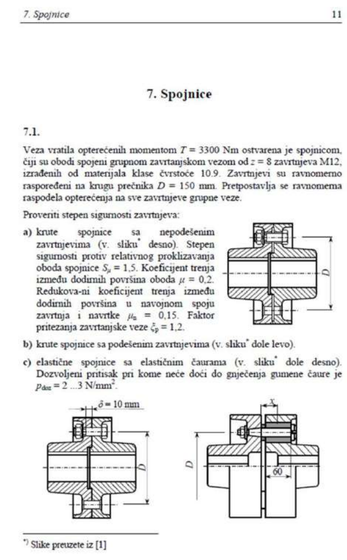
Podaci:
$z_3 = 18$;
$z_4 = 173$;
$m = 8$ mm;
$\varepsilon_\alpha = 1{,}5$;
$b = 35$ mm;
Ukupni faktor merodavnog opterećenja $K = 2{,}1$;
Kritični napon podnožja zubaca je 350 N/mm².

4. Pužni parovi

4.1.

Odrediti stepen sigurnosti protiv zarazanja bokova zubaca pužnog zupčanika pužnog para 1-2, za radni vek od L_h= 5000 sati.

Podaci: Obrtni moment na pužnom zupčaniku je T_2= 250 Nm; učestanost obrtanja puža je $n_1 = 2835$ °/min; rad pogonske i radne mašine je ravnomeran, bez udara. $z_1 = 1$; $z_2 = 48$; $m = 5$ mm; $q = 10$ mm; puž je cilindrični, Arhimedov – ZA; materijal pužnog zupčanika je kalajna bronza C.CuSn12; mazivo je poliglikol ulje.


7. Spojnice 11

7. Spojnice

7.1.

Veza vratila opterećenih momentom $T = 3300$ Nm ostvarena je spojnicom, čiji su oboci spojeni grupnom zavrtanjskom vezom od $z = 8$ zavrtnjeva M12, izrađenih od materijala klase čvrstoće 10.9. Zavrtnjevi su ravnomerno raspoređeni na krugu prečnika $D = 150$ mm. Pretpostavlja se ravnomerna raspodela opterećenja na sve zavrtnjeve grupne veze.

Proveriti stepen sigurnosti zavrtnjeva:

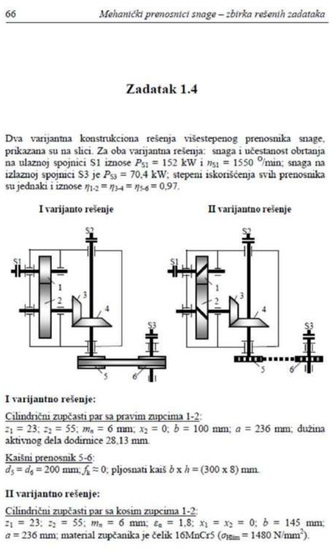
a) krute spojnice sa nepodešenim zavrtnjevima (v. sliku* desno). Stepen sigurnosti protiv relativnog proklizavanja oboda spojnice $S_\mu = 1{,}5$. Koeficijent trenja između dodirnih površina oboda $\mu = 0{,}2$. Redukova-ni koeficijent trenja između dodirnih površina u navojnom spoju zavrtnja i navrtke $\mu_R = 0{,}15$. Faktor pritezanja zavrtanjske veze $\xi_p = 1{,}2$.

b) krute spojnice sa podešenim zavrtnjevima (v. sliku* dole levo).

c) elastične spojnice sa elastičnim čaurama (v. sliku* dole desno). Dozvoljeni pritisak pri kome neće doći do gnječenja gumene čaure je $p_{doz} = 2 \ldots 3$ N/mm².

*) Slike preuzete iz [1]

142 Mehanički prenosnici snage – zbirka rešenih zadataka


66 Mehanički prenosnici snage – zbirka rešenih zadataka

Zadatak 1.4

Dva varijantna konstrukciona rešenja višestepenog prenosnika snage, prikazana su na slici. Za oba varijantna rešenja: snaga i učestanost obrtanja na ulaznoj spojnici S1 iznose $P_{S1} = 152$ kW i $n_{S1} = 1550$ °/min; snaga na izlaznoj spojnici S3 je $P_{S3} = 70{,}4$ kW; stepeni iskorišćenja svih prenosnika su jednaki i iznose $\eta_{1\text{-}2} = \eta_{3\text{-}4} = \eta_{5\text{-}6} = 0{,}97$.

I varijantno rešenje

II varijantno rešenje

I varijantno rešenje:

Cilindrični zupčasti par sa pravim zupcima 1-2:
$z_1 = 23$; $z_2 = 55$; $m_n = 6$ mm; $x_2 = 0$; $b = 100$ mm; $a = 236$ mm; dužina aktivnog dela dodirnice 28,13 mm.

Kaišni prenosnik 5-6:
$d_5 = d_6 = 200$ mm; $f_k \approx 0$; pljosnati kaiš b x h = (300 x 8) mm.

II varijantno rešenje:

Cilindrični zupčasti par sa kosim zupcima 1-2:
$z_1 = 23$; $z_2 = 55$; $m_n = 6$ mm; $\varepsilon_\alpha = 1{,}8$; $x_1 = x_2 = 0$; $b = 145$ mm; $a = 236$ mm; materijal zupčanika je čelik 16MnCr5 (σ_{Hlim} = 1480 N/mm²).

Rešeni ispitni zadaci – Zadatak 2.6 149

Zadatak 2.6

1.

Elektromotor EM snage 6 kW, preko kaišnog para 1-2 pokreće zupčasti prenosnik koji se sastoji od cilindričnog para sa kosim zupcima 3-4 i pužnog para 5-6. Prenosnik preko izlazne spojnice S2, čija je učestanost obrtanja 18 °/min, podiže teret mase m brzinom v, pomoću doboša prečnika $D = 500$ mm.

Kaišni prenosnik 1-2:
d_{w1} = 250 mm; d_{w2} = 492 mm; faktor proklizavanja kaiša f_k = 0,02; koeficijent trenja kaiša po kaišniku μ = 0,20; stepen sigurnosti protiv proklizavanja kaiša S_μ = 1,2; faktor spoljašnjih dinamičkih sila c_A = 1; stepen iskorišćenja $\eta_{1\text{-}2}$ = 0,95.

Cilindrični zupčasti par sa kosim zupcima 3-4:
$z_3 = 22$; $z_4 = 75$; $m_n = 3$ mm; $\alpha_n = 20°$; $\beta = 11°$; $x_1 = 0{,}462$; $x_2 = 0{,}144$; gubitak snage na zupčanom paru 2%.

Pužni par 5-6:
$z_5 = 2$; $z_6 = 50$; $q = 9$; $x = 0{,}5$; ugao trenja $\rho = 3°$; $K_A = 1$; podmazivanje poliglikol uljem.

Rešeni ispitni zadaci – Zadatak 1.6 81

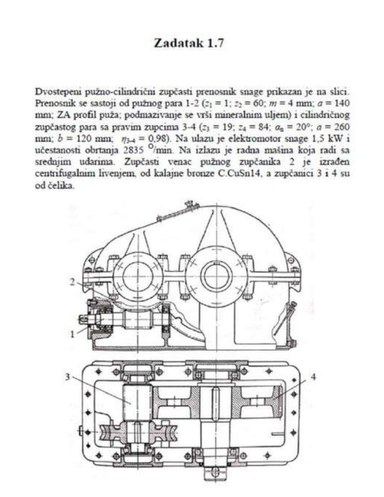
Zadatak 1.6

Na slikama je prikazan stoni rotacioni dodavač. Pogon uređaja se sastoji od elektromotora EM (P_{EM} = 4,5 kW; n_{EM} = 800 °/min), kaišnog prenosnika 1-2 sa tri identična trapezna kaiša, cilindričnog zupčastog para 3-4 sa pravim zupcima i konusnog zupčastog para 5-6 sa pravim zupcima. Na konusnom zupčaniku 6, nalazi se obrtni sto OS dodavača, prečnika D_{OS} = 1500 mm. Pretpostavlja se ravnomeran rad radne mašine, bez promene obrtnog momenta. Uređaj radi do 10 sati dnevno.

Kaišni prenosnik 1-2: d_{w1} = 125 mm; d_{w2} = 375 mm; tri trapezna kaiša normalne širine – široki profil B, nosivosti P_0 = 1,5 kW po jednom kaišu; $a_{1\text{-}2} \approx$ 848 mm; zanemariti proklizavanje; $\eta_{1\text{-}2}$ = 0,90; faktor učestanosti savijanja (dužine) kaiša c_f = 1,02.

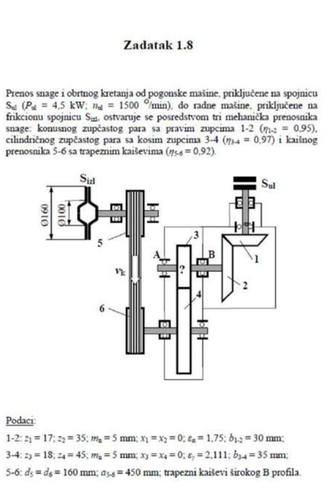
Cilindrični zupčasti par 3-4: $z_3 = 19$; $z_4 = 69$; $m_{n3\text{-}4} = 6$ mm; $x_3 = x_4 = 0$; $\varepsilon_{\alpha3\text{-}4} = 1{,}5$; $b_{3\text{-}4} = 35$ mm; materijal zupčanika je čelik C45E (Č 1531), bokovi zubaca su nitrirani; kvalitet izrade IT7; $\eta_{3\text{-}4} = 0{,}98$.

Konusni zupčasti par 5-6: $z_5 = 18$; $m_{t5\text{-}6} = 6$ mm; $\varepsilon_{\alpha5\text{-}6} = 1{,}5$; $b_{5\text{-}6} = 35$ mm; ukupni faktor opterećenja $K_{5\text{-}6} = 1{,}95$; materijal oba zupčanika je čelik C45E (Č 1531), tvrdoće bokova HRC 60; zupci su izrađeni rendisanjem (ukupni faktor kritičnog napona bokova je 0,85); $\eta_{5\text{-}6} = 0{,}94$.


Rešeni ispitni zadaci – Zadatak 1.7 89

Zadatak 1.7

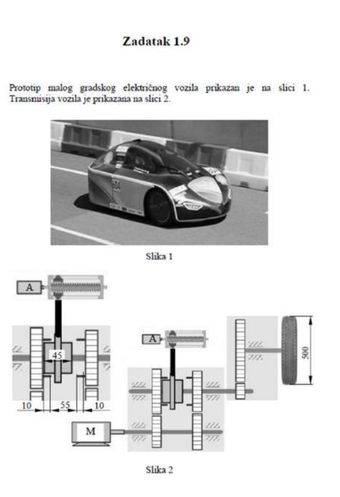
Dvostepeni pužno-cilindrični zupčasti prenosnik snage prikazan je na slici. Prenosnik se sastoji od pužnog para 1-2 ($z_1 = 1$; $z_2 = 60$; $m = 4$ mm; $a = 140$ mm; ZA profil puža; podmazivanje se vrši mineralnim uljem) i cilindričnog zupčastog para sa pravim zupcima 3-4 ($z_3 = 19$; $z_4 = 84$; $\alpha_n = 20°$; $a = 260$ mm; $b = 120$ mm; $\eta_{3\text{-}4} = 0{,}98$). Na ulazu je elektromotor snage 1,5 kW i učestanosti obrtanja 2835 °/min. Na izlazu je radna mašina koja radi sa srednjim udarima. Zupčasti venac pužnog zupčanika 2 je izrađen centrifugalnim livenjem, od kalajne bronze C.CuSn14, a zupčanici 3 i 4 su od čelika.


96 Mehanički prenosnici snage – zbirka rešenih zadataka

Zadatak 1.8

Prenos snage i obrtnog kretanja od pogonske mašine, priključene na spojnicu S_{ul} (P_{el} = 4,5 kW; n_{el} = 1500 °/min), do radne mašine, priključene na frikcionu spojnicu S_{ul}, ostvaruje se posredstvom tri mehanička prenosnika snage: konusnog zupčastog para sa pravim zupcima 1-2 ($\eta_{1\text{-}2}$ = 0,95), cilindričnog zupčastog para sa kosim zupcima 3-4 ($\eta_{3\text{-}4}$ = 0,97) i kaišnog prenosnika 5-6 sa trapeznim kaiševima ($\eta_{5\text{-}6}$ = 0,92).

Podaci:
1-2: $z_1 = 17$; $z_2 = 35$; $m_n = 5$ mm; $x_1 = x_2 = 0$; $\varepsilon_\alpha = 1{,}75$; $b_{1\text{-}2} = 30$ mm;
3-4: $z_3 = 18$; $z_4 = 45$; $m_n = 5$ mm; $x_3 = x_4 = 0$; $\varepsilon_\gamma = 2{,}111$; $b_{3\text{-}4} = 35$ mm;
5-6: $d_5 = d_6 = 160$ mm; $a_{5\text{-}6} = 450$ mm; trapezni kaiševi širokog B profila.

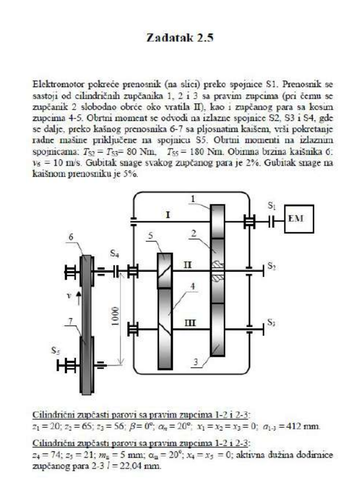

Rešeni ispitni zadaci – Zadatak 1.9 103

Zadatak 1.9

Prototip malog gradskog električnog vozila prikazan je na slici 1. Transmisija vozila je prikazana na slici 2.

Slika 1

Slika 2

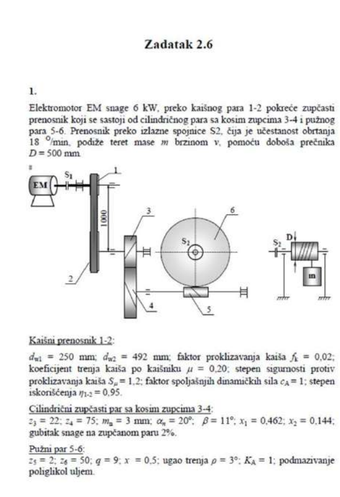

142 Mehanički prenosnici snage – zbirka rešenih zadataka

Zadatak 2.5

Elektromotor pokreće prenosnik (na slici) preko spojnice S1. Prenosnik se sastoji od cilindričnih zupčanika 1, 2 i 3 sa pravim zupcima (pri čemu se zupčanik 2 slobodno obrće oko vratila II), kao i zupčanog para sa kosim zupcima 4-5. Obrtni moment se odvodi na izlazne spojnice S2, S3 i S4, gde se dalje, preko kaišnog prenosnika 6-7 sa pljosnatim kaišem, vrši pokretanje radne mašine priključene na spojnicu S5. Obrtni momenti na izlaznim spojnicama: $T_{S3} = T_{S4}$= 80 Nm, T_{S5} = 180 Nm. Obimna brzina kaišnika 6: v_6 = 10 m/s. Gubitak snage svakog zupčanog para je 2%. Gubitak snage na kaišnom prenosniku je 5%.

Cilindrični zupčasti parovi sa pravim zupcima 1-2 i 2-3:
$z_1 = 20$; $z_2 = 65$; $z_3 = 56$; $\beta = 0°$; $\alpha_n = 20°$. $x_1 = x_2 = x_3 = 0$; $a_{1\text{-}2} = 412$ mm.

Cilindrična zupčasti parovi sa pravim zupcima 1-2 i 2-3:
$z_4 = 74$; $z_5 = 21$; $m_n = 5$ mm; $\alpha_n = 20°$; $x_4 = x_5 = 0$; aktivna dužina dodirnice zupčanog para 2-3 $l = 22.04$ mm.


Rešeni ispitni zadaci – Zadatak 2.6 149

Zadatak 2.6

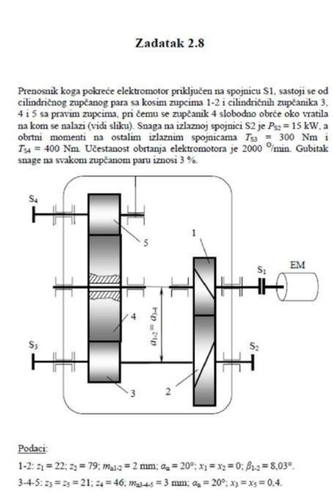
1.

Elektromotor EM snage 6 kW, preko kaišnog para 1-2 pokreće zupčasti prenosnik koji se sastoji od cilindričnog para sa kosim zupcima 3-4 i pužnog para 5-6. Prenosnik preko izlazne spojnice S2, čija je učestanost obrtanja 18 °/min, podiže teret mase m brzinom v, pomoću doboša prečnika D = 500 mm.

Kaišni prenosnik 1-2:
d_{w1} = 250 mm; d_{w2} = 492 mm; faktor proklizavanja kaiša f_k = 0,02; koeficijent trenja kaiša po kaišniku μ = 0,20; stepen sigurnosti protiv proklizavanja kaiša S_μ = 1,2; faktor spoljašnjih dinamičkih sila c_A = 1; stepen iskorišćenja $\eta_{1\text{-}2}$ = 0,95.

Cilindrični zupčasti par sa kosim zupcima 3-4:
$z_3 = 22$; $z_4 = 75$; $m_n = 3$ mm; $\alpha_n = 20°$; $\beta = 11°$; $x_1 = 0{,}462$; $x_2 = 0{,}144$; gubitak snage na zupčanom paru 2%.

Pužni par 5-6:
$z_5 = 2$; $z_6 = 50$; $q = 9$; $x = 0{,}5$; ugao trenja $\rho = 3°$; $K_A = 1$; podmazivanje poliglikol uljem.


Rešeni ispitni zadaci – Zadatak 2.8 163

Zadatak 2.8

Prenosnik koga pokreće elektromotor priključen na spojnicu S1, sastoji se od cilindričnog zupčanog para sa kosim zupcima 1-2 i cilindričnih zupčanika 3, 4 i 5 sa pravim zupcima, pri čemu se zupčanik 4 slobodno obrće oko vratila na kom se nalazi (vidi sliku). Snaga na izlaznoj spojnici S2 je P_{S2} = 15 kW, a obrtni momenti na ostalim izlaznim spojnicama T_{S3} = 300 Nm i T_{S4} = 400 Nm. Učestanost obrtanja elektromotora je 2000 °/min. Gubitak snage na svakom zupčanom paru iznosi 3 %.

Podaci:
1-2: $z_1 = 22$; $z_2 = 79$; $m_{n1\text{-}2} = 2$ mm; $\alpha_n = 20°$; $x_1 = x_2 = 0$; $\beta_{1\text{-}2} = 8{,}03°$.
3-4-5: $z_3 = z_5 = 21$; $z_4 = 46$; $m_{n3\text{-}4\text{-}5} = 3$ mm; $\alpha_n = 20°$; $x_3 = x_5 = 0{,}4$.

The Book of tasks has 44 illustrations and 17 references. The tasks can be used for exercises in classes, homework and projects, and exam preparation. In addition, some of the presented tasks can be used by engineers from the industry to solve real problems in their field of activity. The book Mechanical Power Transmissions - Problems with Solution was published in 2022, 300 examples). Almost all copies have been sold so far and a new edition is ready.

Contact: tlazovic@mas.bg.ac.rs

Julia's Books

My Books

Carte de teste pentru Evaluarea Nationala – Limba si literature Romana

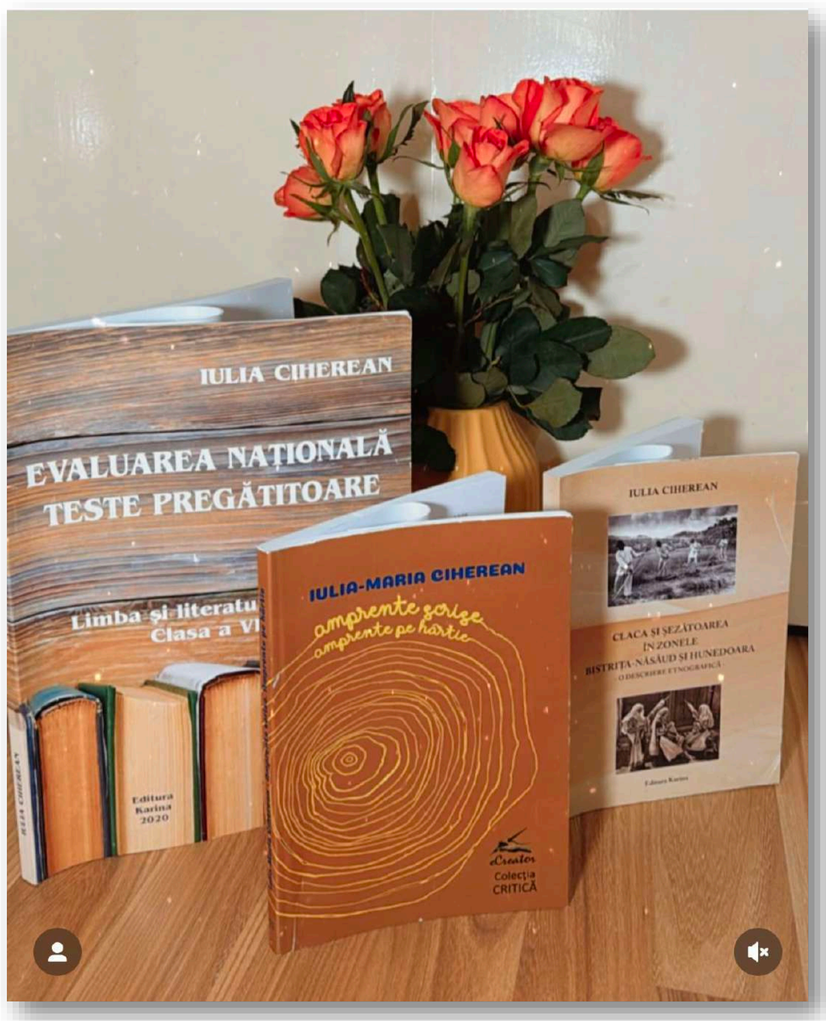
Claca si sezatoarea in zonele Bistrita-Nasaud si Hunedoara

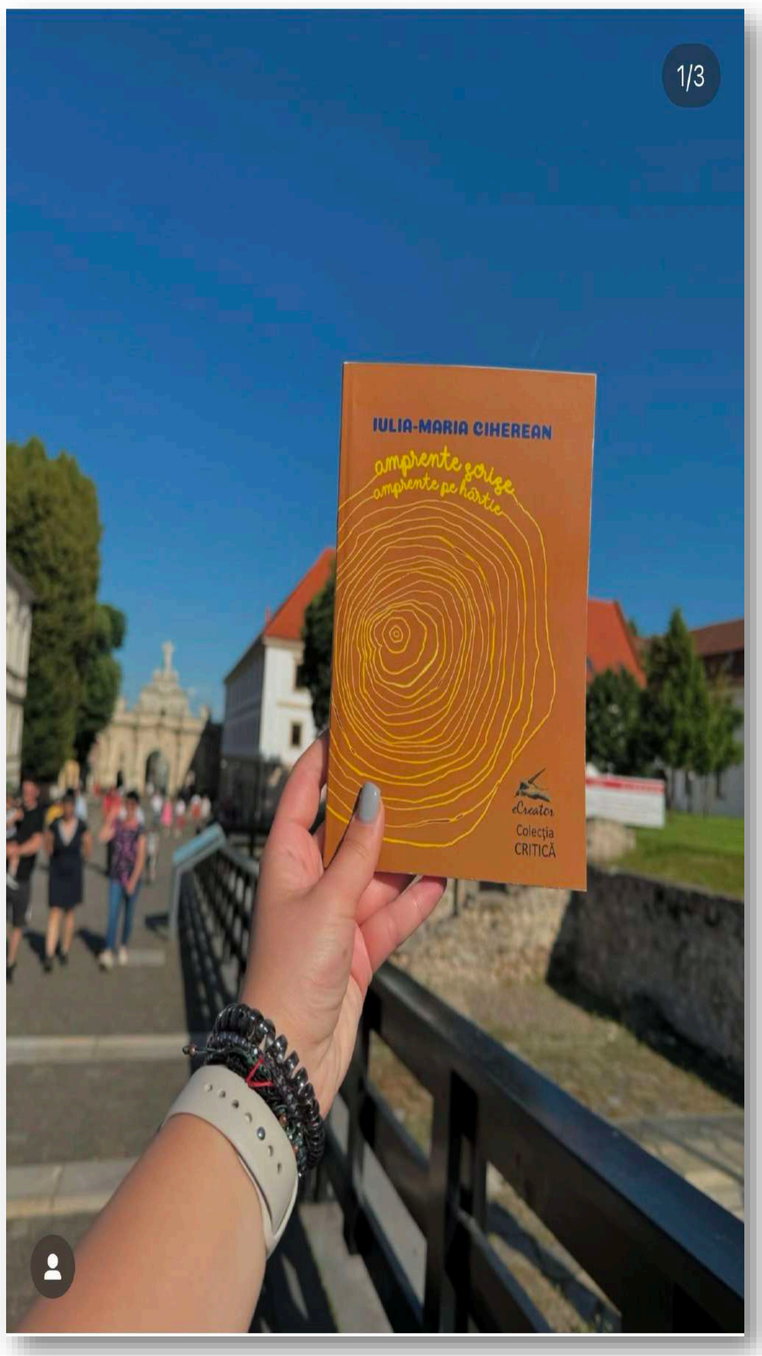
Amprente scrise. Amprente pe hartie

Iulia-Maria Ciherean

E

My 3 books are written in the few 5 years, since 2020 to 2023. My first book is dedicated to students; the second is about two traditions: claca si sezatoarea in Bistrita-Nasaud and Hunedoara; the third is about different authors and studies from romanian literature.





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Photon and the Lost Treasure

Educational Program

Authors: Friendship Team

Mentors: Stanca Maria Anca, Ionescu Adriana

E

„Photon and the Lost Treasure” is an interactive educational project designed for students to enhance their English language skills while navigating a thrilling adventure.

Using the Photon robot, students journey through a series of stations, solving language challenges to uncover the "lost treasure." The journey starts with basic commands to control Photon, followed by tasks that involve colors, actions, sentence construction, and storytelling.

Each station presents a different challenge, such as describing objects by color or arranging words into a correct sentence. As students progress, they build essential vocabulary, improve grammar, and develop collaboration and problem-solving skills. The project encourages teamwork and creativity, turning learning into an engaging game. The final goal is for Photon to reach the treasure, rewarding students with a sense of achievement.

SCAN ME

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Innovative Learning with VR: Exploring the Future of Education

Educational Program

Authors: Friendship Team

Mentors: Stanca Maria Anca, Ionescu Adriana,

E

This project explores the transformative potential of Virtual Reality (VR) in education, aiming to make learning more engaging and interactive. By integrating VR headsets into various subjects, students can experience immersive environments that enhance their understanding of complex topics.

The project includes five key initiatives: "Explorers of the Universe," where students explore the solar system; "Anatomy in Virtual Reality," allowing an interactive exploration of the human body; "Time Travels with Us," offering historical experiences like Ancient Rome and the Industrial Revolution; "VR Architect: Build Your Own World," where students design cities and structures; and "Safe Chemistry Lessons," enabling students to conduct chemical experiments in a risk-free environment. Currently at the concept stage, the project is set for testing with students to evaluate its impact on learning.

SCAN ME

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- Silent Protocol -
The Unspoken Power of English in Modern Warfare and Tech

Research project

Authors: MIHAIL-ALEXANDRU STANESCU & MIHAI FLORIAN MIU

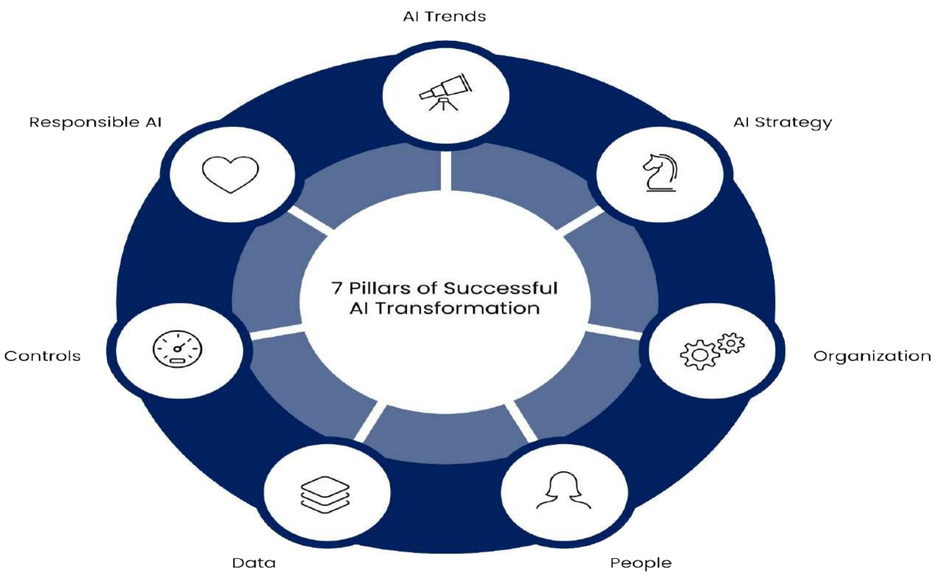
Effective communication is essential in military operations, where accuracy can significantly influence mission outcomes. Over time, English has established itself as the global standard for military communication, being widely utilized by entities such as NATO, the United Nations (UN), and various multinational defense alliances.

In cybersecurity, English dominates (99%) in several key areas:

- ***Ethical Hacking: Tools, documentation, and certifications are primarily in English.***
- ***Red Teaming / Blue Teaming: Collaboration and resources are almost all in English.***
- ***Malware Analysis & Reverse Engineering: Research papers, tools, and forums use English.***
- ***Security Research: Most academic papers and technical reports are in English.***
- ***DevSecOps: Most tools and documentation are in English.***

Some statistics from the point of view of innovation in the technology trend:

- ***Over 70% of defense-related AI technologies are programmed using English-based coding languages.***
- ***Approximately 80% of military cybersecurity protocols use English-language algorithms for data analysis and threat detection.***
- ***Over 85% of cybersecurity protocols used by multinational defense organizations rely on English-based encryption and communication systems.***
- ***Real-time operational communication for military autonomous systems is 95% in English, even in multinational missions involving non-English speaking countries.***



KEY POINTS ABOUT THE CRUCIAL ROLE OF ENGLISH

Technological Progress and Military Development

A substantial portion of cybersecurity tools, research, and threat intelligence is available in English, rendering it essential for practitioners in this domain. Essential scientific studies, military documentation, and development guidelines are predominantly released in English, rendering it an indispensable resource for experts in defense technology and research.

Global Alliances and Diplomacy

Proficiency in English is crucial within the realms of diplomacy and international relations, particularly in military alliances like NATO and numerous bilateral agreements that necessitate precise and effective communication.

Cybersecurity and Information Warfare

With the increasing significance of cyber warfare in contemporary conflicts, English continues to be the primary language for both cyber defense and offensive strategies

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6th International Exhibition InventCor
03-05 April 2025 – Deva, Romania
Universitatea de Stat de Medicină și Farmacie „Nicolae Testemițanu” din Republica Moldova
Nicolae Testemițanu State University of Medicine and Pharmacy of the Republic of Moldova

METHOD OF USE OF AUGMENTED REALITY IN ONCOLOGY THROUGH 3D-PRINTING TECHNOLOGIES FOR DIDACTICAL AND PRACTICAL PURPOSES

Certificate of Innovator Nr.6264 / 25 June 2024

Authors: Valic Eugeniu, Valic Vladimir, Ciobanu Daniela, Șchiopu Victor

The innovation consists in combining augmented reality (AR) with 3D-printing technologies (3D-PT), which allows viewing objects in an interactive and innovative three-dimensional format.

This principle facilitates the studying process of the anatomical structures of healthy and pathological organs, tissues and cells in much more details, with a better understanding of morphology, topographical localization and subsequently treatment tactics. Also, it would allow the study of molecules models, from open-source databases, especially their complex quaternary structure, in a didactic, research and curative role.

The 3D virtual models developed could be used in workshops and open lessons for didactic-scientific purposes for medical workers in the oncology field or for the general population, in order to inform and raise awareness of oncological screening and the prevention of certain types of cancer, with the ability to quickly scan, redirect and save the anatomical model over a long period of time on s specialized platform, saving the memory on the user’s device.

The results of implementation

Following the testing of the models during the courses and practical lessons at Oncology Department, the collaborators and students were impressed and motivated by the innovative approach in the practical-educational process and visualization in real time of the tumors and p53 molecule.

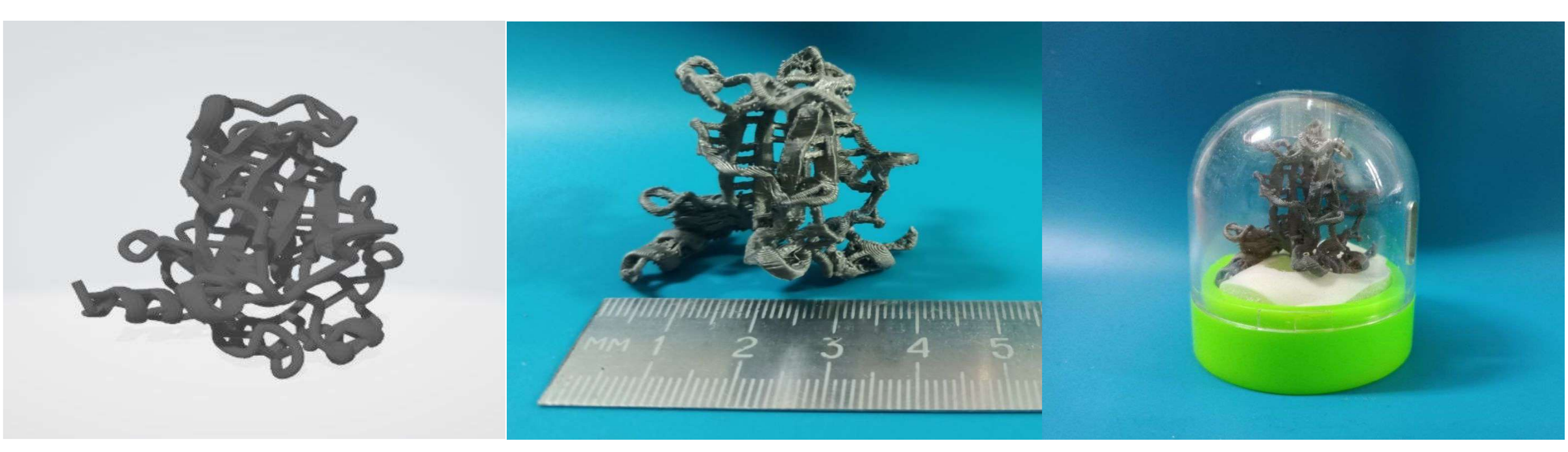

Fig. 1. Representation of p53 protein molecule in AR (A) and 3D-printed (B, C) formats.

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6th International Exhibition InventCor
03-05 April 2025 – Deva, Romania
Universitatea de Stat de Medicină și Farmacie „Nicolae Testemițanu” din Republica Moldova
Nicolae Testemițanu State University of Medicine and Pharmacy of the Republic of Moldova

INTERACTIVE MODEL OF CHILDREN PLAYGROUND FOR EDUCATIONAL-INSTRUCTIONAL PURPOSES

Certificate of Innovator Nr.6266 / 27 June 2024

E

Authors: Ciobanu Daniela, Valic Eugeniu, Valic Vladimir, Cociu Svetlana, Cazacu-Stratu Angela, Cebanu Serghei

This innnovation represents an interactive model of a children playground. It consists of a landscape represented by a terrain arranged with models of playhouses with slides, houses with bridges and climbing nets, a carousel equipped with support bars, a playground arranged with a swing, a model of a lantern that illuminates the terrain, representing a faithful copy of the real elements of a playground according to EN 1176 safety standards.

The working principle is based on the interactive representation of a children's playground model, equipped with appropriate elements. Also, the materials used in the creation of this model were environmentally friendly, durable, and pleasant and resistant during their demonstration for children, parents and the general population.

As of advantages, The given model of the children's playground would constitute a theoretical, methodical and practical support within open lessons intended for the category of preschool children, parents and the general population regarding information, awareness and training about children's traumas at playgrounds, rules of behavior and preventive measures. The ergonomic design, small dimensions, ecological and accessible materials allow for maintenance and use with minimal costs, with the possibility of transportation and demonstration both in closed rooms and open spaces.

Fig.1. Viewing the models of the houses (A), lantern (B), carousel (C) and finished playground (D).

The results of implementation

The innovation and model were implemented at Hygiene Discipline from Preventive Medicine Department of Nicolae Testemițanu SUMPh for use in the instructional-didactic process during the study of the characteristics of trauma in children within the Child Hygiene Module, as well as in open lessons intended for preschool children, parents, and the general population regarding information, awareness-raising, and training about children's trauma on playgrounds, rules of behavior, and their preventive measures.

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Opportunity
CORNELIUGROUP
Research-Innovation Association
Creation
Realization
INVENTCOR
Power of Creative Mind
Deva ROMANIA

Ziene Sanzienee

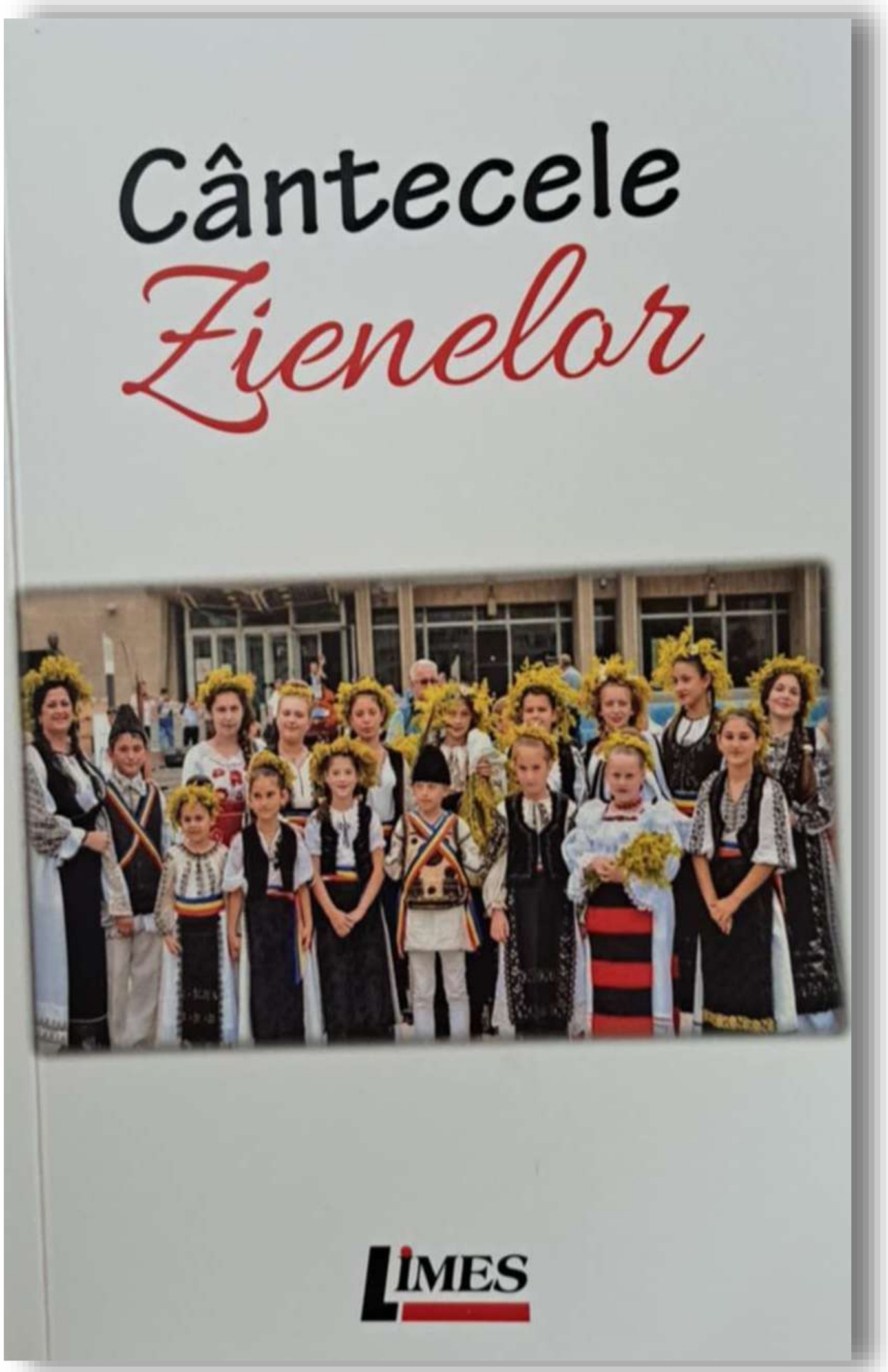
CANTECELE ZIENELOR
THE SONGS OF THE ZIENES

ISBN 978-606-799-790-3

Author: Asociatia Culturala ,,Ziene Sanziene”

E

The folk group "Ziene Sânziene" was founded in 2012 by teacher Violeta Deminescu, inspired by the desire of her students to become folk music soloists. This group continued the activity of a previous folk ensemble, "Îngerașii", and quickly distinguished itself by participating in shows and competitions. Under the patronage of Saint Arsenie Boca, the group became a vibrant community of young folk music performers. Over time, the group collaborated with teachers, musicians and composers to create and record folk songs, which led to its recognition at the local and national level. Many of the group members pursued musical careers, and "Ziene Sânziene" turned into a true nursery of future artists of the folk tradition. To support the activities, a cultural association was also established, which obtained funding and carried out cultural projects. Professor Violeta Deminescu, also a folk music soloist, has produced and presented folklore shows on local television, promoting young artists. She expresses her gratitude to all those who contributed to the group's success and to her "Sanțian ancestors."



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NEBUNUL DIN TAROT THE TAROT MADMAN

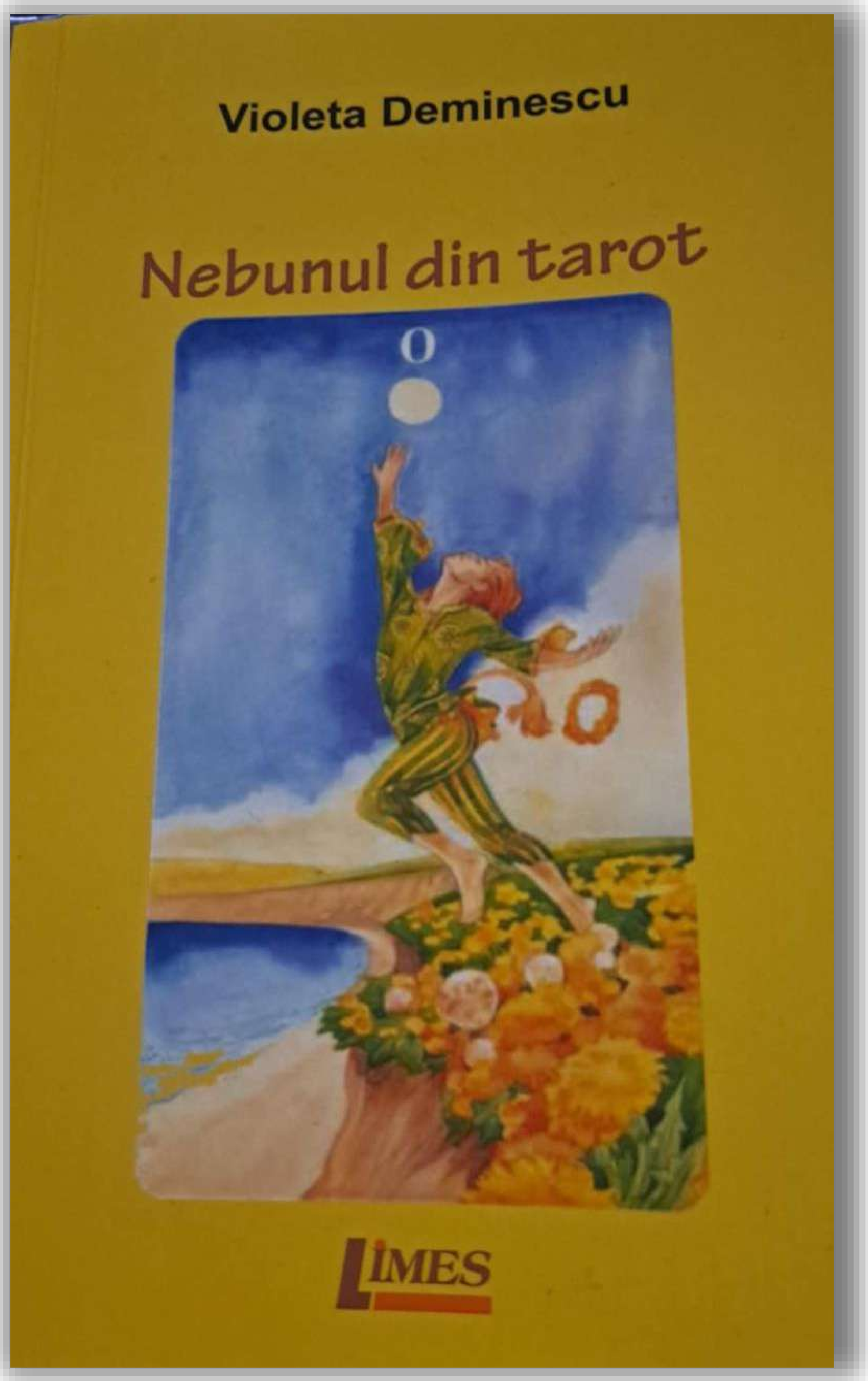
Ziene Sanzienee

ISBN 978-606-799-791-0

Author: Violeta Deminescu

E

This is a book of poetry written by Violeta Deminescu, published by Mirabilia Publishing House. It contains three reviews signed by Silviu Guga, Ioan Barb and Ottilia Ardeleanu, which highlight the author's talent and poetic maturity. Silviu Guga describes her as an authentic poet, who makes her editorial debut with a profound volume, "The Fool in the Tarot". Ioan Barb emphasizes that her debut, although belated, is a gain for poetry, and her verses confirm its literary value. Ottilia Ardeleanu notes the author's special lyricism, characterized by tenderness and spirituality, emphasizing that Violeta Deminescu sees the supreme poet in God.



Contact: violetamyrdeminescu@yahoo.com

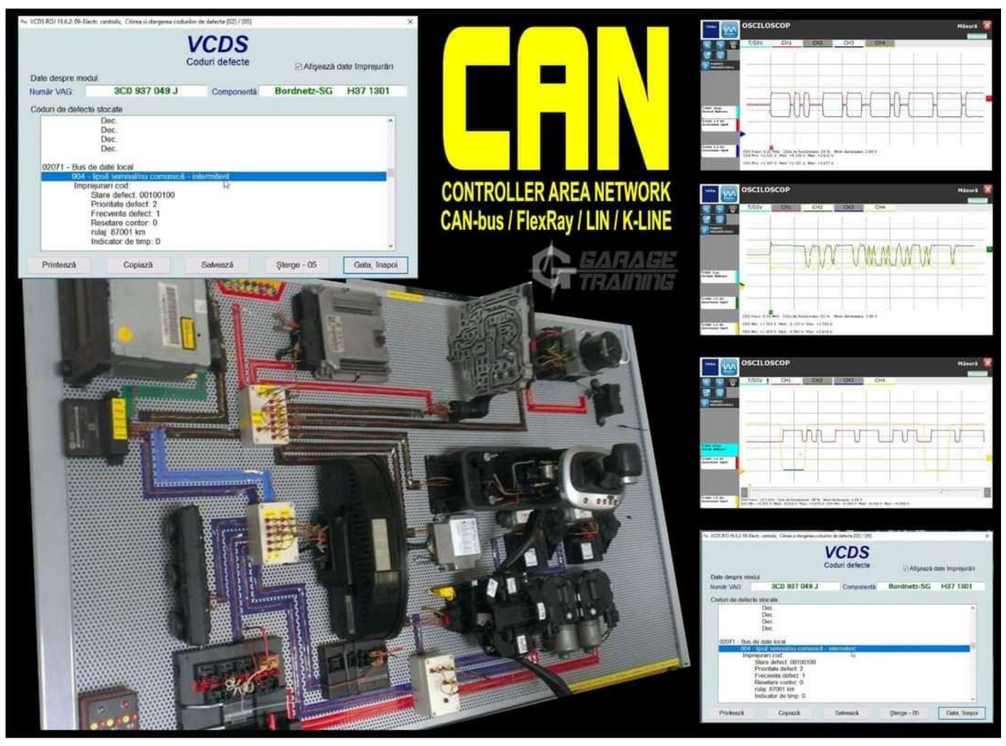
ADVANCED AUTOMOTIVE DIAGNOSTICS TRAINING

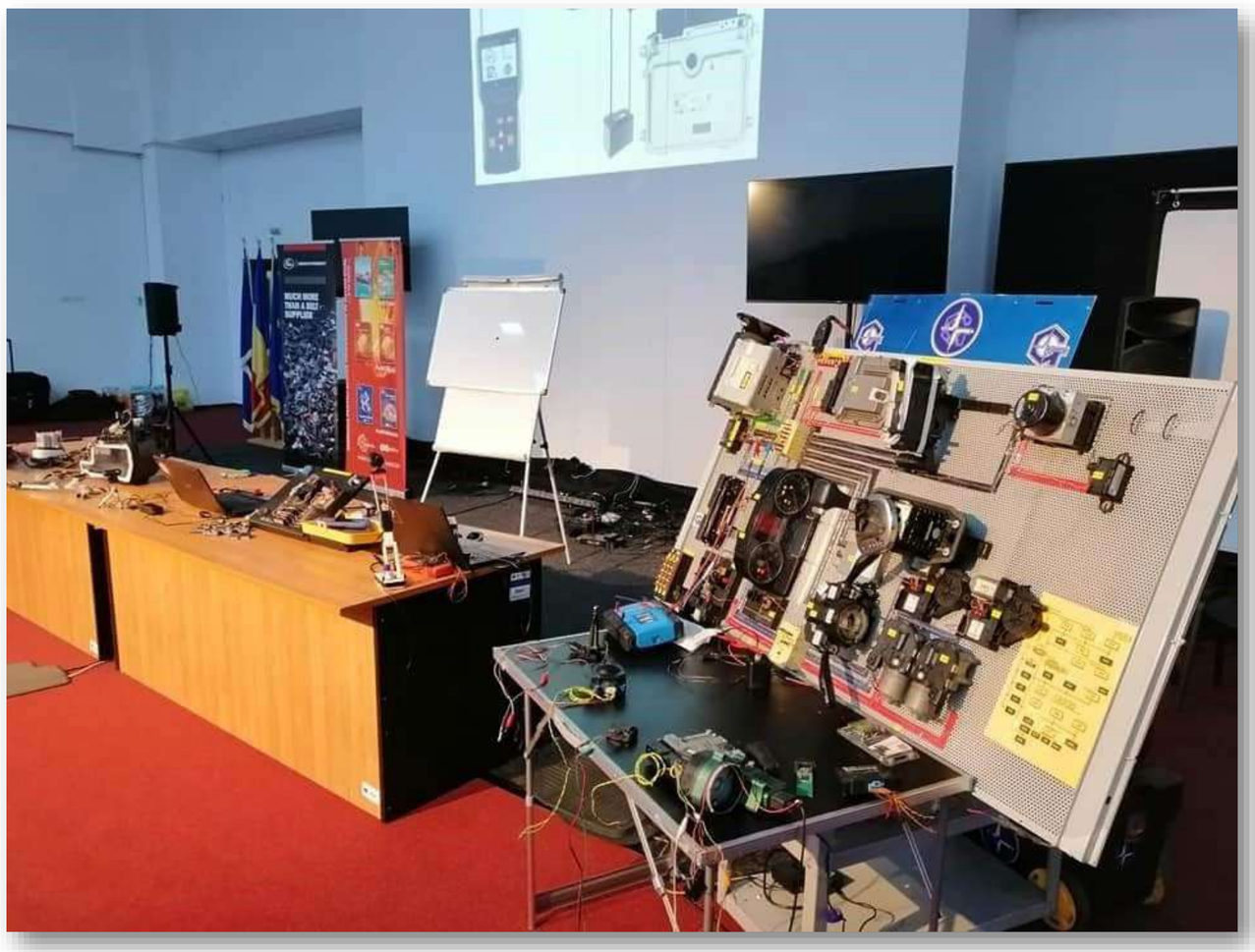
advanced training courses

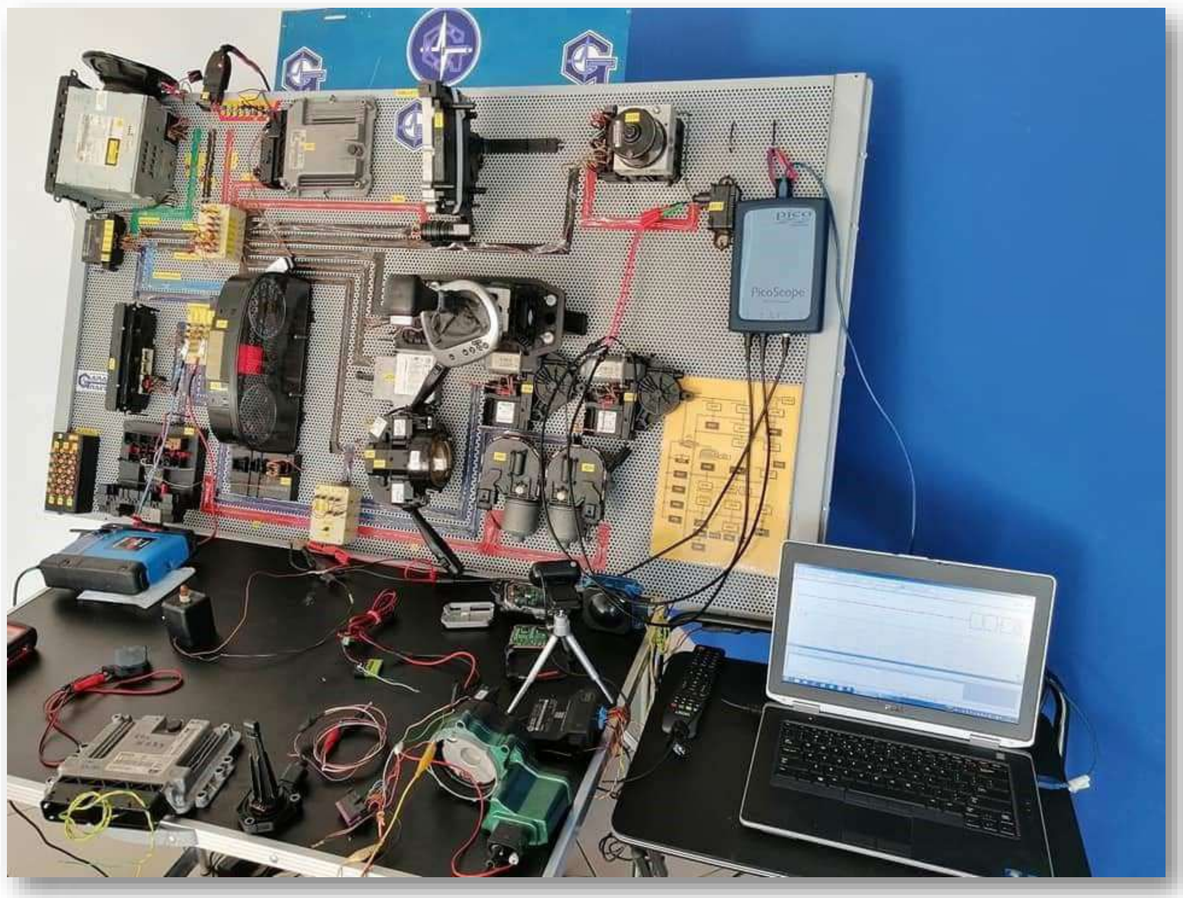
Authors: *Gidali Adrian, Simon Florin*

E

GARAGE TRAINING's field of activity is the development and support of advanced training courses for automotive diagnosticians and qualified technical personnel in automotive repair workshops (mechatronics, electricians and car mechanics). The courses focus on the application of practical diagnostic methods, on detailed knowledge of the systems and components of the proposed topic, on the optimal use of specific measuring and testing equipment (diagnostic tester-oscilloscope-multimeter-specific equipment), as well as on compliance with the maintenance and repair standards imposed by automotive manufacturers. The initial segment of the course structure represents a series of introductory training sessions, developed specifically to understand the functioning of AUTOMOTIVE MECHATRONIC SYSTEMS. The course schedule is from 9:00 AM to 5:00 PM, with a lunch break from 1:00 PM to 2:00 PM and coffee breaks at 11:00 AM and 3:00 PM.







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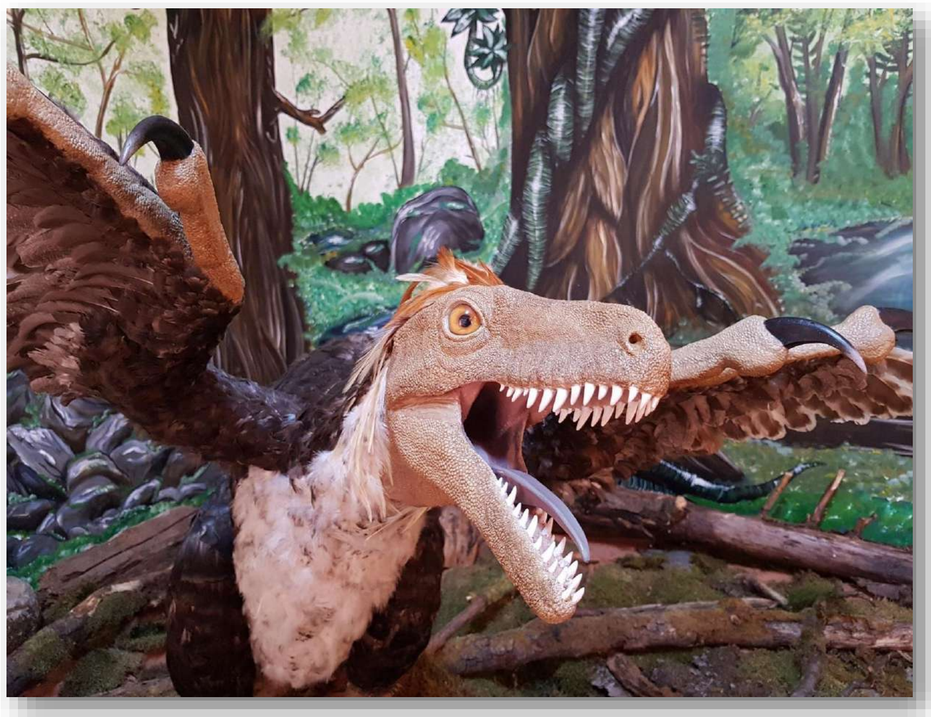
EDUCATION AND INNOVATION
IN THE HATEG COUNTRY UNESCO GLOBAL GEOPARK

Authors: Alexandru Andrășanu, Cristian Ciobanu, Adina Popa, Dan Horațiu Popa, Maria Tănăsescu, Cristina Toma

E

The Country Hațegului UNESCO Global Geopark is the first territory in the country recognized by UNESCO for the creative way of touristic, educational and scientific valorization of a special geological and cultural heritage. You can find us in the southwest of Transylvania, in Țara Hațegului in Hunedoara County. Practically, wherever you walk through Țara Hațegului, you are in the Geopark and in a UNESCO site. The University of Bucharest is the one that ensures the administration of this UNESCO site, coordinating and carrying out research, education, interpretation and promotion activities of the Geopark. The Geopark is a space for multidisciplinary scientific studies, covering fields such as paleontology, geology, education, biology, sociology, philosophy, art, etc. These studies contribute to a better understanding of the relationship between man and planet Earth.



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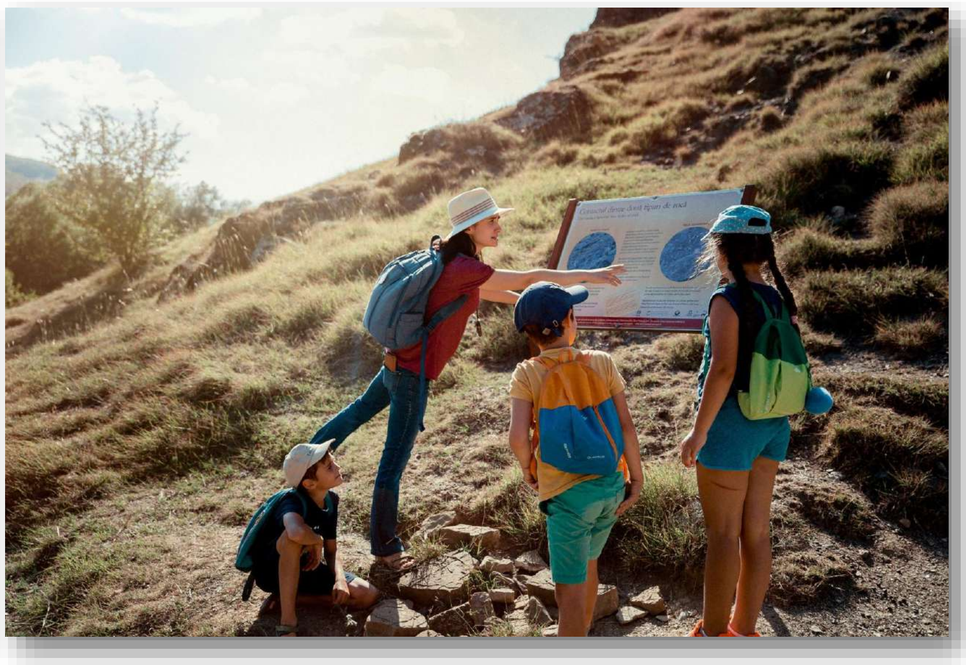

The projects carried out in these areas facilitate collaboration between researchers, teachers and local communities, supporting sustainable development and the active involvement of residents in protecting and valorizing the natural and cultural heritage of Țara Hațegului.

Contact: *cristian.ciobanu@unibuc.ro*
https://www.hateggeoparc.ro/new/index.php/en/home/

ESSENCE VOLUME OF POEMS
ESENTA VOLUM DE POEZII

ISBN: 987 606 9224113

Author: Adriana VLAD

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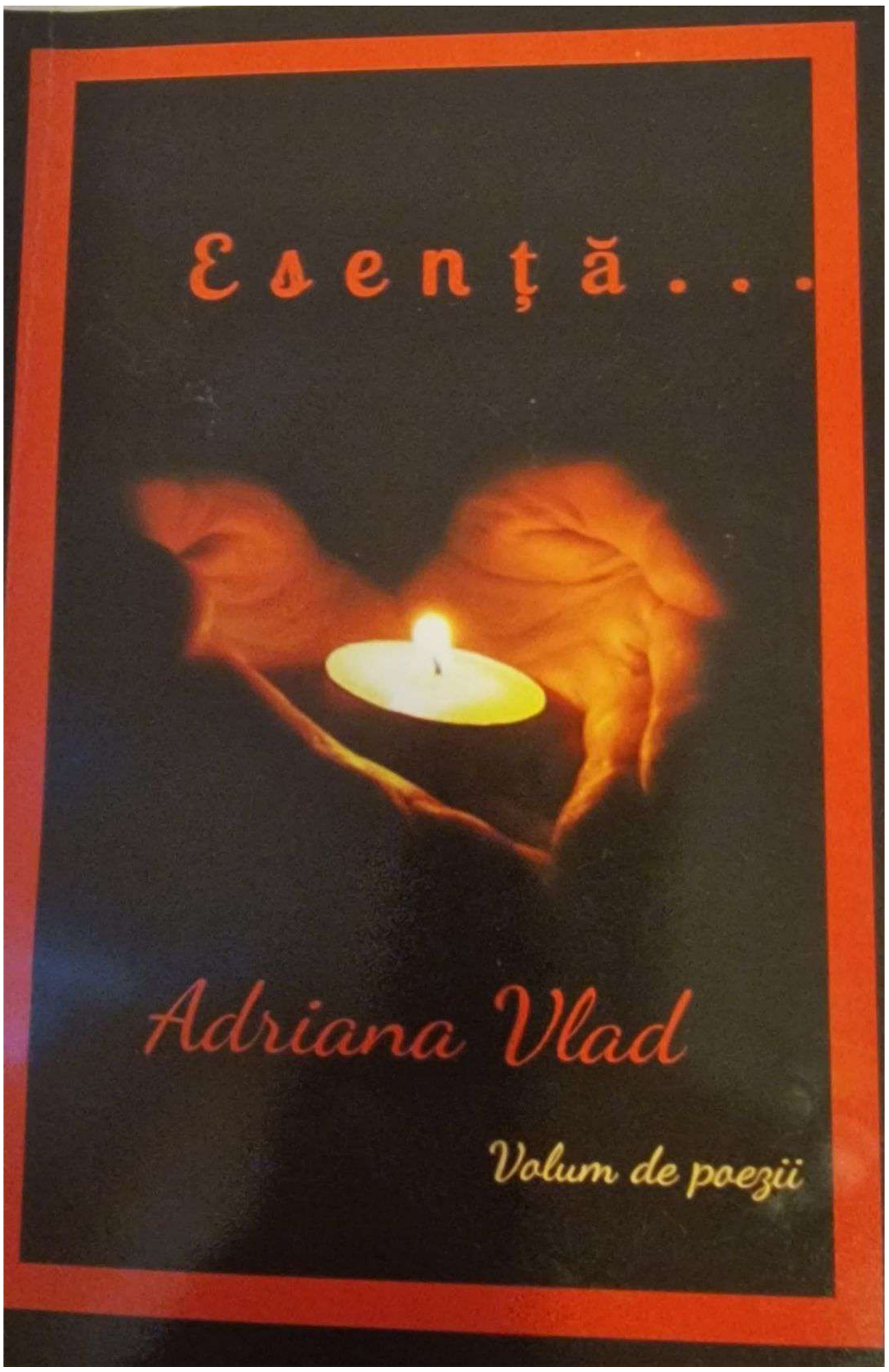


Adriana Vlad's debut volume highlights a special poetic sensitivity, a spirit concerned with dressing in lyrical form the numerous spiritual turmoils and questions that the poet asks herself. Each poem has a quote from great writers or philosophers attached at the end, which emphasizes the deeply meditative nature of the poems. The book launch will end with an autograph session offered by the poet to poetry lovers who will come to this event",
County Library,
Ioan Sebastian Bara.

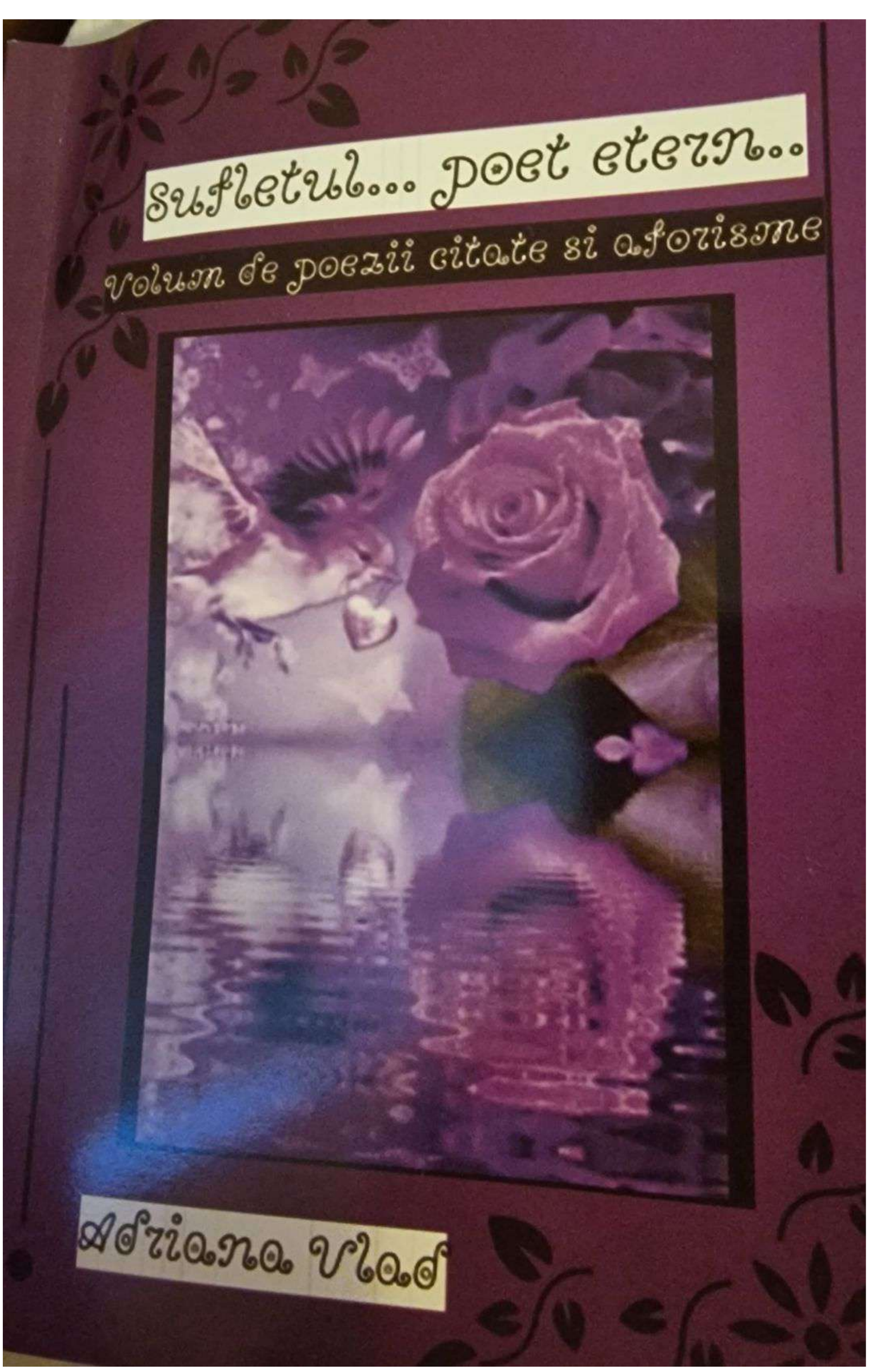
Contact: vladadriana11@gmail.com

THE ETERNAL POET SOUL / SUFLETUL POET ETERN

ISBN: 978-606-517-101-5

Author: Adriana VLAD

E



For man, refuge in art is the chance to heal from the wounds suffered throughout life, it is a form of overcoming trials and overcoming. Of all the arts, the metaphorizing word, in a process of infinite germination, is the only one that can encompass the complexity of the soul of the being, the intense experiences throughout existence, the aspirations, the tragedy of life and the joy of fulfillment.

The new volume of poems signed by professor Adriana Vlad is a poetic exercise in converting life into metaphor, wishing for a condensation of suffering and happiness in the word, the supreme gift that man received through Creation from God.

Contact: vladadriana11@gmail.com

MECANISME PENTRU DEBITAT PRODUSE METALURGICE ANALIZA CINEMATICĂ ŞI CINETOSTATICĂ

MECHANISMS FOR FLOWING METALLURGICAL PRODUCTS KINEMATIC AND KINETOSTATIC ANALYSIS

E

ISBN 978-606-35-0533-1

Authors:. Adina BUDIUL BERGHIAN

Shears for cutting metal products play an important role in the steel industry. Due to the specificity of their operation, these machines are relatively difficult to study in depth their structure because any non-technological stops imply blockages of the rolling process. Once put into operation, the shears acquire a “closed box” character, being able to observe only the mode of action of the knives. As a result, most studies regarding these machines are of an experimental type. Such a study is also attempted to be developed in the present work which proposes the use of empirical and phenomenological models of a shear with 8000 kN parallel knives.

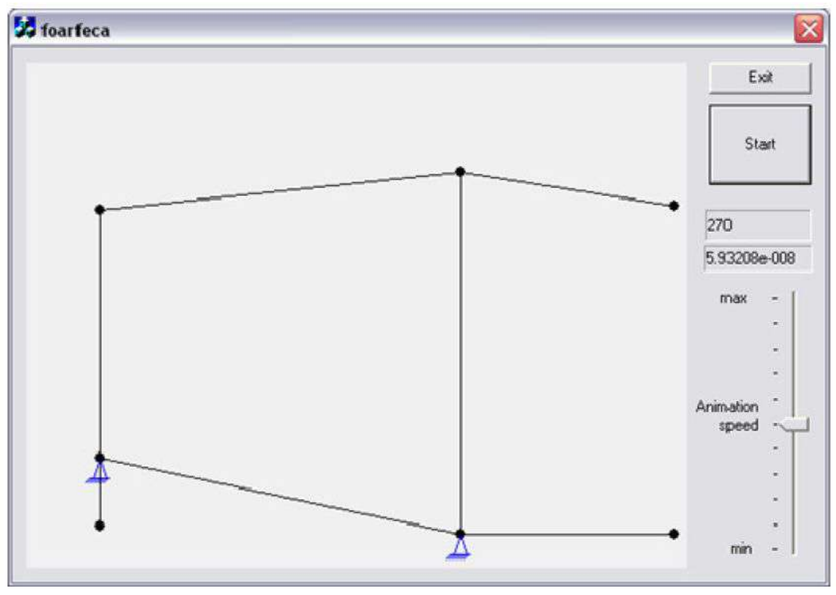
ADINA BUDIUL BERGHIAN

MECANISME PENTRU DEBITAT PRODUSE METALURGICE

ANALIZA CINEMATICĂ ŞI CINETOSTATICĂ

Colecţia "MANUALUL STUDENTULUI"

EDITURA POLITEHNICA
TIMIŞOARA – 2023



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"Tudor Iclănzan"
Industrial Property Office

PATENTING OF INVENTIONS
GOOD PRACTICE GUIDE

BREVETAREA INVENTIILOR
GHID DE BUNE PRACTICI

Patent/project number: 978-606-35-0405-1

Author: Tudor Iclanzan

E

The book meets justified expectations both from the inventors and from many specialists in the field. It is written with the main objective of developing quality patents on the conceptual platform that aims to facilitate technology transfer.

Fundamental notions of patenting inventions that over the years have often suffered from inadequate interpretations are now clarified. The book really has the valences of a true guide of good practices by explaining some mistakes that frequently appear in the practice of patenting, by analyzing the evoked cases and especially by offering some solutions by the author.

The main objective of each patenting or certification approach has always been the quality of the works performed so that the property titles obtained (patents, trademarks, designs/models) are viable and comply with the expectations of the clients.

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EDUROD Association
for Digital and Environmental Education

I have knowledge! I know! / Ba Cunosc! Ba Stiu!

Discovering Professions

E

Author: Sarah LASCU HARVAT

The EDUROD Association aims to bring together three important directions: **digital education, environmental education, and cultural education**, in order to help and support educators, youth, parents, and individuals from disadvantaged groups in education and art therapy.

The main project **“I have knowledge! I know!”** / **,,Ba Cunosc! Ba Stiu!"** aims to document as many professions from various locations as possible in order to make known to the general public their products and services, the people behind the professions, and the main activities required to carry out these professions.

The documented professions so far:

Providing document copying, spiral binding, and laminating services are key activities of a **printing & copying shop**.

A space **where fashion meets sustainability**, and individual style blends with environmental responsibility.

Behind the profession of ,,**Veterinarian**" lies a lot of dedication, knowledge, passion, and extensive practice. Discover the exceptional people who dedicate themselves to caring for and healing animals.

Where do the **vegetables and fruits** we find at our **local producers** come from, how are they cultivated, watered, and cared for.

Solar panels convert solar energy into electricity, contributing to reducing electricity costs and protecting the environment.

The **connection with objects where history is found** and how we can integrate them into the desired decor.

How to manage a **real estate agency** and what are the main activities of the profession of ,,**real estate agent”**.

We discover the mastery with which metal is treated. The profession of ,,**blacksmith”** is being related to us.

The importance of caring for pets and the discovery of a lesser-known profession, that of a ,,**pet groomer**”

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Science Labs & Camps

E

Science workshops

Author: Tiberiu Stroia & Team

CASA STIINTEI (The House of Science) has been carrying out, for almost three years, a series of activities in which students passionate about natural sciences are invited to participate. Science camps, astronomical observation nights, zoom classes, science workshops held in the Association's laboratory and, starting this summer, scientific expeditions.

SCIENCE IS MAGIC THAT WORKS!

The study of gases

Children will obtain in the laboratory Oxygen, Hydrogen, Iodine, Acetylene, AMMONIA, HYDROGEN SULPHIDE, and Carbon Dioxide. They will learn the story of the discovery of each gas and will be able to observe, through experiment, the properties of these gases. Experiments carried out by the teacher: obtaining chlorine and ozone.

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SCAN ME

Grapevine genotypes in the context of climate change

ISBN 978-9975-165-49-5. 2023

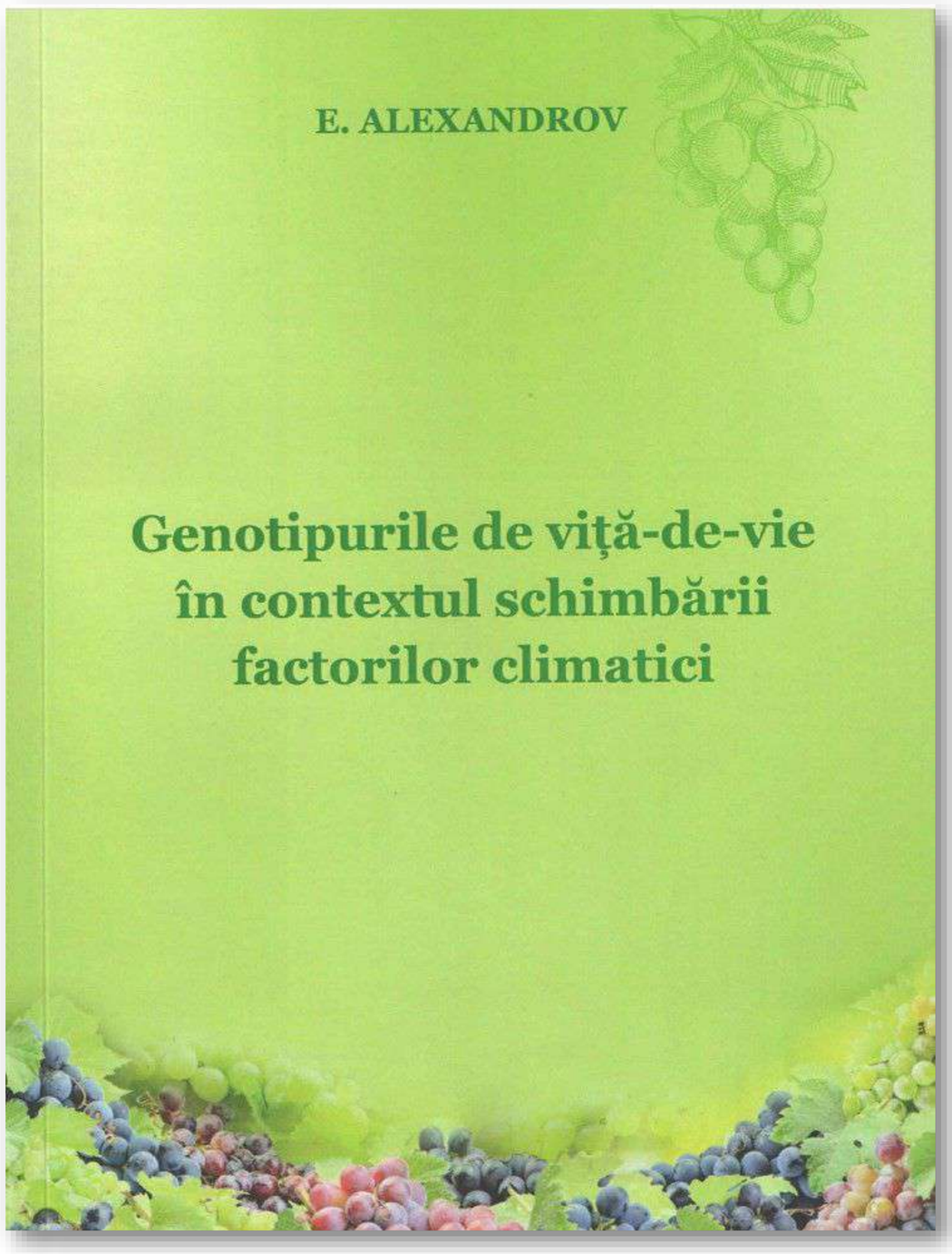
Alexandrov Eugeniu

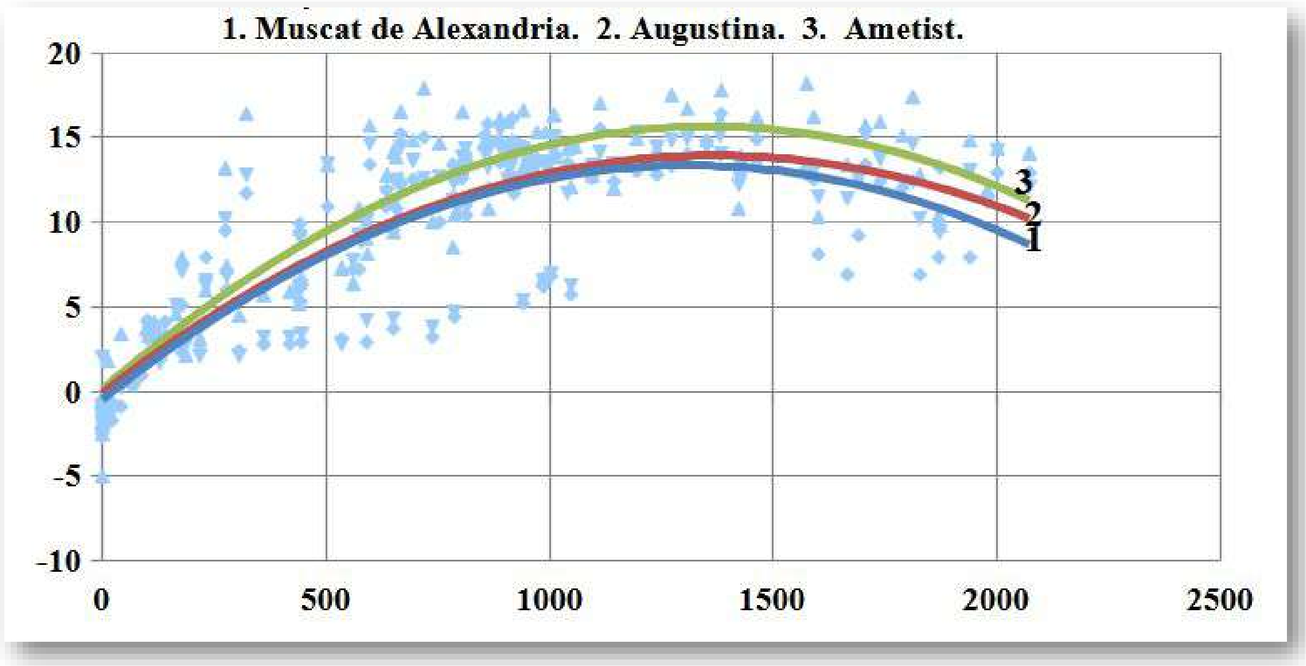
Institute of Genetics, Physiology and Plant Protection of the State University of Moldova

E

The photosynthesis irradiance curve makes it possible to understand the eco-physiological characteristics of a species, and in turn, these indices give us the opportunity to compare different plant genotypes in more or less similar conditions, thus determining the productive capacity and resistance to environmental factors. Studies have shown that the interspecific grapevine genotypes are characterized by much better adaptive features than intraspecific genotypes in relation to climate change.

Taking into account the effectiveness of physiological processes, such as: photosynthesis, respiration, transpiration, stomatal conductance, assimilation etc., in the process of plant breeding, it is possible to identify plant genotypes with an increased potential for capturing carbon dioxide from the atmosphere, thus helping to maintain the global average temperature within limits that would not lead to an intensification of the greenhouse effect and climate change. This method can also be applied in the process of breeding different plant crops. In this case, it is necessary to apply techniques and methods of plant breeding to create plant genotypes that will be used to expand the forest areas, to stop desertification processes, to create protective forest belts, for the sustainable use of agricultural and other types of land etc., and which will be characterized by a high efficiency of the photosynthesis process under the new climatic conditions.





Fitomonitor PTM-48A.

IGPPP, Padurii Str. 20, MD 2002, Chisinau, Republic of Moldova
Tel.: (+373 22) 77 04 47; (+373) 79450998; Fax: (+373 22) 55 61 80;
E-mail: institut.gfpp@gmail.com; alexandrov.egugeniu@gmail.com; Web: www.igfpp.md

THE CREATION OF OWN-ROOTED INTERSPECIFIC GENOTYPES OF GRAPEVINE

ISBN 978-9975-3161-5-6. 2020

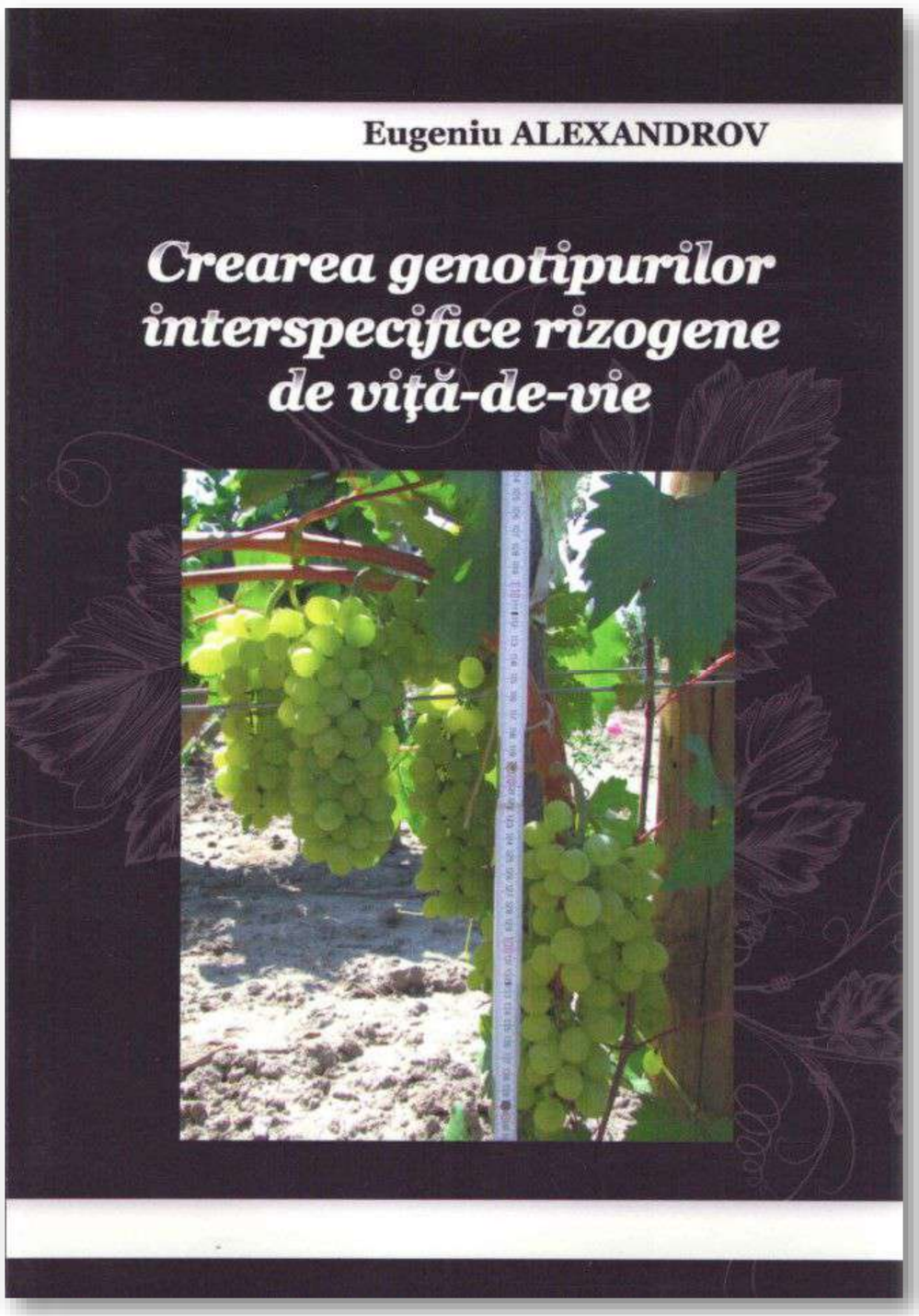
Alexandrov Eugeniu

Institute of Genetics, Physiology and Plant Protection
of the State University of Moldova

E

As a result of the development of the methodology for creating interspecific rhizogenic genotypes, which consists in elucidating the functionality of genetically related taxonomic entities Vitis vinifera L. and Muscadinia rotundifolia Michx. with diminished combinative capacity, which can be overcome by involving two determining genetic factors: parental as a hybridization component - Vitis vinifera maternal parent, and Muscadinia rotundifolia - paternal and additive - through backcrossing.

Finally, a wide induction of recombinant varieties takes place, which provides opportunities for streamlining distant hybridization in the process of improving valuable characters. By crossing the genotypes of V. vinifera L. with M. rotundifolia Michx., interspecific rhizogenic grapevine genotypes were obtained and selected in BC3, with valuable characters, which allows to expand the grapevine cultivation area to the northern limit, on own roots and reduce the number of chemical treatments. Rhizogenic interspecific genotypes:



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A.D.O.R.

Human rights support project

E

Author: *Anca Maria Dorina & ADOR team*

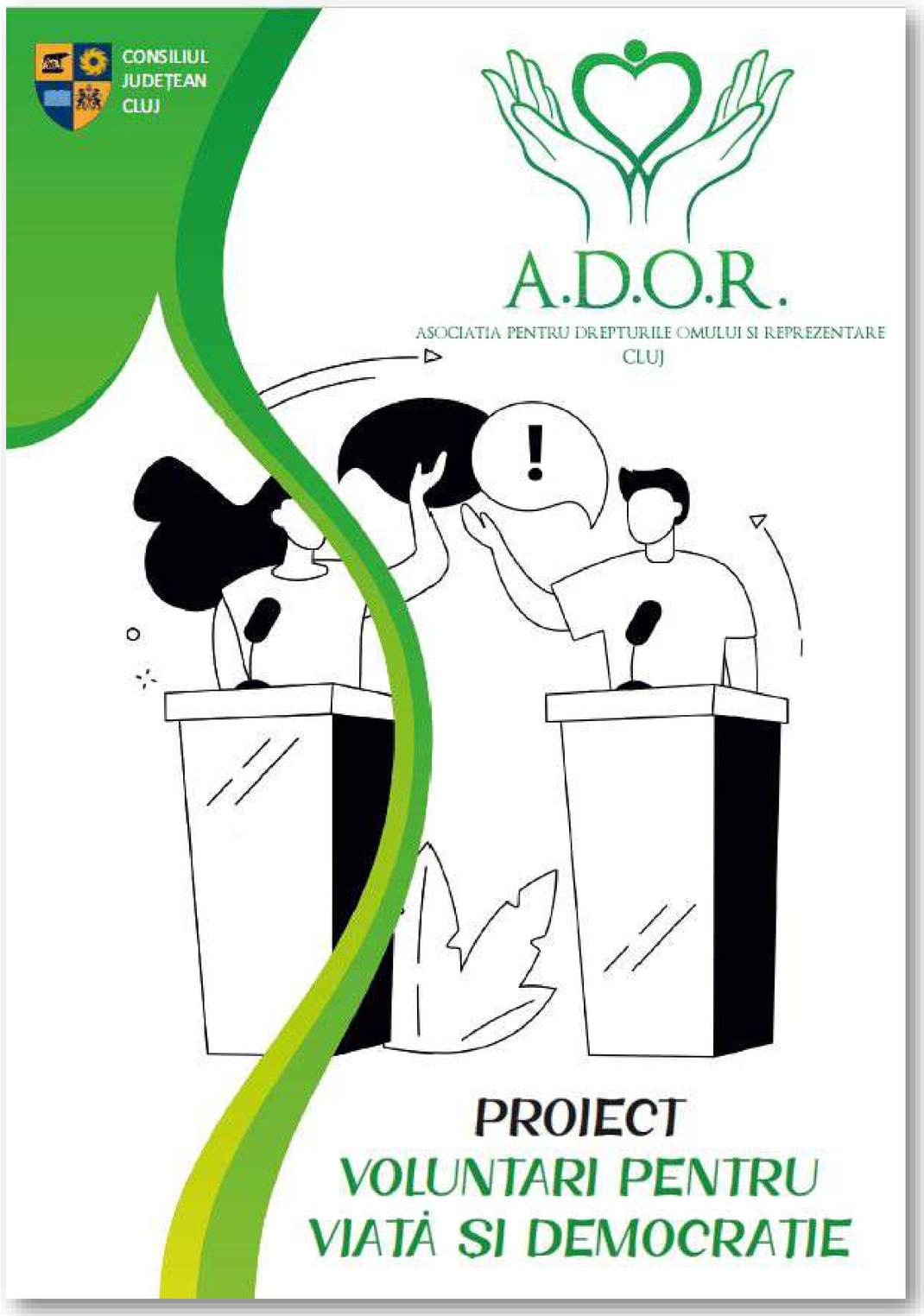
*The purpose of the **ASSOCIATION FOR HUMAN RIGHTS AND REPRESENTATION – ADOR** is in mainly, the support of human rights, and to increase it, it proposes a series of objectives, including:*

- monitoring local, parliamentary, European parliamentary, presidential elections and referenda local and national, through accredited observers and through any other legal means;

- creation of information centers and legal advice in the matter of human rights and social protection;

- carrying out studies, analyses, researches, opinion polls on different topics;

- promoting volunteerism, especially among young people.



*Through the **VOLUNTEERS FOR LIFE AND DEMOCRACY** project we propose to initiate and introduce the practice of dialogue with the all actors can contribute ideas, to promote structured dialogue between decision-makers at political level and civil society, in order to ensure the effective participation of employees in the electoral process. Also, through active involvement of our non-governmental organization in non-formal and informal education activities, we will lay the foundations the process of introduction into the formal curriculum of political education.*

SCAN ME

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MECHANICAL VIBRATIONS
THEORY AND APPLICATIONS

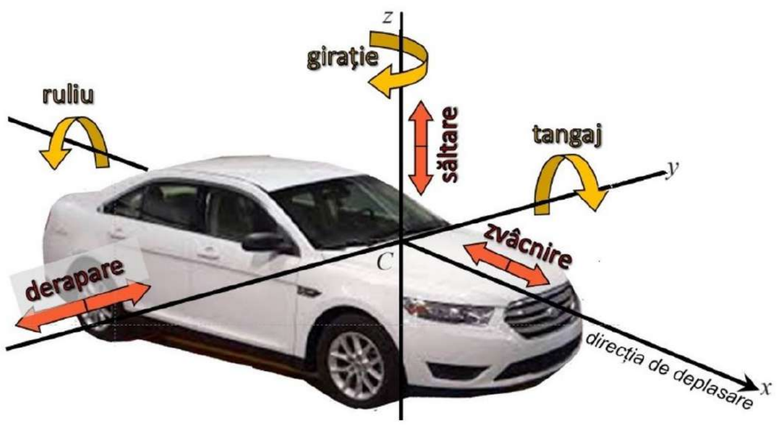
Book number: ISBN: 978-606-35-0597-3

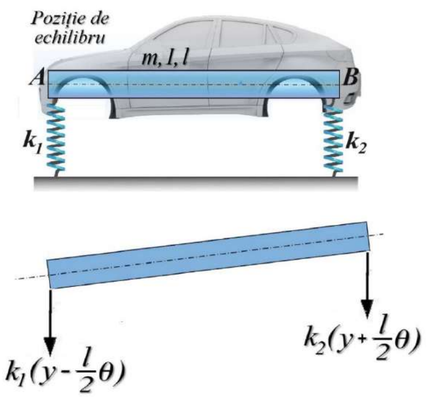
Author: Daniela-Delia ALIC

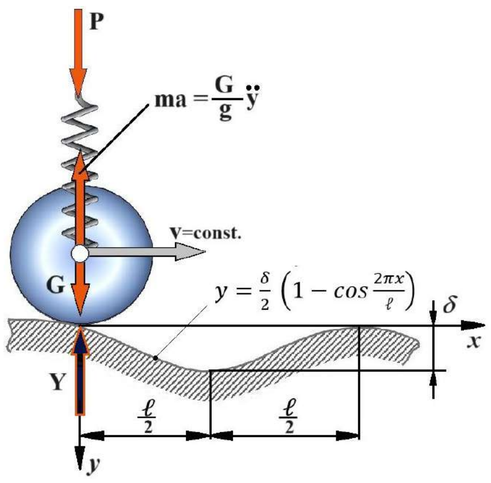
E

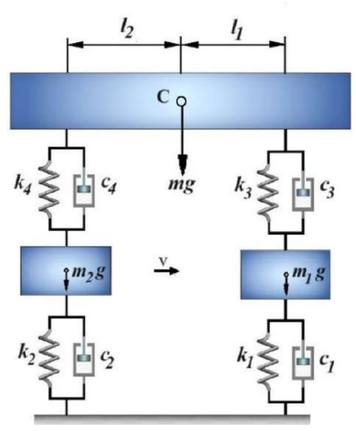
Centered on Automotive applications of mechanical vibration theory, this book explains physical phenomena with examples, images, and real system models using open resources and simulation tools. It explores system responses to disturbances through physical and mathematical modeling, derives motion laws, and solves equations using analytical or numerical methods. The results are then analyzed and interpreted within the framework of vibration theory.

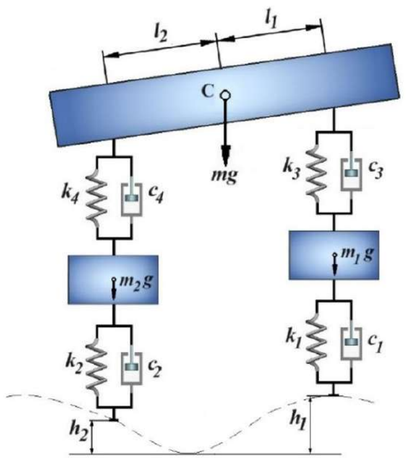
Aiming to develop problem-solving skills for students, teachers, and researchers, the seven chapters of the book presents theoretical concepts and practical applications in science, engineering, and everyday life.

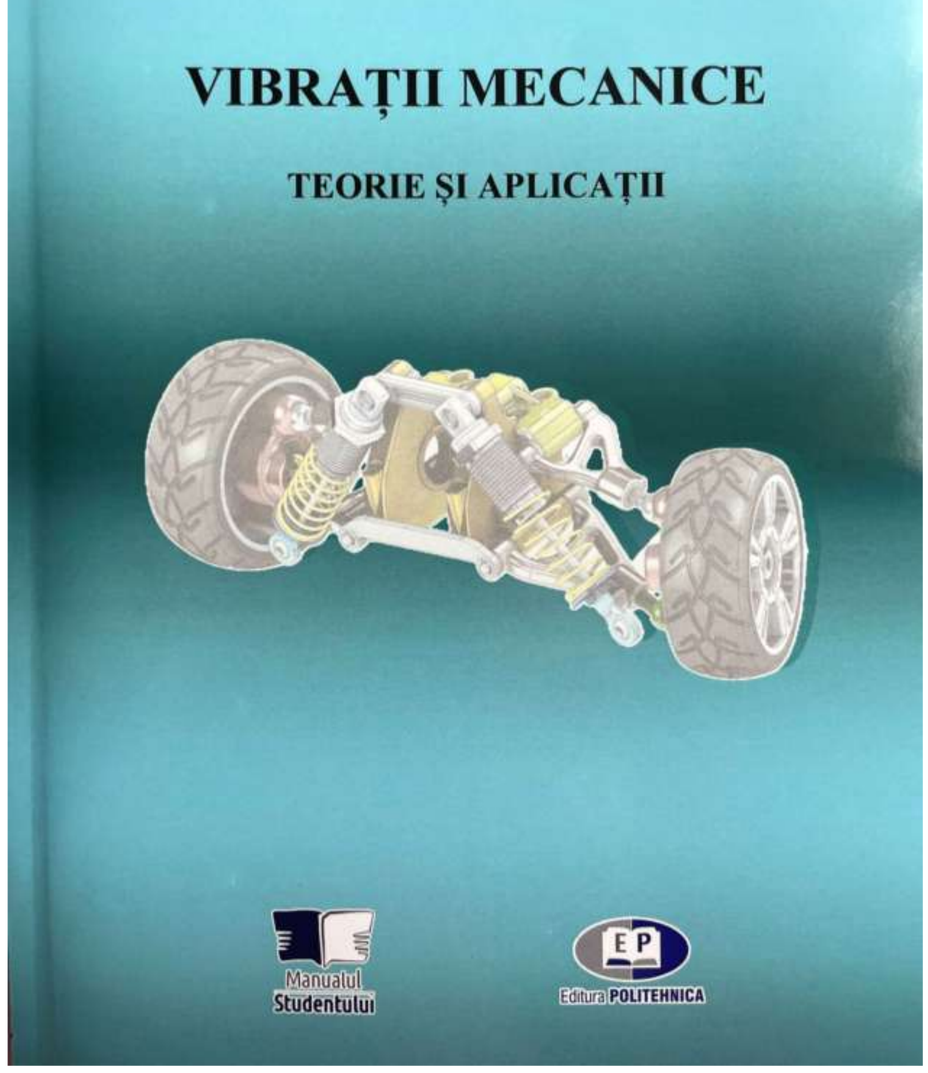


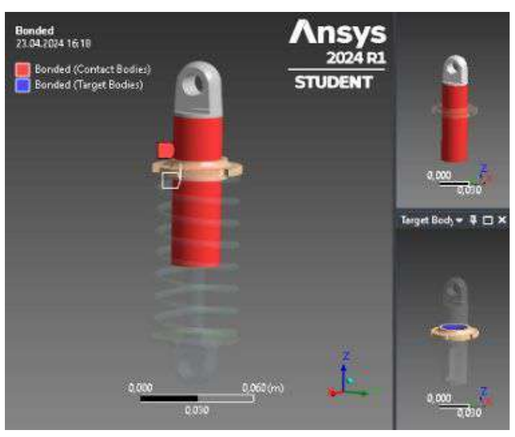


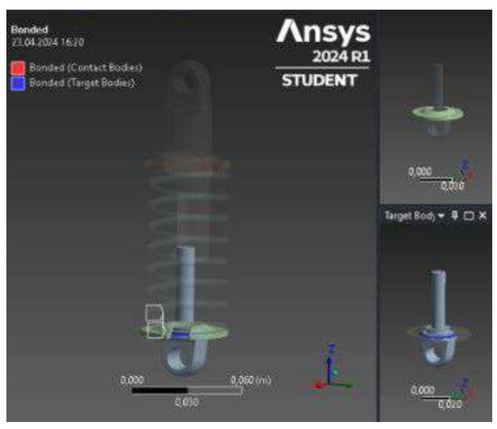


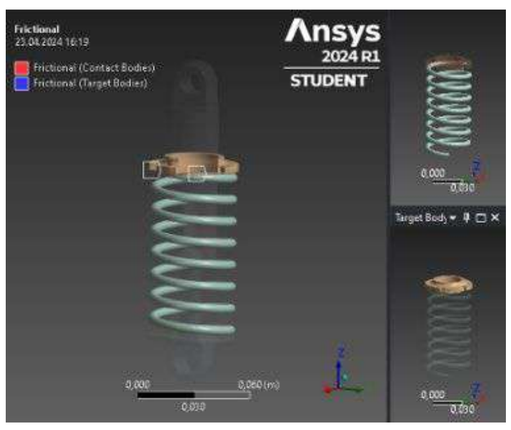


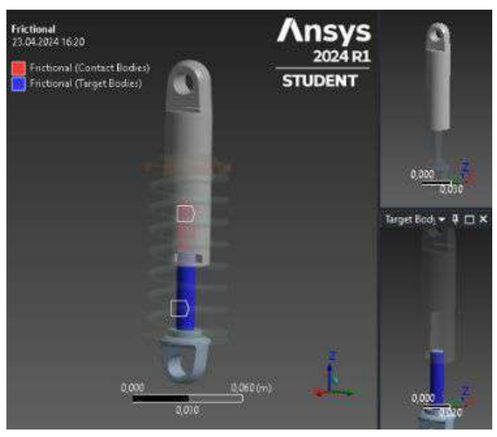


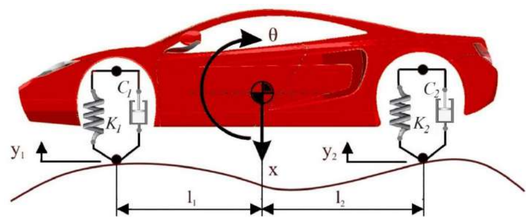


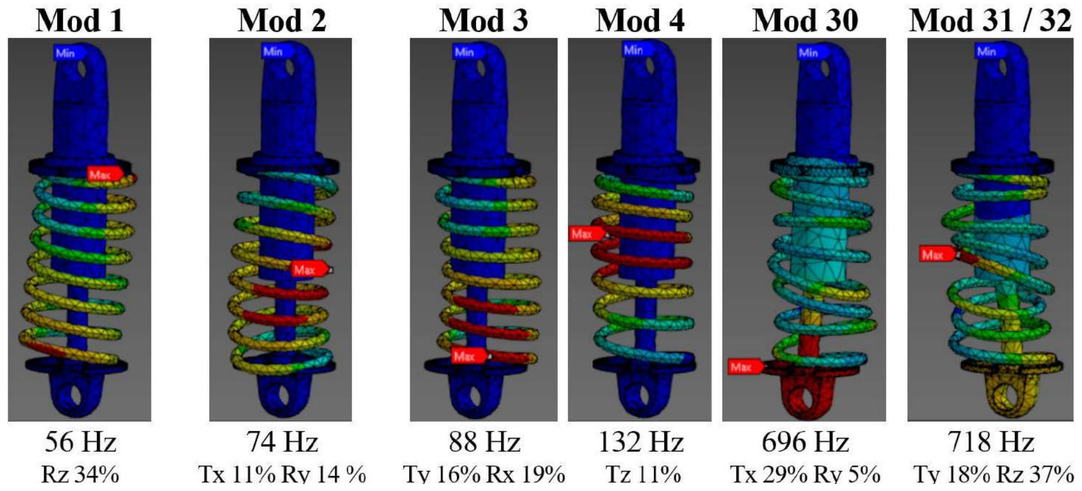












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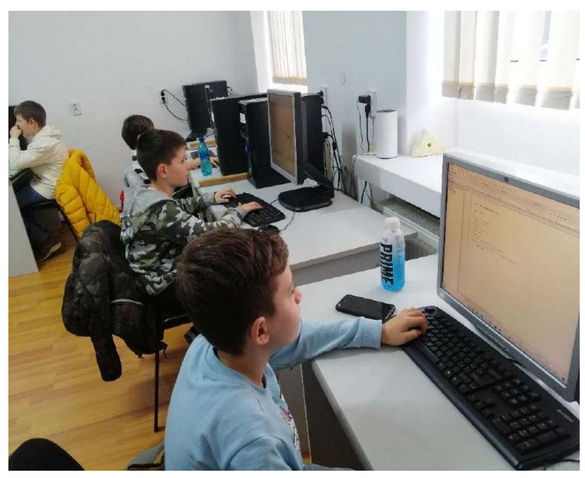
Initiation in the C++ programming language at the Informatics circle at the Deva Children's Palace

Author: Bianca Claudia POPESCU

E

At the IT circle at Palatul Copiilor Deva, students are introduced to the C++ programming language, a language used to develop complex software applications, games and even operating systems, but also in programming applications such as simulations, scientific calculations, engineering, financial applications. This language was developed in the 1980s as an extension of the C language, but adding object-oriented programming (OOP) functionality. C++ is a compiled language, which means that the source code written by the programmer is translated into machine code that the computer can execute. In the computer science circle, students learn to download and use the CodeBlocks programming environment for writing and running programs in C++. The beginner groups study some basic concepts of the language: the structure of a program in C++, the meaning of the instructions used, the data types in C++, the declaration and initialization of variables, simple operations with variables. In C++ there are many types of structures and concepts that students learn in order to write correct and efficient programs. Students in advanced groups are introduced to the use of control structures, namely: if-else-which allows a decision to be made, switch-case-used to choose between several options based on a value, for-used to repeat a block of code a given number of times, while-which is an instruction that is executed while the set condition is met, do-while – similar to while, but the condition is checked at the end of each iteration, so that the little once Performance group students learn one-dimensional (vectors) and two-dimensional (matrices) text files and arrays in C++, used in a variety of applications. Text files are an essential part of programming because they are used to store and retrieve data in the form of text (characters), that is, information that can be read and processed by humans or programs. Text files are used to save data to disk, which means that even after the program has ended, the data can be accessed later. Working with arrays in C++ requires knowledge of the following basic concepts and functionality: declaring and initializing arrays, accessing array elements, searching, sorting array elements. In the spring of each school year, my students, as well as the students of the computer science circles in Hunedoara county, can check their knowledge and skills acquired in the circle, in the "INFO-PC-DEVA" county computer contest, approved in the extracurricular activities calendar of Hunedoara county, whose project initiator and coordinator I am.



It is very important for students to learn programming for the significant contribution to the development of logical and organized thinking. The knowledge and skills learned through programming will be of great use to them in an increasingly digitized world.

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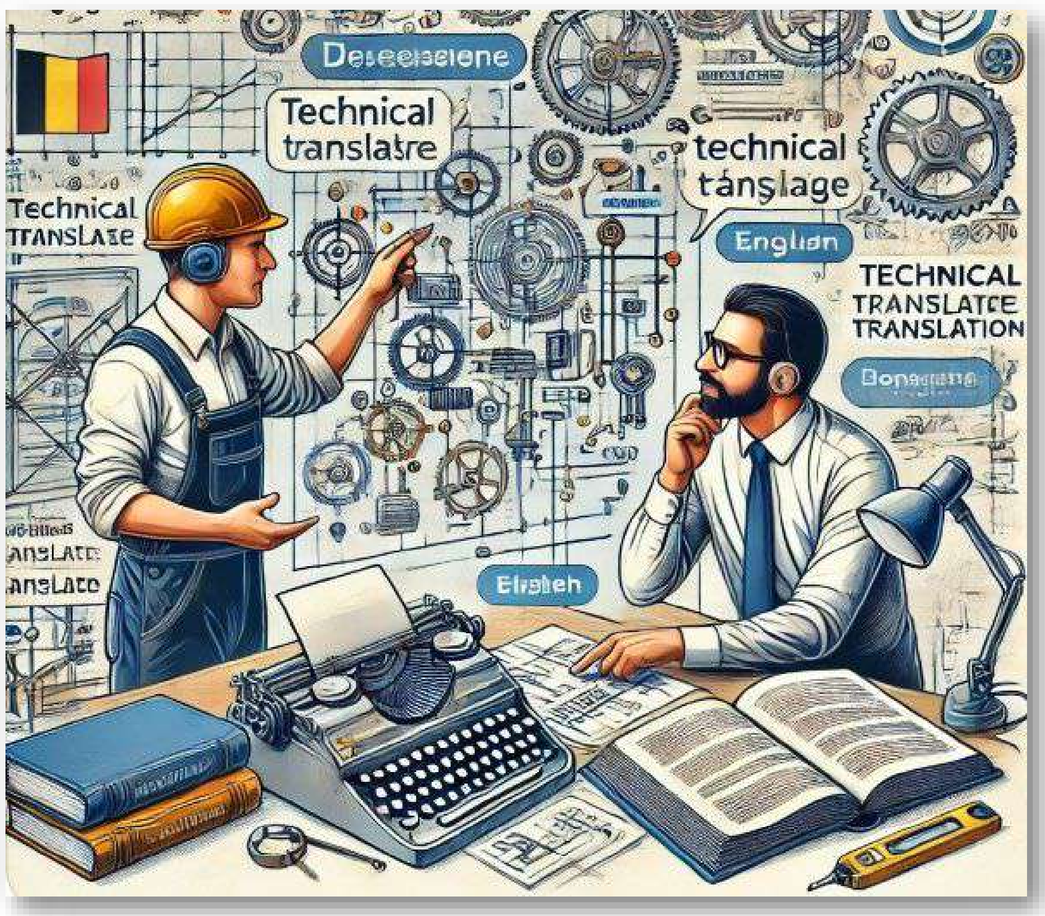
TECHNICAL TRANSLATION
A COMPLEX JOURNEY

Research project

Author: Oana GĂIANU-LUCA

Translation is an intricate process that requires linguistic proficiency, cultural awareness, and technical expertise, particularly when dealing with specialized fields. Translating technical language from Romanian to English presents unique challenges, as it involves industry-specific terminology, context-sensitive phrases, and structural differences between the two languages. One of the main difficulties in translating technical texts from Romanian to English is the precision required for specialized terminology. Based on research, it is observed that terminology is defined as the discipline that deals with the study of terms, analyzing their creation, meaning, evolution, and usage. It represents a collective body of terms, offering an alternative approach to studying the lexicon by utilizing analytical techniques and methods for an object formed through the entirety of terminologies. From the perspective of specialists, terminological science involves the strict standardization of terms through codes established by international authorities. Technical language often relies on precise, standardized terms that do not always have direct equivalents in the target language. For example, Romanian technical documents in engineering or medicine may use terminology rooted in Latin or French, which must be adapted to fit English conventions.

Another challenge is the structural differences between the two languages. Romanian, a Romance language, has a more flexible word order than English, which follows a stricter subject-verb-object structure. This means that a direct translation might sound unnatural in English and may require rephrasing for clarity and readability.



Furthermore, technical documents often contain abbreviations, acronyms, and units of measurement that may differ between languages and regions. A translator must be familiar with the standard English equivalents to ensure accuracy and consistency. For instance, measurements such as kilograms and meters are commonly used in Romania but may need to be converted to imperial units (pounds, feet) depending on the target audience. To achieve high-quality technical translation, professionals should follow several best practices: 1. Understanding the Subject Matter, 2. Using Specialized Dictionaries and Resources, 3. Adapting to the Target Audience, 4. Maintaining Clarity and Conciseness, 5. Proofreading and Quality Assurance. Translating technical language from Romanian to English requires more than just linguistic skills; it demands a deep understanding of the subject matter, industry standards, and cultural nuances. By adhering to best practices, translators can produce accurate and effective technical translations that meet the needs of international audiences. Whether in engineering, medicine, IT, or other technical fields, a well-executed translation ensures clarity, consistency, and professional quality in cross-language communication.

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CHEMISTRY IN TWO VERSE
CHIMIE ÎN DOUĂ VERSURI

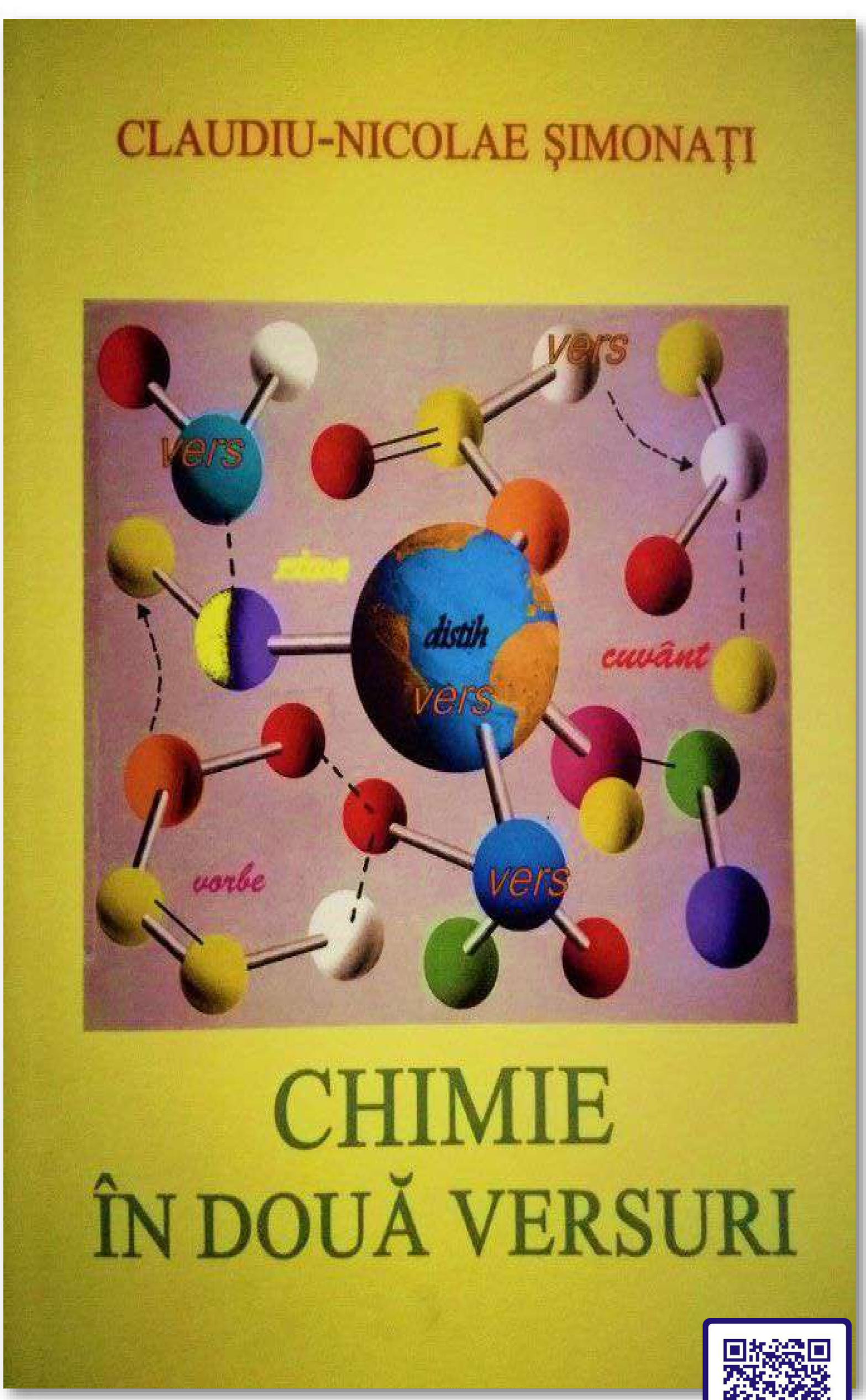
978-606-93427-4-9

Author: Claudiu Nicolae ȘIMONAȚI

E

The book combines two great passions of the author: Literature and Chemistry. This book of poems in two lines, with a humorous tone (distihurs), I wanted it to be an original work also due to the fact that, in fact, everything that surrounds us is CHEMISTRY.

Despite the small proportions, these comic poems are full of substance, they can be grouped into: medical poems, love poems, hedonic poems, kitchen poems, household poems. As in the case of all humorous writings, beyond the form intended to provoke laughter, there is a deep background, which expresses universally valid human truths. Also through this work, I wanted to come to the aid of students and enthusiasts of this field, to be able to more easily remember different chemical formulas, of substances that we face all the time in our everyday life, chemical formulas, which if you put them in rhymes form these short micro poems, which also teach you what to use these chemical compounds for.



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SCAN ME

TECHNOLOGICAL TRANSFER CENTER CTT-UCB

Author/s: Rădulescu Constanța, Bălăcescu Aniela, Călina Denis, Boncea Adrian, Anghelescu Lucica, Borcoși Corina

E

The CTT-UCB Technological Transfer Center aims to become an important structure of the regional innovation ecosystem in South-West Oltenia, acting both as a connecting element between the people/entities working in the CDI sector, the business environment and end users, but also as an accelerator of innovative products and services developed either by exploiting research results or by covering the specific needs of companies to develop/improve/test/validate/transfer a new product or technology to the market that responds to consumer problems.

CTT-UCB aims to increase the technology transfer capacity and achieve a unitary process for the development of management and the monitoring of the technology transfer activity through the need to professionalize the human resource within UCB as well as through the need to develop a culture of collaboration between the human resource from the different departments of the university, but also with public entities and economic entities.

The areas of activity of CTT-UCB are:

1. The field of Industrial Engineering and Materials, with the subfields: Systems, installations,equipment, machines/equipment for construction and other industries; Systems, processes, installations, equipment, environmental technologies/Environmental protection; Systems, equipment, technologies for the agri-food, aeronautical, sanitary sector; Advanced materials, composites; Recovered materials, materials from bioresources;

2. The field of ICT and Digitization with the subfields: Smart city, smart village; Productsinnovative in the IT field, with an emphasis on medium fields, energy, heritage, tourism; Digitization of the economy;

3. The Bioeconomy domain with the sub-domains: Safe and sustainable food, Agriculture 4.0, Technologies for organic farming, agroecology, Seed and breed improvement.

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NATURAL THERAPEUTIC FACTORS AND TOURIST ATTRACTIONS IN THE GEOAGIU BAI

FACTORI TERAPEUTICI NATURALI ȘI OBIECTIVE TURISTICE DIN STAȚIUNEA GEOAGIU BĂI

978-630-325-045-8

Author: Claudiu Nicolae ȘIMONAȚI

E

In this small paper about the presentation of the Geoagiu Băi resort (Ancient "GERMISARA"), as it was known in ancient times, I wanted to highlight some aspects of what this area blessed by the Good God, at the foot of the Metaliferous Mountains, means from a geographical, therapeutic, touristic and, last but not least, historical point of view, because here, practically at every step taken, the place in ancient history and not only "MUSTESTE".

I wanted to design this tourist guide also for the fact that many of the tourists who arrived in the area wanted to have the related information somewhere in writing, in order to retain it better, but at the same time I wanted what I conveyed here not to be lost over the years, to remain in the mind of the reader and the future guest who wants to learn about what this place means and what they could do if they come here for a few days.

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COLEGIUL ECONOMIC
"DIONISIE POP MARȚIAN"
ALBA IULIA

SOCIAL MEDIA IN TOURISM

Student Project

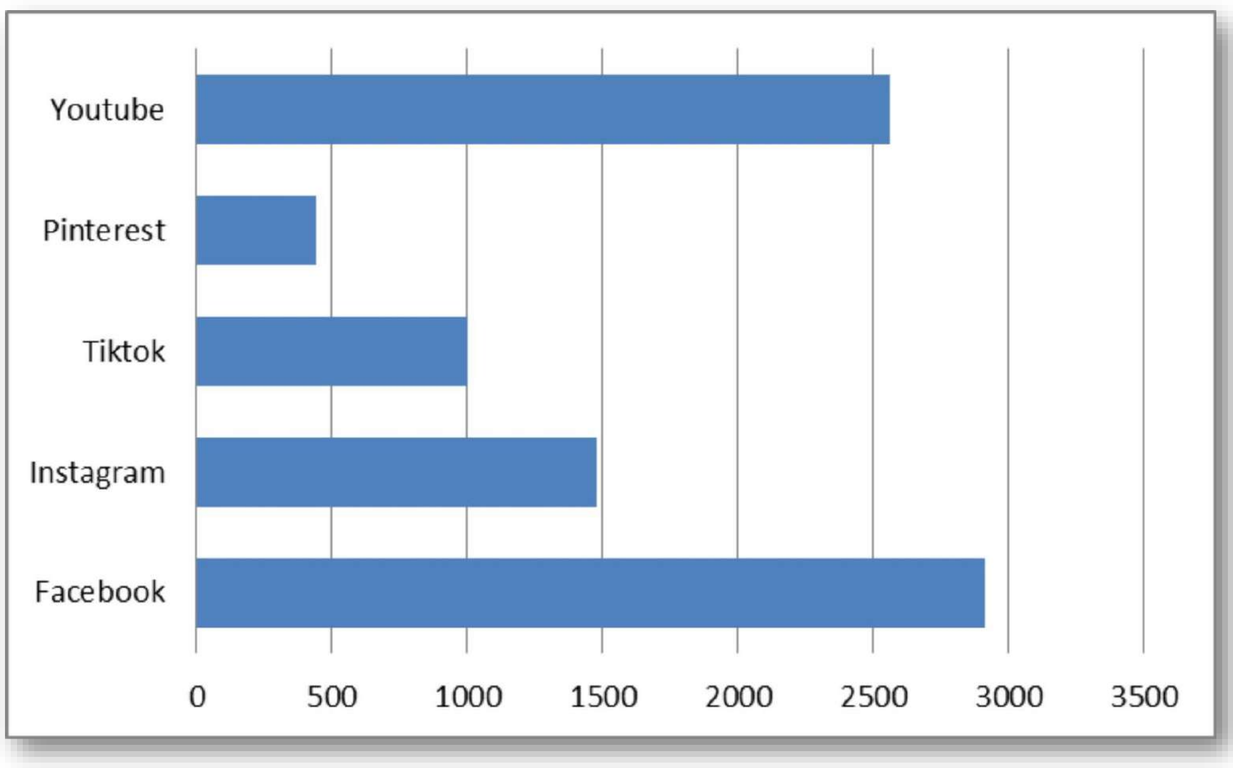
Author: Carla PARPUCEA

E

Social media platforms have become key channels for informing and influencing consumers in the tourism sector. More and more travelers choose their destinations and services based on online recommendations and reviews. In this context, the study aims to highlight the importance and impact of digital promotion on tourist behavior and on the marketing strategies of tourism agencies and operators.

Analysis of how social media networks influence travel decisions. Identification of the main platforms used in tourism marketing. Evaluation of the impact of online reviews and recommendations on the reputation of destinations. Proposal of strategies and recommendations for operators in the field.

Social networks have evolved from simple communication platforms into a real sales channel for tourist accommodation units. Consumers spend more and more time on these platforms while browsing the internet, as they offer them the opportunity to interact directly with tourist reception structures.



The evolution of social media requires a paradigm shift in tourism marketing. To remain competitive, operators in the field must develop effective digital strategies, use social platforms to build trusting relationships with customers and capitalize on the power of user-generated content.

Integrating digital technologies in tourism promotion is no longer just an option, but a necessity for long-term success.

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BAČKA PALANKA CULTURAL CENTER

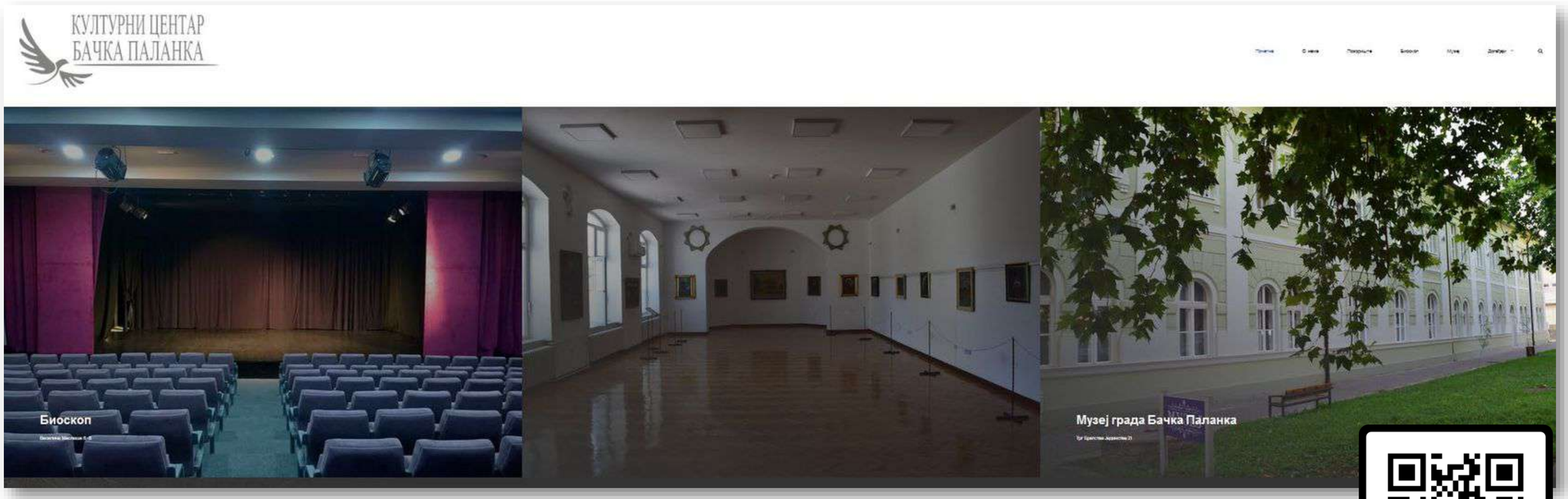
E

Olja NAD & Team

The Bačka Palanka Cultural Center was founded as a cultural institution by the decision of the Bačka Palanka Municipal Assembly in 1990 as a professional institution in the field of culture of special importance and interest. From the very beginning, this institution occupied a prominent place in the cultural life of our municipality.

The Bačka Palanka Cultural Center launched a series of events, activities and manifestations that contributed to the affirmation and better quality of life in our environment: we will only mention the traditional manifestations Blues-Jazz-Rock, Theater Autumn and Theater Spring, as well as participation in the Night of the Museum event.

The cultural center in Bačka Palanka provides its citizens with a variety of content. Within it, there is a city cinema where film screenings of recent films and performances by theater troupes are held. Also, the Gallery of the Cultural Center exhibits the works of renowned painters every day, and concerts are held.



SCAN ME

Presentation link: https://kcbp.rs/

Contact: kulturnicentarbp@gmail.com

THE IMPORTANCE OF EDUCATION AND CREATIVITY FOR YOUNG STUDENTS

Author: Prof. Dr. Anuja Malik

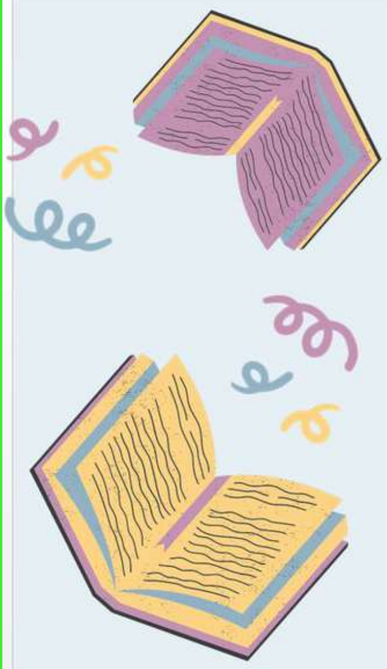
E

THE IMPORTANCE OF EDUCATION AND CREATIVITY FOR YOUNG STUDENTS

Knowing and understanding the importance of education and creativity in young students has a profound effect on their adulthood. The benefits of instilling a love for learning and creative endeavors early in life are numerous, and the sooner we recognize this, the better our children's futures will be.

IMPORTANCE OF EDUCATION: OPENING NEW HORIZONS

- *Allows youngsters to gain knowledge, develop critical thinking skills, and become aware of the world around them.*
- *Alleviates socioeconomic barriers, offering a level playing field where anyone can learn and grow.*
- *Provides the flexibility to learn at one's own pace, irregardless of location or time constraints.*



THE HARMONY OF EDUCATION AND CREATIVITY: UNLEASHING POTENTIALS

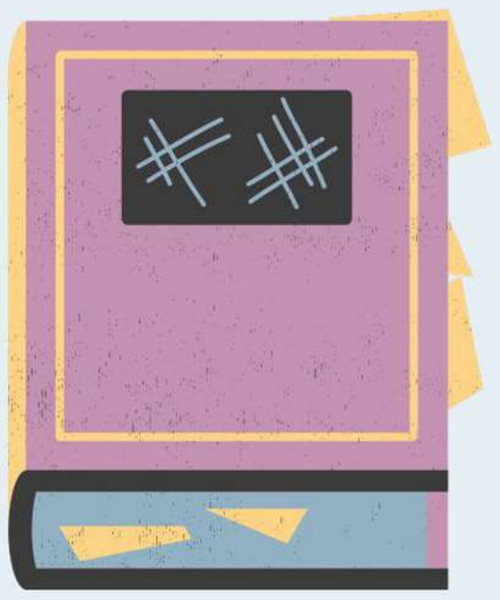
The education system should aim to foster creativity, elevating students' potential. Creativity empowers students to think out of the box, enabling them to approach problems from novel perspectives. It enhances their flexibility, adaptability, and resilience, thereby preparing them for the rapidly changing world.

THE POWER DUO: EDUCATION AND CREATIVITY

What happens when education meets creativity? Here's the product - a versatile, resilient, and innovative young student.
When creativity is combined with a quality education, students learn how to adapt, innovate, and tackle challenges strategically. They experience the joy of learning, are more driven to explore new areas, and develop a continuous thirst for knowledge and understanding, certainly the perfect recipe for success.

FOSTERING SELF-EXPRESSION AND CONFIDENCE

Creativity and education go hand-in-hand to build a child's self-expression. Teaching kids to articulate their thoughts, feelings, and ideas confidently is integral to their development.
A system that values creativity promotes risk-taking and curiosity, which leads to confidence in their abilities.



THE SOCIAL IMPACT

How can creativity in education influence the broader social fabric, you ask?
Well, it enhances cooperation, tolerance, and empathy among students. It paves the way for better interpersonal relationships and an inclusive society.
To sum up, the importance of education and creativity for young students cannot be overstated. It's crucial for their personal growth and helps prepare them to succeed in today's dynamic, interconnected world.

EDUCATION AND CREATIVITY - A STEP TOWARDS A BRIGHTER FUTURE

The significance of both education and creativity for young students cannot be overstated. Not only does it equip young minds with necessary life skills, but it also harnesses their unique potentials. The amalgamation of online or free education and creativity is a window for immeasurable opportunities that young students ought to embrace.
Meta-description: Discover the pivotal role of education and creativity in the lives of young students. Uncover how their intersection can shape a brighter future for our young generation.

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Negocieri transatlantice. Cooperarea româno – americană în educație, cultură și arte
Transatlantic Negotiations. Romanian - American Cooperation in Education, Culture, and Arts

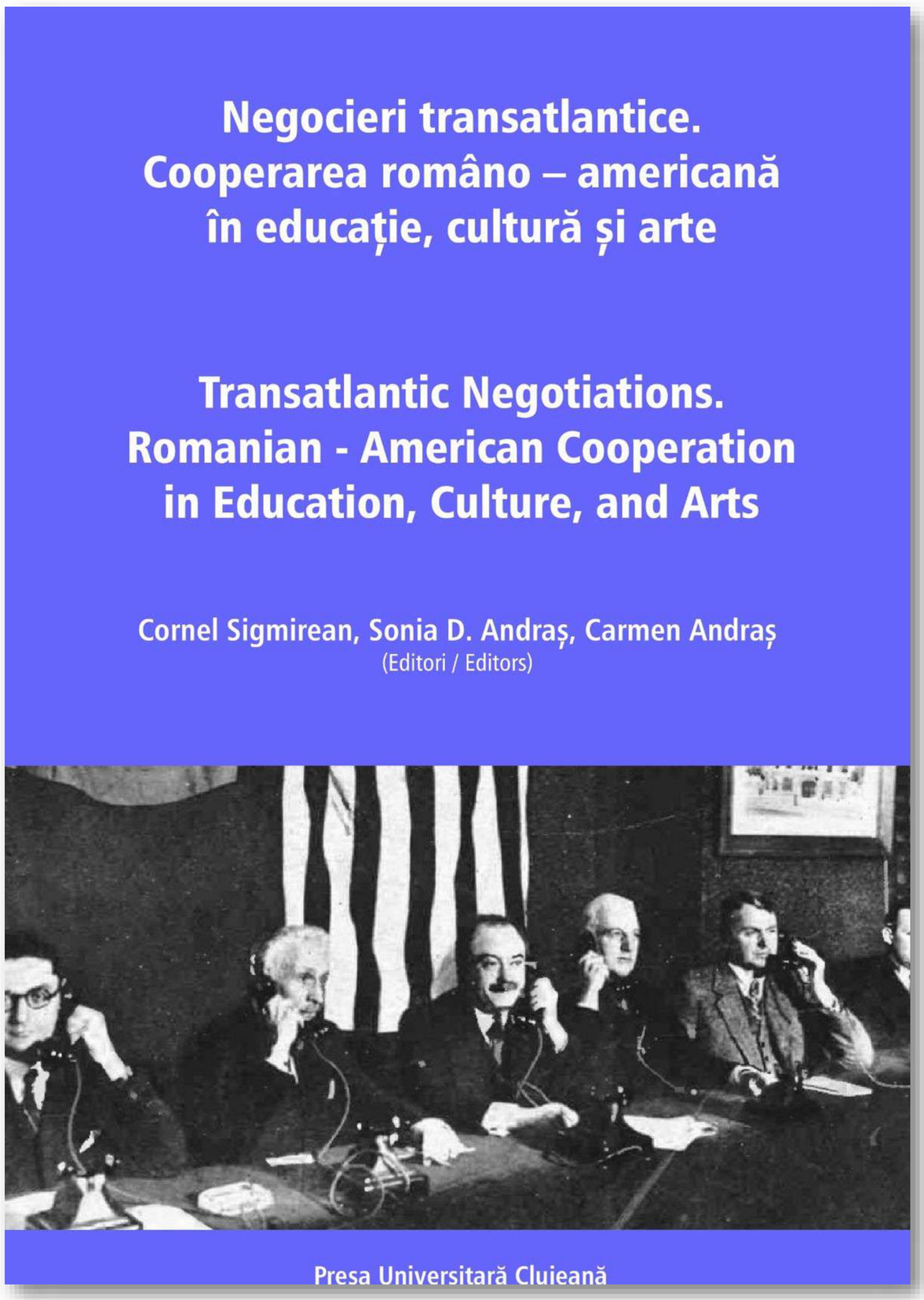
Editors: Cornel Sigmirean, Sonia D. Andraș, Carmen Andraș
Cluj Napoca: Editura Presa Universitară Clujeană, 2024, 284 pp.
ISBN 978-606-37-2356-8. CNCS A.

E

The volume **Negocieri transatlantice. Cooperarea româno – americană în educație, cultură și arte / Transatlantic Negotiations: Romanian-American Cooperation in Education, Culture, and Arts** explores the intricate intellectual, scientific, and cultural pathways that have influenced Romanian-American relations.

It highlights foundational elements fostered through scholarships, academic exchanges, initiatives of philanthropic institutions and humanitarian organizations in America, the impact of the American War correspondents' representations on mutual knowledge, Romanian personalities in American archives, museums and libraries, the portrayal of the American automotive industry in Romanian press, the relations between the YMCA/ACT and the National Legionary State, emphasizing the complexity of these relations.

The approach delves into the complex cultural and artistic interactions between Romania and the United States, shedding light on significant individuals, impactful initiatives, noteworthy events, and various organizations instrumental in nurturing this dialogue.



The authors have explored how American cultural frameworks, identity constructs, and gender paradigms influence perceptions and interactions with Romania. Transatlantic Negotiations studies the dynamic flow of ideas and the intricate cultural exchanges that have given rise to various mutual representations.

It describes the political and identity implications of Romanian-American relations. It underscores the exchange of ideas, ideologies, and policies between the two nations, accentuating the significance of Romanian scholarly, cultural, and artistic contributions within the United States.

It recognizes the influential individuals involved in these interactions and the noteworthy literary and artistic movements they inspired. The multi-perspectival, interdisciplinary and comparative methodology thus highlights the continuity and discontinuity in Romanian-American relations from the birth of Greater Romania to the present day.

It encourages cultivating intercultural and international dialogue, enhancing openness in Romanian-American relations. Emphasizing a dedication to diverse methodologies that span disciplines, cultures, and perspectives, this work invites a comprehensive exploration of the intricate relationships between these two nations.

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„Travelers and Travels – Historical-Cultural and Spiritual Forces„

E

Scientific Article published in a Journal indexed in International Databases

Authors:
Gherghina BODA, Dumitru-Cătălin ROGOJANU

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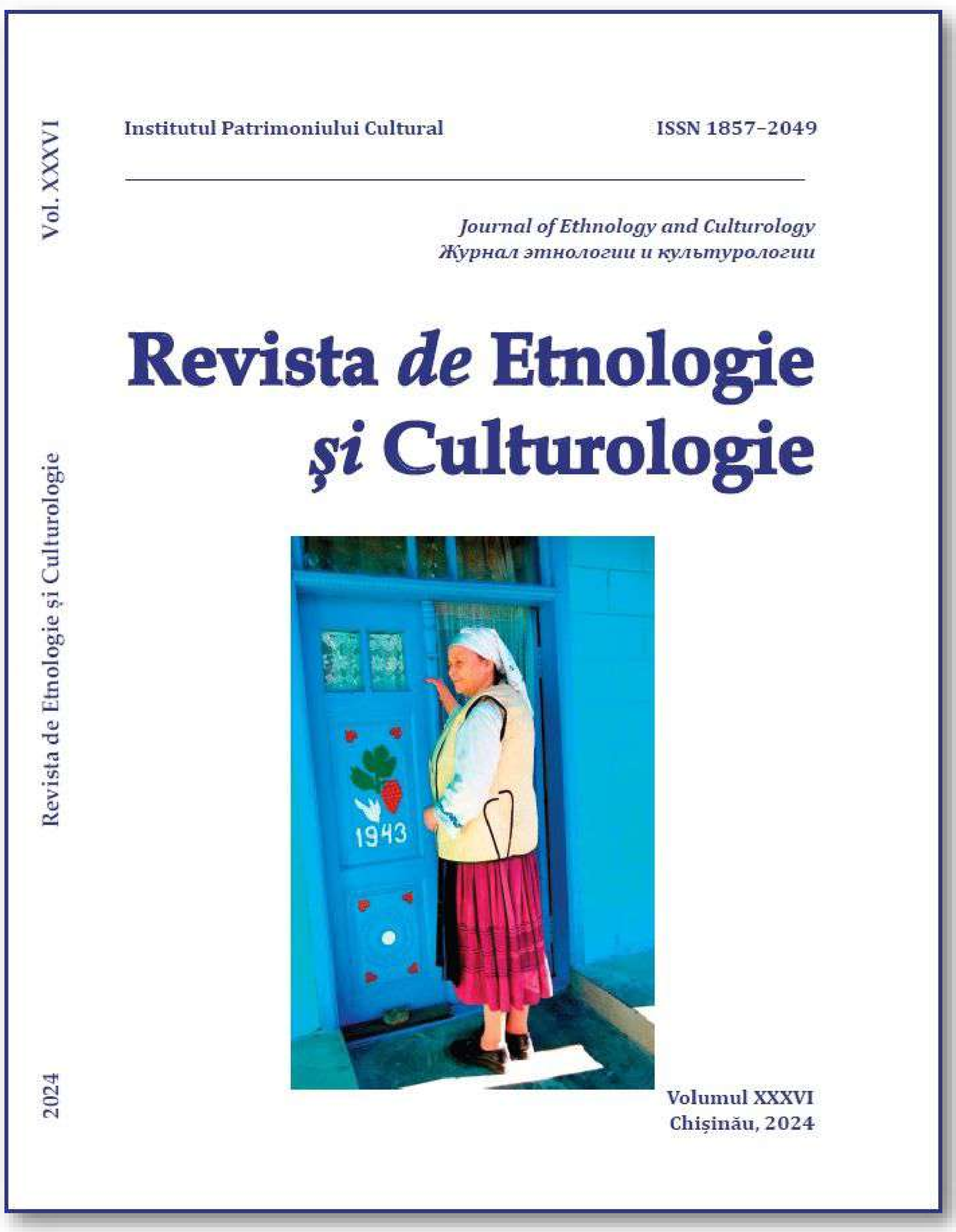

Description

Ever since his appearance, man has been driven by various needs to move beyond his comfort zone, his actions and activities often requiring him to travel around. Thus, he becomes a traveler in search of food, living space, conquest of new territories, curiosity, pilgrimages, pleasure, relaxation, and entertainment. If the testimonies from Antiquity about journeys and travelers are quite brief and sporadic, over time they have multiplied and become valuable historical sources, especially through travel diaries or descriptions of events, such as armed confrontations and their movement around different areas of the world. Thus, people have obtained information about spaces other than their homelands, about cultures, traditions, customs, rites and rituals, religions, monuments and works of art, etc. of Others, compared to their own. The individual is excited to travel, to make direct contact with other peoples and communities, with their famous monuments, which he assimilates in a subjective way, psychologizes them and reinvests them with new values, thus bringing his own contribution to the process of heritagization of some special objects, outstanding products of human creativity.

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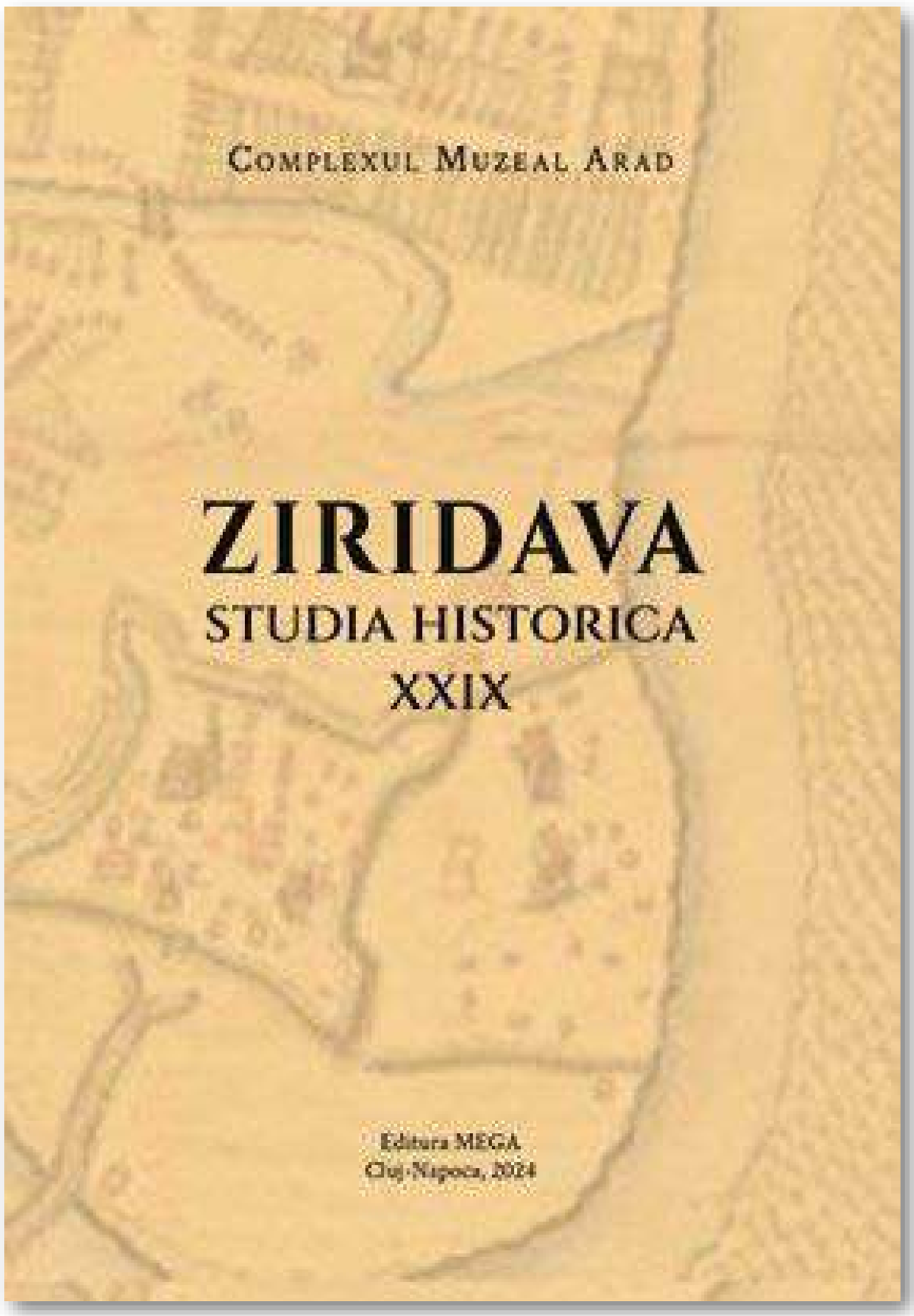
”Istoricul Baroulului Hunedoara”
”History of the Hunedoara Bar”

E

Scientific Article published in a Journal indexed in International Databases

Author: **Gherghina BODA**



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https://www.ceeol.com/search/journal-detail?id=2938

Description

The legal phenomenon has accompanied human society at all stages of its development, which has required the establishment of specific bodies to regulate people’s misconduct, as well as punitive means associated with each violation of social rules. Each historical period is characterized by a legal system that met the requirements of the time and that, like society, has been constantly perfected and improved. Bars appeared in the second period of the 19th century, first in Bucharest, then in Iași, Dolj-Jiu, and in Deva in 1923. The lawyers' contribution to the Hunedoara society was not limited only to the field of justice, but also to participate in some events of a national nature, such as the Great Union. They have become true symbols in which there are "values and hopes, ideals and faith, unity and dignity", common struggle with the other citizens of the country, demonstrating a mentality professional life, solid traditions of the legal profession and the enlightened spirit of the times that strongly demanded the ideal of national unification.

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„The symbiosis between the contemporary museum, emotional and experiential tourism”

E

Scientific Article published in a Journal indexed in International Databases

Author:

Dumitru-Cătălin ROGOJANU

Revista de Etnologie i Culturologie/
Journal of Ethnology and Culturology
vol. XXXV/2024, Chişinău, pp. 12-18
ISSN: 1857-2049, E-ISSN: 2537-6152
https://doi.org/10.52603/rec.2024.35.02
https://ibn.idsi.md/vizualizare_articol/216943

Description

The extremely rapid transformations that human society has experienced in recent decades have entailed changes in all fields and institutions, which have been forced to accept them in order to ensure their own survival. The museum, as a cultural institution preserving the national heritage, has entered this whirlwind of paradigm changes precisely to face an increasingly fierce competition in the cultural field. It has expanded its characteristics by also adopting methods of tourism, particularly from the experiential tourism and the emotional tourism, that are traveler/visitor-oriented so as to meet their cultural needs through the most sophisticated means of cultural mediation that incite curiosity and emotions, as well as to involve him/her in actions that will transform him/ her from spectator to actor. The relationship between the museum and tourism is relevant for the post-modern period, characterized by great mobility both nationally and especially internationally. The contemporary museum permanently adopts and creates means of heritage mediation. If tourism provides the traveler with a wide range of cultural destinations, the museum, through its events, tries to absorb as many tourists as possible. In this case the relationship between these two institutions becoming a symbiotic one, with benefits on both sides, but the main winner remains the traveler/visitor, who, if the museum has achieved its goal, leaves more cognitively and emotionally enriched, with the desire to. return

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ANALYSIS OF ENVIRONMENTAL COSTS IN THE ELECTRICAL EQUIPMENT INDUSTRY

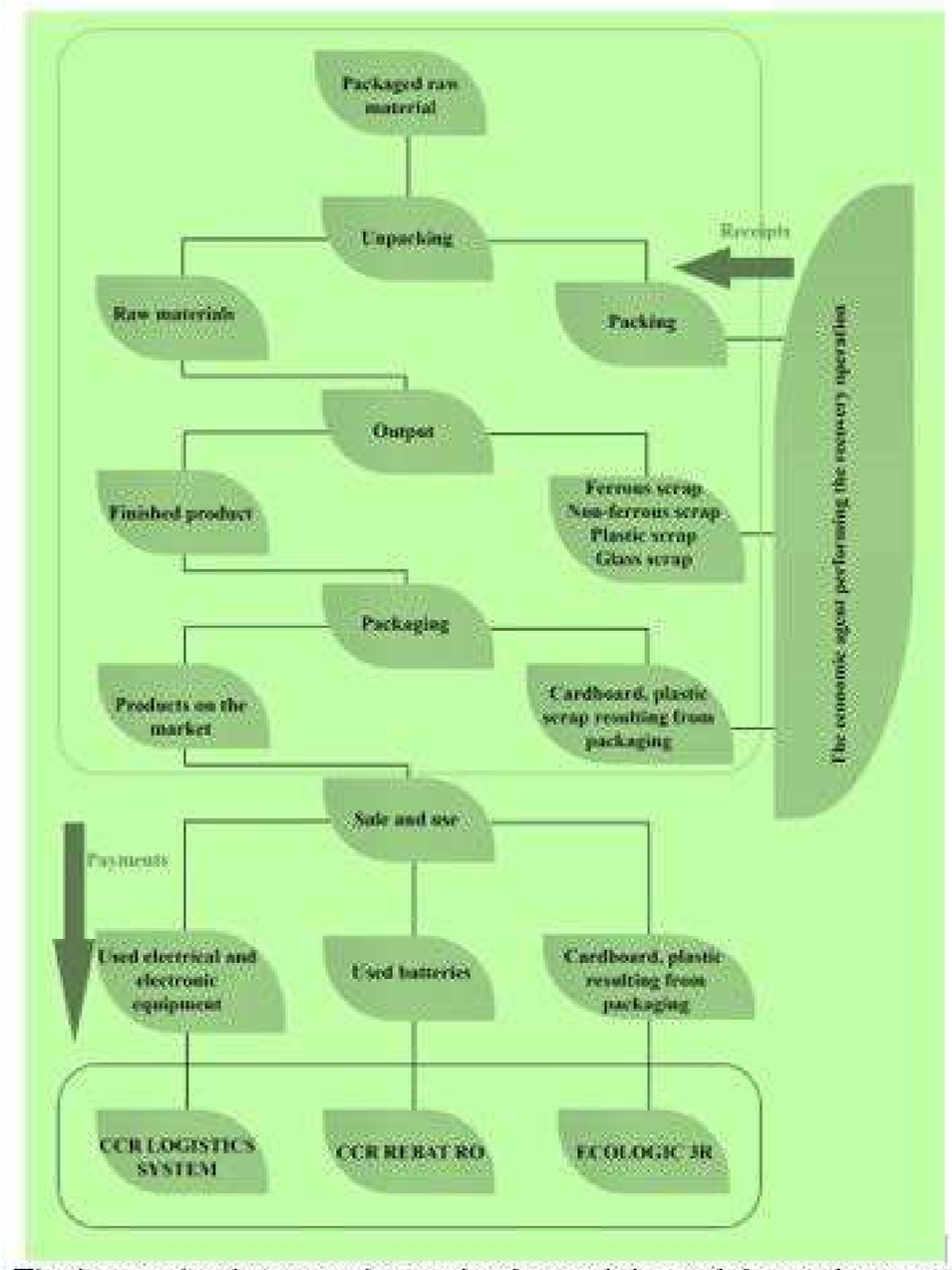
E

Student project

Authors: Iulia NISTORA, Gavriela RĂDUȚIU, Lavinia TÎRNĂVEAN, Flavia VIERU

Menthors: Mihaela ȘTEFAN, Ioana FĂRCEAN

The environmental costs represent those costs with the actions taken by an economic entity and by third parties on behalf of an economic entity include prevent, reduce or repair the damage caused to the environment resulting from operational activities. These costs include: waste storage and disposal, soil protection, underground and surface water protection, clean air and climate protection, noise reduction, biodiversity and landscape protection Another international organization, UNCTAD, states that these costs encompass expenses related to measures necessary for managing the environmental impact of a company's activities responsibly, along with other costs driven by the company's environmental goals and regulatory requirements. The research analyzes the dependence between the resulting waste and the volume of production by category. The usefulness of determining these dependencies leads to the identification of product categories with significant influence on environmental expenses.



The interaction between the production activity and the environment

According to a dataset on waste types and fees paid to the main processors over a 24-month period, of which only a part is presented in tabular form, the average costs related to electrical and electronic equipment placed on the market have been calculated. Thus, the average cost for batteries and accumulators placed on the market was obtained to be 0.10 EUR/kg and 1.52 EUR/kg.

Waste generating categories

Interval [month]	Electrical and electronic equipment introduced to the market [kg]	Batteries and accumulators placed on the market [kg]	Cardboard, plastic introduced on the market [kg]	The amount paid to CCR Logistic [euro]	Amount paid CCR rebate [euro]	Amount paid Ecologic 3R [euro]	Total amount paid [euro]
1	947.00	240.00	14.00	908.32	0.00	6.55	914.87
2	1,379.00	0.00	24.00	0.00	0.00	11.45	11.45
3	2,123.00	0.00	11.20	0.00	0.00	17.81	17.81
4	1,513.00	170.00	4.30	908.73	0.00	9.67	918.41
5	1,450.00	0.00	6.00	0.00	0.00	0.00	0.00
6	1,211.00	0.00	13.00	0.00	0.00	8.20	8.20
7	1,017.00	0.00	13.00	852.56	0.00	10.82	863.38
8	816.00	0.00	13.00	0.00	0.00	17.46	17.46
9	912.00	0.00	12.80	0.00	0.00	17.46	17.46
10	1,299.00	0.00	11.00	560.68	0.00	17.23	577.91
11	1,532.00	0.00	11.00	0.00	0.00	14.91	14.91
12	1,937.00	0.00	8.40	0.00	382.98	2.55	385.53

Within the entity, there are waste materials that are recovered (aluminum scraps, shavings, scrap iron) through a contract concluded with the main recyclers. Thus, for part of the analyzed period, the situation of these waste materials, as well as the recovered amounts, is presented in tabular form.

Waste situation and recovered amounts

Month	Electrical and electronic equipment introduced on the market [kg]	Aluminum scrap		Aluminum chip waste		Scrap metal		Total amount recovered [euro]
		[kg]	[eur]	[kg]	[eur]	[kg]	[eur]	
1	947.00	160.00	156.60	30.00	12.77	140.00	13.40	182.77
2	1,379.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	2,123.00	0.00	0.00	55.00	25.74	0.00	0.00	25.74
4	1,513.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	1,450.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	1,211.00	325.00	331.91	100.00	46.81	35.00	2.23	380.96
7	1,017.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	816.00	0.00	0.00	100.00	53.19	0.00	0.00	53.19
9	912.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1,299.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1,532.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1,937.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

This project analyzes environmental costs in the electrical equipment industry, highlighting the role of environmental accounting as a strategic tool for the effective management of economic entities. This allows the outline of managerial strategies for improving production technologies, optimizing products and reducing the impact on the environment.

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MANFACTURING PROCESSES OF MICRO-ELECTRO-MECHANICAL-SYSTEMS WITH APPLICATIONS IN MEDICINE

Book / ISBN *978-973-720-903-0*

Author: Dr. ing. MARINESCU MARIA-ROXANA

E

Technology represents the processes, methods and operations used to obtain a particular product. Microelectronics and nanoelectronics are two areas with a significant contribution to technological progress.

The research-development-innovation activities within the two fields, have produced valuable results of reference for the current work: micro-electro-mechanical systems (MEMS).

MEMS are miniaturised systems with small dimensions and weights that can be easily integrated into various commercial applications. These small aids with high technology are increasingly present in our daily lives. Innovative structures allow us to control the environment better and help us increase the energy efficiency of devices. All the applications in the current era, Industry 4.0 (the fourth industrial revolution), integrate sensing devices, data processing and transmission, and actuation devices.

Dr. ing. Maria-Roxana MARINESCU este absolventă a Facultății Ingineria și Managementul Sistemelor Tehnologice a Universității Politehnica București în anul 2012. A urmat apoi două programe de masterat (2012-2014):

- Master în domeniul „Inginerie și Management", Programul de studii: „Calitate în Inginerie și Managementul Afacerilor", Universitatea Politehnica din București, Facultatea Ingineria și Managementul Sistemelor Tehnologice;
- Master în domeniul „Științe Administrative", Programul de studii: „Administrație Publică Europeană", Universitatea Lucian Blaga din Sibiu, Facultatea de Drept.

În anul 2021 a obținut titlul de doctor (*distincția Summa Cum Laude*) în domeniul Inginerie Industrială, la Facultatea Inginerie Industrială și Robotică, Universitatea Politehnica din București.

În prezent este cercetător științific în cadrul Institutului Național de Cercetare-Dezvoltare pentru Microtehnologie – IMT București.

Activitatea profesională s-a concretizat până în prezent prin realizarea și publicarea a 20 de lucrări, dintre care 10 ca prim autor, patru lucrări publicate în volumele unor conferințe indexate ISI, cinci în reviste indexate ISI, două în volumele unor conferințe și nouă în reviste indexate în alte baze de date (EBSCO, ProQuest, Google Scholar etc.). De asemenea, în calitate de coautor, a publicat trei tratate de specialitate.

Sunt de menționat mai mult de 20 de participări la conferințe internaționale la secțiunea de postere sau lucrări apărute în publicații sub forma *Book of abstracts*.

Prin participarea la conferințe și saloane de invenții în țară și străinătate, a obținut în calitate de autor principal sau coautor un număr impresionant de peste 60 de premii.

Expertiza autoarei acoperă experiența în fabricarea senzorilor de umiditate – prototipuri: pregătirea materialului nanocompozit pentru straturi sensibile; măsurători de rezistență electrică; măsurători ale depunerilor de strat sensibil și ale senzorului de umiditate; caracterizarea mecanică a senzorilor. Aceste cunoștințe au fost dezvoltate prin participarea în cadrul diverselor proiecte de cercetare-dezvoltare. În cadrul acestor cercetări, a depus 40 cereri de brevet în calitate de coautor.

ISBN 978-973-720-903-0

PROCESE DE FABRICAȚIE A SISTEMELOR MICRO-ELECTRO-MECANICE CU APLICAȚII ÎN MEDICINĂ

Maria-Roxana MARINESCU

Maria-Roxana MARINESCU

PROCESE DE FABRICAȚIE A SISTEMELOR MICRO-ELECTRO-MECANICE CU APLICAȚII ÎN MEDICINĂ

Editura AGIR

Studii și cercetări

Within the work entitled "Manufacturing processes of micro-electro-mechanical systems with applications in medicine", a "lab-on-a-chip" type device was designed, modelled, simulated and manufactured, with the help of which it can be identified and measured blood T lymphocyte concentrations.

Therefore, the work can be included in the field of bioengineering. In this branch of science, concepts are developed from the molecular level to the systemic level, with the role of developing new biological products, materials and medical devices for the diagnosis, prevention and treatment of diseases, as is the case of the device resulting from this work. The field of medical engineering is closely related to the following subfields: biomechanics, biomaterials, electronics, mechatronics, biophysics, medical imaging, telemedicine, nanotechnology, cellular engineering and genetics; therefore, it is a field with evident multidisciplinary character.

The micro-electro-mechanical devices in the present work were made within the National Institute for Research and Development in Microtechnologies – IMT Bucharest.

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Tehnici de cercetare și scriere academică

Authors: **Angela Solcan, Monica Vlad**

E

Research Techniques and Academic Writing, authored by Angela Solcan and Monica Vlad, is a comprehensive course guide designed for master's students specializing in the didactics of non-linguistic disciplines in English, French, or Romanian. This book provides essential guidance on conducting academic research and writing a well-structured dissertation while adhering to scholarly standards.

The book systematically covers key aspects of academic writing, including formulating research problems, developing hypotheses, and identifying and operationalizing the research corpus. It offers practical insights into selecting and structuring research material effectively to support a coherent argument.

A significant focus is placed on dissertation writing, with detailed explanations on crafting introductions and conclusions, structuring theoretical chapters, and employing proper citation techniques. Students will find valuable strategies for quoting, paraphrasing, and referencing sources while ensuring clarity and academic integrity. The book also discusses bibliographic formatting, citation styles, and typographic constraints.

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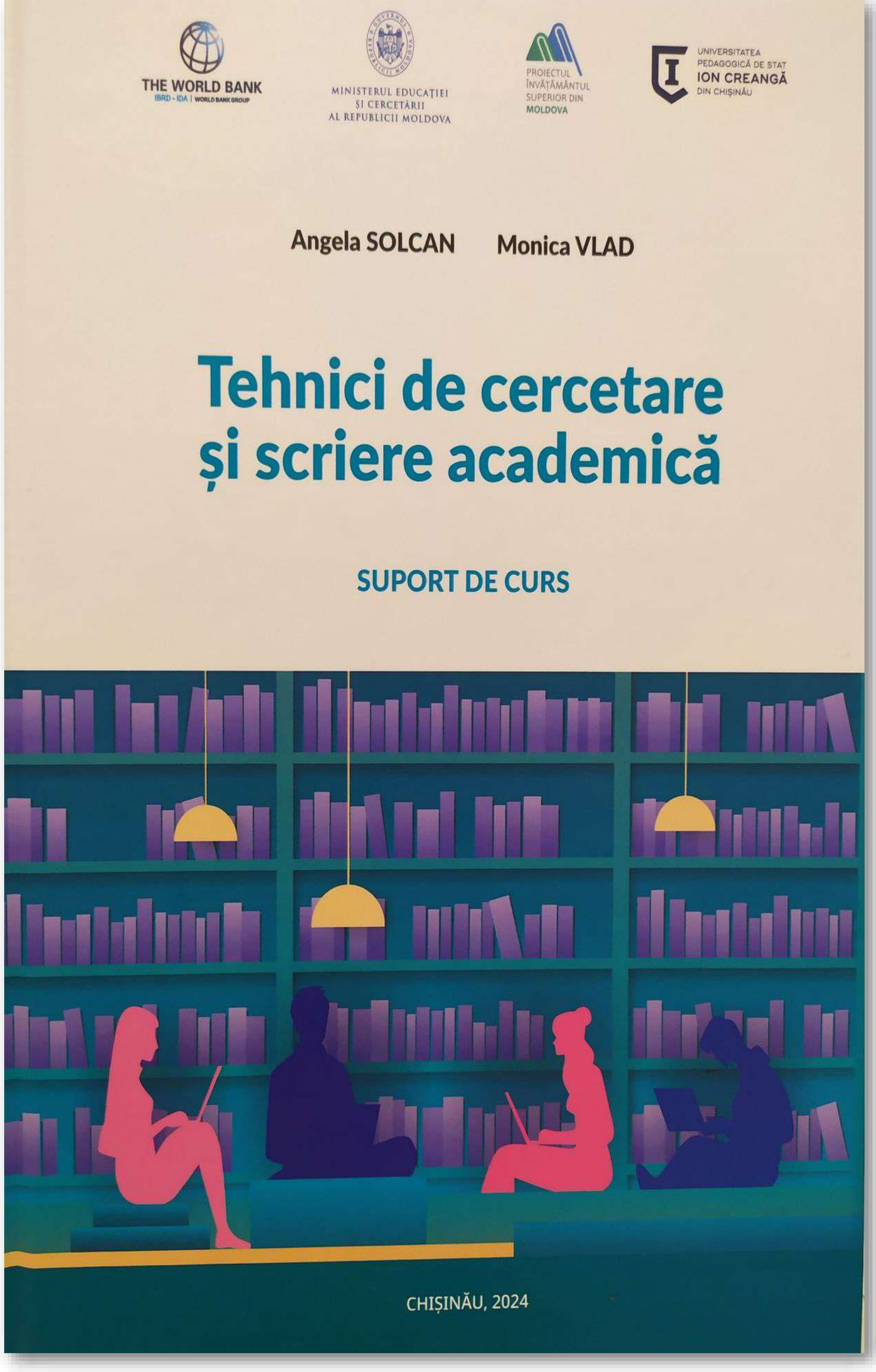

To promote ethical research practices, the authors explore issues related to plagiarism and introduce anti-plagiarism software, offering practical solutions for maintaining originality in academic work. Additionally, a dedicated section on dissertation defense provides guidelines on structuring PowerPoint presentations and mastering oral presentation techniques.

By blending theoretical principles with practical applications, *Research Techniques and Academic Writing* serves as an essential resource for students seeking to develop strong research and academic writing skills while meeting scholarly and ethical requirements.

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Valori postmoderne în învățământul primar: dezvoltarea profesională a învățătorilor în raport cu educația lingvistică a elevilor / Postmodern values in primary education: teachers' professional development in relation to students' language education

E

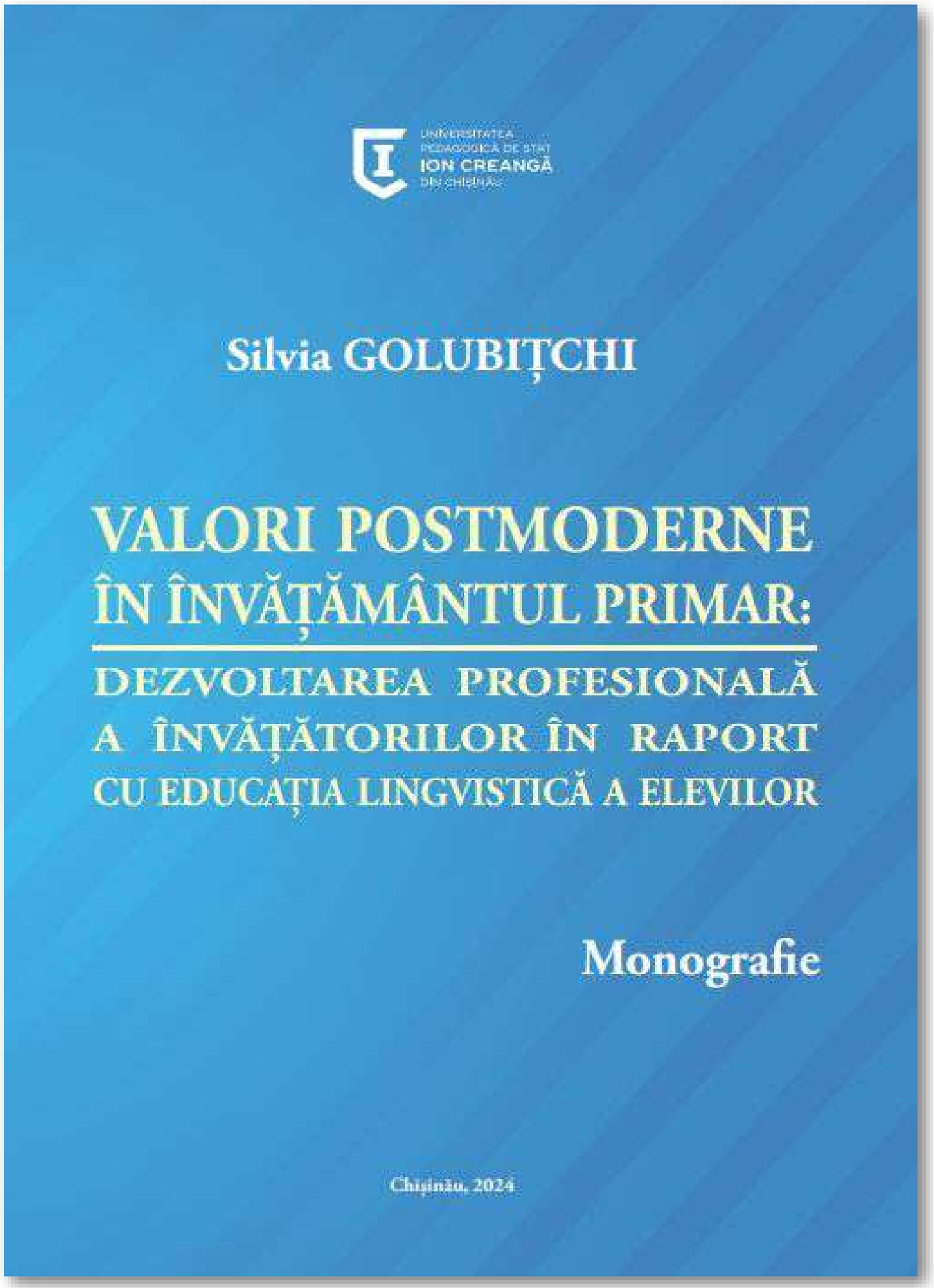
Author: Silvia Golubițchi

This monograph presents an analysis of how postmodern approaches influence the training and professional development of teachers, particularly in the context of students' linguistic education. It is structured around the following key concepts: postmodern values, primary education, professional development, students' linguistic education, relationships, practical wisdom and the cultivation of phronesis.

In this study, we aim to identify, within the general framework of pedagogical mentality and the specific framework of primary education, the phenomenon that characterizes and determines the essence of teachers' professional development from a postmodern perspective-namely, their practical wisdom in their professional activity. To achieve this, we have engaged in discussions about the specificities of primary education in light of changes in dimensions, processes, criteria, connections, reconfigurations, content, integration, and more. Additionally, we have addressed the pragmatic and communicative dimensions of linguistic education, as well as multifunctional learning and professionalization from the perspective of its components, its polysemic nature, its effects in the classroom and its guiding principles.

A special focus is given to the issue of postmodern values and postmodernism as a factor of evolution and as one of the determining conditions. Differentiating between modernism and postmodernism requires identifying their defining features based on a comparative approach that highlights their general points of reference.

These theoretical approaches, alongside other similar perspectives from various branches of educational sciences, seek to highlight the demands of the new educational orientation in the evolving landscape of professional activity. The interpretation is examined from multiple perspectives-philosophical, psychological, anthropological, praxeological, relational, logical, etc. Equally important is the exploration of the pedagogical characteristics of postmodernism, which are described in the paper.



The vision we propose, through the lens of postmodern values in the process of professional development, aims to recover, at least in part, the real complexity of the pedagogical phenomenon of teachers' practical wisdom within the real context of their attitudes.

Bringing together multiple domains within the same study, as is actually recommended in educational sciences, even when addressing issues from a specific field, might initially seem risky. However, from our chosen perspective the one of postmodern values a number of highly significant correlations are absolutely necessary.

We express our belief that this monograph can serve as a valuable resource for both core and elective courses for students, master and doctoral candidates, as well as students from pedagogical colleges. Additionally, it can support practitioners teaching staff and school administrators in their continuous professional development.

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ANIMALS, ILLUSTRATED ENCYCLOPAEDIA, 3 VOLUMES

Authors: Tudor Cozari , Mihai Cîrlig

E

Aim:
Study at local, regional and European level on about diversity, ecological and conservation status of animals was carried out.

Solution:
Expeditions to collect the original material and a photographic study of the animals (habitat, life cycle, degree of rarity, conservation status, ecology at local (Republic of Moldova), regional level (Ukraine, Romania) and partly European level (Bulgaria, Italy, Austria) have been

Advantages:
For the first time the illustrated encyclopedia – **ANIMALS. ILLUSTRATED ENCICLOPEDIA** (Vol. 3) was edited. This one contains data about 25 ANIMAL species from Europe, presented in over 1,200 original color images. During 5 years the author traveled across 20 000 km crossing Republic of Moldova, Ukraine, Romania, Bulgaria, Austria and Italy.

Impact:
Investigated and presented animals in the encyclopedia are protected species at European level, see the sources:

- **IUCN Red List** (Red List of International Union for Conservation of Nature)
- Concil Directive 79/409/EEC on the Conservation of Wild Birds; 1979/1981;
- **SPEC** (Species of European Conservation Concern);
- ConventionontheConservationofEuropeanWildlifeand natural habitats, **BERN 1979/1982**;
- Convention on the Conservation of Migratory Species of Wild Animals; **BONN, 1979/1983**

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Geografie, Republica Moldova și lumea contemporană

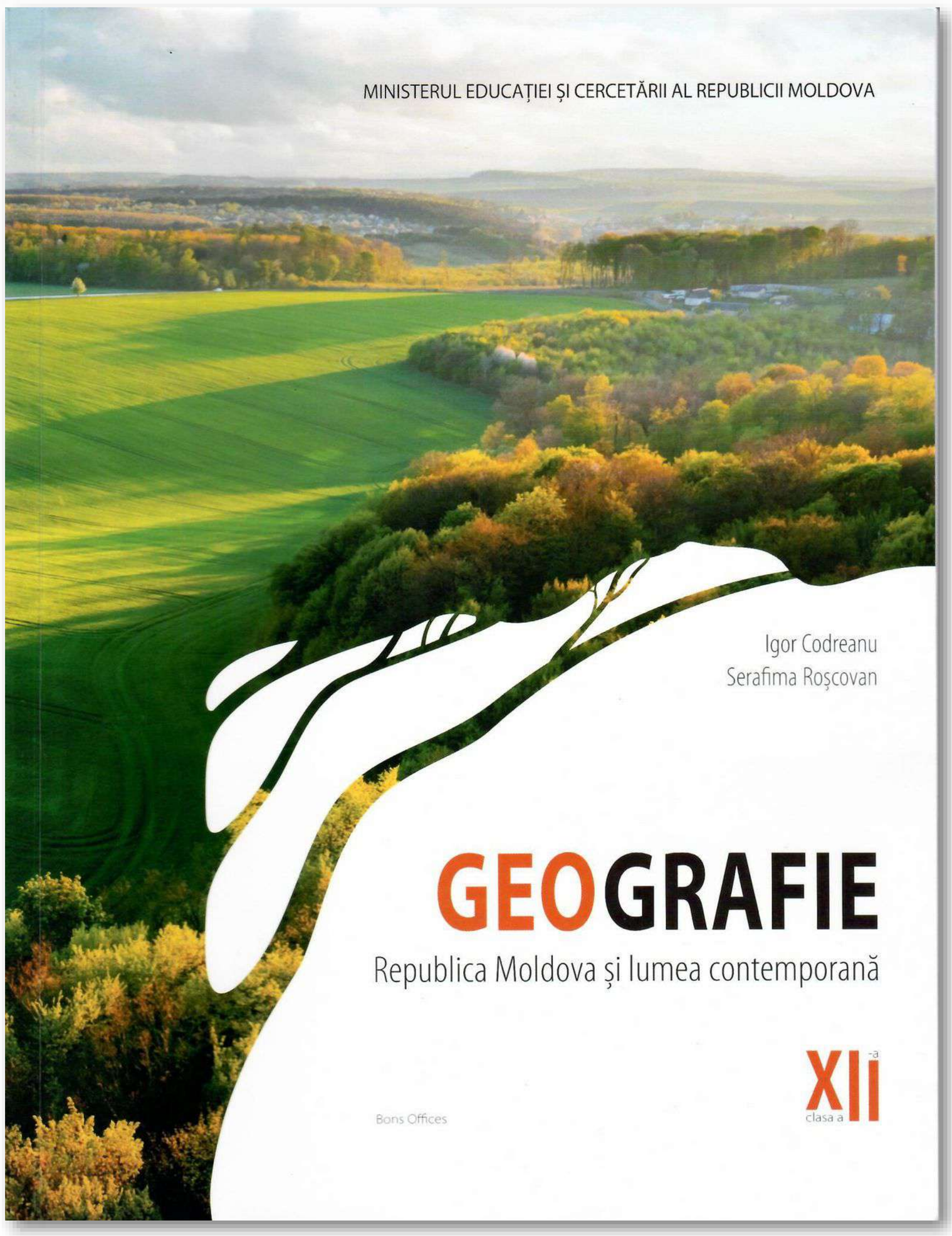
Geography, the Republic of Moldova and the contemporary world

Authors: Igor CODREANU, Serafima ROȘCOVAN

E

The school manual, developed for students studying in the twelfth grade, has the title „ Geography, the Republic of Moldova and the contemporary world”,
ISBN 978-5-36241-357-6, "Bons Offices" publishing-printing house, 2024.

The work includes extensive information about the problems of the Geographical Environment in the world and in the Republic of Moldova (Geografie, Republica Moldova și lumea contemporană), including about the quality, valorization and protection of the environment at the global, regional and local level, including about the social problems of the contemporary world. The manual includes contents related to the peculiarities and legalities of the Geographical Environment as an integrated system, the mutual relations between its components, the negative human impact and the consequences on the environment.



The competencies that form and deepen this work will prepare the future generation will be based on the accumulation of knowledge, the formation of skills and constructive attitudes to solve the most pressing problems of the environment and the contemporary world, with a view to a sustainable future.

Contact: **State Pedagogical University "Ion Creanga" from Chisinau, Republic of Moldova, Faculty of Geography, Department of Geography and Tourism, Igor Codreanu, Tel. +373-079538908, Email: codreanu.igor@upsc.md**

F

Medicine

Paramedical

Pharmacy

Cosmetics

Hygiene

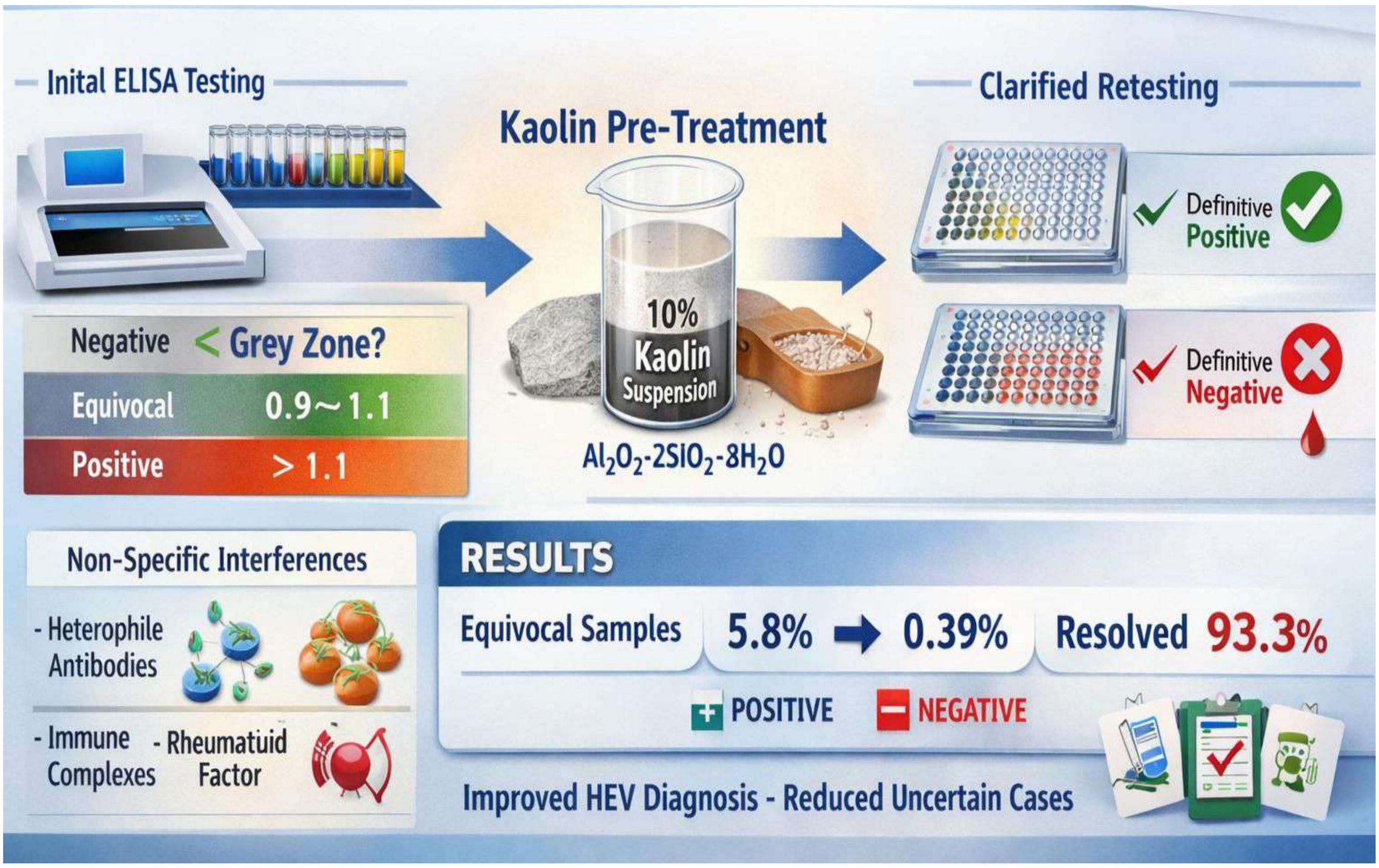
Method for clarifying equivocal results in the determination of anti-HEV IgM in blood serum

Patent deposit number: s 2025 0124 dated 2025.12.15

Authors: Sajin Octavian; Iziumov Nina; Ţurcanu Adela; Holban Tiberiu; Blaj Valentina

F

The invention proposes a standardized laboratory method to clarify equivocal (“grey zone”) anti-HEV IgM results obtained by ELISA, improving the serological diagnosis of acute hepatitis E. Serum samples are initially tested using HEV-antigen coated microplates and optical density is measured at 450–620 nm. Results are interpreted using a defined cut-off (mean OD of negative controls + 0.250) and classified as negative, positive, or equivocal (ratio 0.9–1.1). Samples falling within the equivocal range undergo an additional pre-treatment step with a 10% kaolin suspension ($Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$), followed by retesting with the same ELISA protocol. This approach reduces non-specific serum interferences and enables clear final interpretation in most cases. In an experimental validation on 256 sera, the method reduced equivocal results from 5.8% to 0.39% (93.3% of equivocal samples were clarified after kaolin pre-treatment). The method is simple, low-cost, compatible with existing commercial ELISA kits, and particularly useful in settings where HEV PCR is limited or unavailable.



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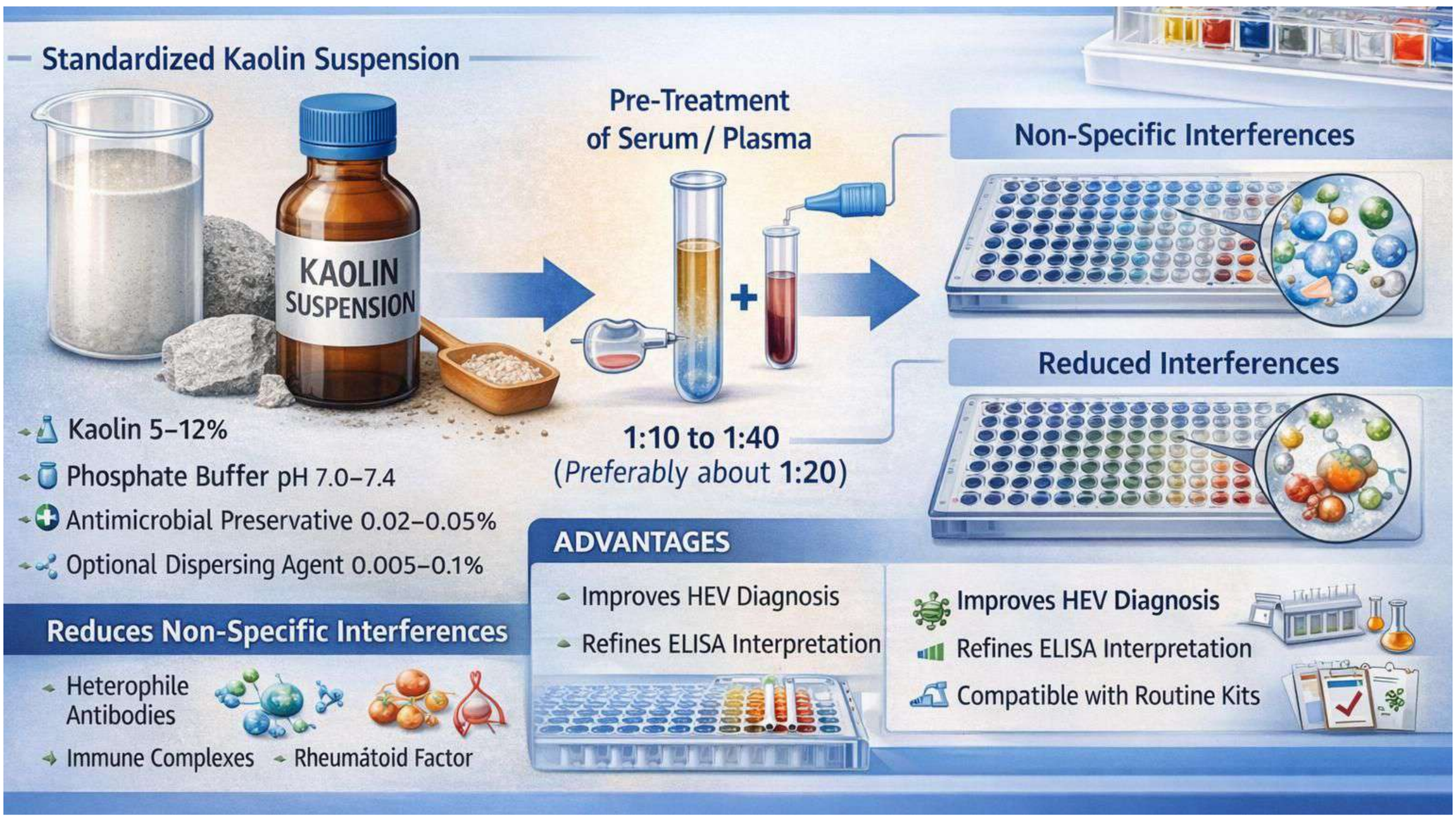
Standardized kaolin suspension for the control of interferences in immunoenzymatic assays for hepatitis E

Patent deposit number: s 2025 0125 dated 2025.12.16

Authors: Octavian Sajin, Nina Iziumov, Adela Țurcanu, Veaceslav Guțu, Valentina Blaj.

The invention provides a standardized kaolin-based reagent for pre-treatment of serum or plasma samples used in ELISA assays for hepatitis E virus (HEV) diagnostics. The reagent consists of an aqueous kaolin suspension dispersed in a phosphate buffer with neutral pH (6.8–7.6, preferably 7.0–7.4) and a controlled adsorbent concentration of 2–15% (preferably 5–12%), ensuring effective and reproducible reduction of non-specific matrix interferences.Non-specific serum components such as heterophile antibodies, immune complexes, lipoproteins, and background turbidity frequently cause elevated absorbance, false-reactive or equivocal ELISA results in HEV serology. The standardized kaolin suspension selectively adsorbs these interfering substances while preserving the specific analytical signal of HEV markers, including anti-HEV IgM, anti-HEV IgG, and HEV antigen.Sample pre-treatment is performed using defined reagent-to-serum ratios of 1:10–1:40 (preferably ~1:20) with short incubation times of 5–10 minutes, followed by centrifugation. This standardized workflow reduces background reactions, improves inter-laboratory reproducibility, and enhances the reliability of HEV serological diagnostics.The reagent is stable during storage (2–8°C), ready-to-use, compatible with commercial ELISA kits, and may be supplied as an independent product or incorporated as a component of diagnostic kits for hepatitis E.



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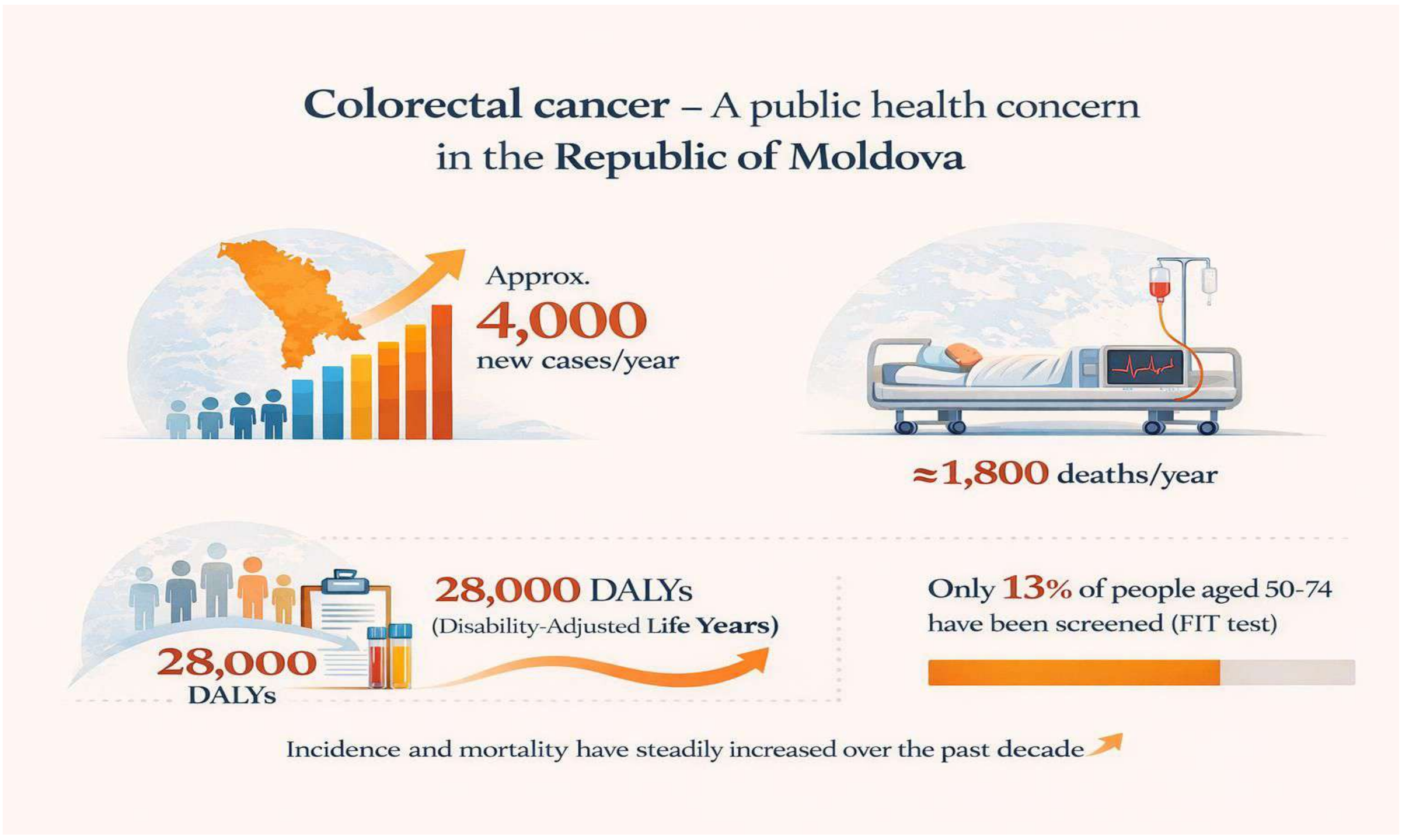
Epidemiological aspects of colorectal cancer in the Republic of Moldova

Doctoral research project
Authors: Cotorobai Vitalie, Sajin Octavian, Ghervas Vadim

The doctoral project provides a detailed epidemiological assessment of colorectal cancer in the Republic of Moldova based on national registry and mortality database analyses over multiple consecutive years. Preliminary evaluations indicate a persistent increase in incidence, particularly among individuals aged over 50 years, with higher disease concentration in urban and industrialized regions. Mortality remains substantial, reflecting both late-stage diagnosis and limited population coverage of screening programs.

The study examines sex-specific and regional disparities, highlighting higher risk profiles among males and populations exposed to unfavorable lifestyle patterns such as low dietary fiber intake, physical inactivity, obesity, and metabolic disorders. In parallel, the project assesses current screening coverage, participation rates, and diagnostic delays in relation to stage at detection.

A core analytical component is the quantification of disease burden using Disability-Adjusted Life Years (DALY), demonstrating that colorectal cancer contributes significantly to years of life lost due to premature mortality and prolonged morbidity. These findings aim to provide concrete evidence for strengthening national screening strategies, optimizing early detection policies, and reducing avoidable mortality through targeted public health interventions.



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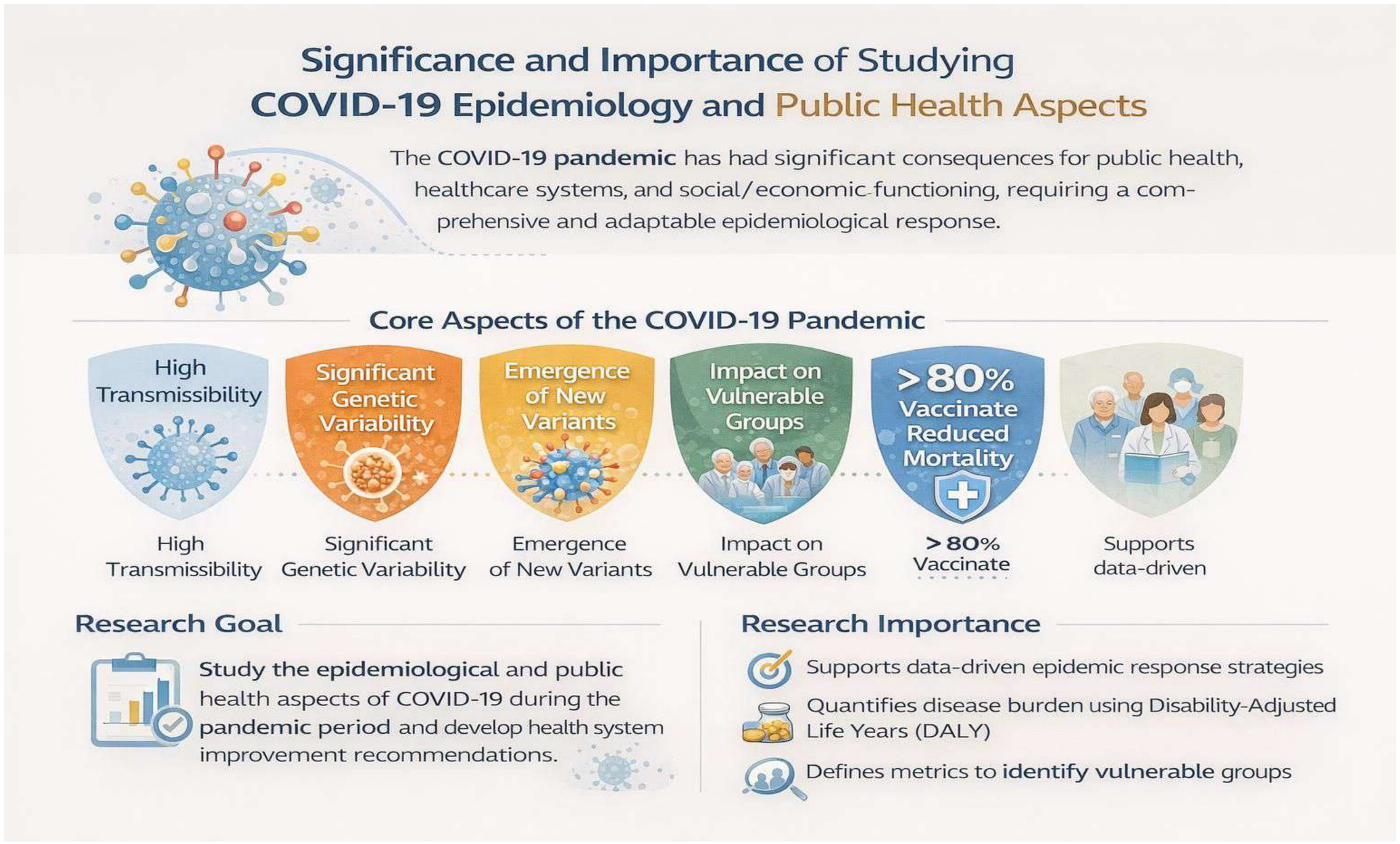
Epidemiological and public health aspects of COVID-19 in the Republic of Moldova during the pandemic period

Doctoral research project
Authors: Dascalov Alexandr, Sajin Octavian

The doctoral project delivers a comprehensive epidemiological analysis of colorectal cancer in the Republic of Moldova for the period 2026–2030, using national cancer registry data, mortality statistics, and population health indicators. The research monitors annual incidence and mortality trends, age- and sex-specific distributions, and regional variations across urban and rural areas. Preliminary assessments indicate a continued upward trend in new colorectal cancer cases, particularly among individuals over 50 years of age, alongside persistently high mortality linked to late-stage diagnosis.The project quantitatively evaluates major population-level risk factors, including obesity prevalence, sedentary behavior, dietary patterns low in fiber, metabolic disorders, and socio-economic determinants. In parallel, screening coverage rates, diagnostic delays, and stage at detection are systematically analyzed to identify gaps in early diagnosis.A central outcome of the research is the estimation of disease burden using Disability-Adjusted Life Years (DALY) for each year between 2026 and 2030, allowing precise measurement of premature mortality and years lived with disability attributable to colorectal cancer. By integrating trend analysis, risk profiling, and burden quantification, the project generates actionable evidence to guide national prevention strategies, strengthen screening programs, and reduce avoidable colorectal cancer mortality in Moldova.



Contact: alexandr.dascalov@gmail.com +373 69530639

101 Questions and Answers About Endocrine Disruptors

Brochure was edited and published using the financial resources of the State Scientific Project "State Program (2024–2027)", scientific subproject "Modeling Human Biomonitoring as a Priority Tool in Chemical Risk Management" (code 130101). No. 2964 of 17.03.2025

Authors: Iurie Pinzaru, MD, DHM, Vladimir Bernic, MD, PhD, Miron Inga, MD, PhD, Kristina Stîncă, MD, Roman Coreţchi, MD

Objective: The goal of this work is to provide the public with an accessible, well-documented, and easy-to-understand guide on endocrine disruptors.

Solution: It represents an innovative public education tool designed to raise awareness about endocrine disruptors and encourage the adoption of preventive behaviors among the population.

Advatages: Organized in the form of a set of 101 questions and answers, this material aims to address the most common questions related to chemicals that disrupt the endocrine system, explaining in simple terms the risks to which we are exposed daily and practical measures to reduce their impact on health. Proper information and the application of preventive strategies will not only contribute to protecting public health but will also reduce the burden that endocrine disruptors place on public health systems.

Implementation: The practical value of the guide is undeniable, offering direct and effective solutions for protecting public health by preventing exposure to endocrine disruptors. Understanding the main sources of exposure to endocrine disruptors and how they function can help the public make healthier choices in daily life.

Contact: iurie.pinzaru@ansp.gov.md

STROKE – PREVENTION, RECOGNITION, ACTION

Brochure was edited and published using the financial resources of the State Scientific Project "State Program (2024–2027)", scientific subproject "Modeling Human Biomonitoring as a Priority Tool in Chemical Risk Management" (code 130101). No. 2964 of 17.03.2025

Author: Vladimir Bernic, MD, PhD,

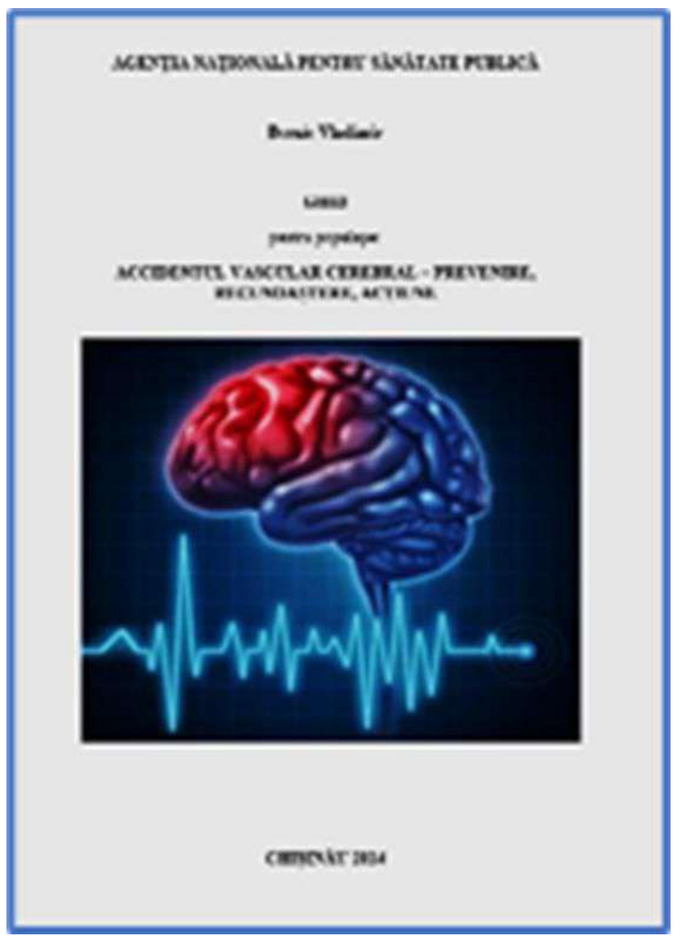
Objective: The objective of this work is to reduce the burden of stroke by educating the population, raising awareness, and promoting preventive measures and rapid intervention.

Solution: A practical, structured, and accessible tool is proposed, providing clear and easily understandable information for the public. Its content covers the main risk factors for stroke, evidence-based prevention recommendations, the correct way to recognize early symptoms, and the exact steps to follow in emergency situations.

Advatages: This work stands out for its practical nature, clear language, accessibility to the general public, and its potential impact on reducing the incidence and consequences of stroke. Presented in a simple and engaging format, the guide serves not only as an informative resource but also as a tool for fostering healthy behaviors and encouraging a prompt response to the signs of stroke.

Aim of Application: The guide is intended for the general population, local communities, and public health programs, serving as a valuable tool for education, prevention, and rapid action.

Implementation: The implementation of the guide involves its dissemination through public health networks, medical institutions, schools, community organizations, and online platforms. Additionally, it can be integrated into awareness campaigns, educational sessions, and training activities for target groups. This approach ensures wide reach and facilitates the adoption of preventive messages at the population level.



Contact: vladimir.bernic@ansp.gov.md

HEALTH STATUS OF EMPLOYEES IN MEAT PROCESSING ENTERPRISES AND PREVENTIVE MEASURES

Authors: Pînzaru Iurie – Republica Moldova, Friptuleac Grigore – Republica Moldova, Rașcu Agripina - România

The monograph **"The Health Status of Employees in Meat Processing Enterprises and Preventive Measures"** presents a new direction in occupational hygiene for employees in the meat processing industry and includes the results of the most recent research conducted by the authors and other scholars regarding the influence of multiple occupational risk factors on health status.

The authors propose a hygienic evaluation of the technological and work processes in meat processing enterprises, focusing on the characterization and assessment of the employees' health status, the functional condition of workers involved in the main stages of the technological process, as well as the characterization and hygienic assessment of occupational risk factors in the work environment of meat processing enterprises.

The authors have developed specific preventive measures for the occupational environment in this extremely important field from the perspective of hygiene and occupational medicine.

The monograph presents new models of Occupational Health Services, which are essential for the development of a new Concept of Occupational Health, as well as modern strategies and policies in the field of occupational hygiene and occupational medicine.

Iurie Pînzaru, doctor habilitat în științe medicale, conferențiar universitar, șef Secție sănătate ocupațională, siguranță chimică și toxicologie din cadrul Agenției Naționale pentru Sănătate Publică. A absolvit facultatea de Medicină Preventivă a Institutului de Stat de Medicină din Chișinău (azi Universitatea de Stat de Medicină și Farmacie „Nicolae Testemițanu") în anul 1986. În anii 2009 a susținut teza de doctor în științe medicale iar în 2023 a susținut teza de doctor habilitat în științe medicale. Este autor a peste 330 lucrări științifico-practice și metodice inclusiv 10 monografii, 20 articole în reviste ISI și în reviste recunoscute din străinătate. Este președinte al Societății Igieniștilor din Republica Moldova, redactor șef al Revistei Cronica Sănătății Publice, expert pentru reomologarea și extinderea sferei de utilizare prin procedura de recunoaștere a produselor de uz fitosanitar și fertilizanților. Este membru titular al Academiei de Științe Medicale a Moldovei „Gheorghe Țîbîrnă". A fost decorat cu medaliile Academiei de Științe a Moldovei Nicolae Milescu Spătaru și Dmitrie Cantemir, ordinul Gloria Muncii.

Profesorul universitar **Grigore Friptuleac** s-a născut în comuna Scumpia, raionul Fălești, în anul 1943, într-o familie de țărani. Este doctor habilitat în științe medicale, profesor universitar la Disciplina de Igienă a Universității de Stat de Medicină și Farmacie „Nicolae Testemițanu". În anul 1970 a absolvit facultatea de Medicină Preventivă a Institutului de Stat de Medicină din Chișinău. În anii 1979 a susținut teza de doctor în științe medicale iar în 2001 a susținut teza de doctor habilitat în științe medicale, din anul 2004 deține titlul de profesor universitar. A trecut toate treptele funcțiilor didactice – asistent, lector superior, conferențiar, profesor universitar. În anii 1995–1999 a fost decan al facultății de Medicină Preventivă. În perioada 1999–2016 a deținut funcția de șef catedră igienă a USMF „Nicolae Testemițanu". A pregătit 11 doctori și 2 doctori habilitați în științe medicale. A publicat peste 500 de lucrări științifico-practice și metodice inclusiv 9 monografii și 12 manuale, 14 ghiduri practice, 10 articole în reviste ISI. Concomitent, cu activitatea didactică, conlucrează cu structurile științifico-practice ale Serviciului de Supraveghere de Stat a Sănătății Publice. Din 1993, timp de 25 de ani, prin cumul, a deținut funcția de șef al laboratorului științific Igiena mediului și habitatului uman al Centrului Național de Sănătate Publică. Este Om Emerit, cavaler al ordinului Gloria Muncii, a fost decorat cu medaliile Academiei de Științe a Moldovei Nicolae Milescu Spătaru și Dmitrie Cantemir. Este membru titular al Academiei de Științe Medicale a Moldovei „Gheorghe Țîbîrnă".

Agripina Rașcu, doctor în științe medicale, profesor universitar, este șefa disciplinei de Medicina Muncii a Universității de Medicină și Farmacie "Carol Davila", București, România, medic primar medicina muncii în Secția clinică de Medicină Muncii a Spitalului Clinic "Colentina" din mun. București.

În anul 1983 a absolvit facultatea de Medicină Generală a Institutului de Medicină și Farmacie din București. Este doctor în medicină din anul 2003.

Este autor/coordonator la 3 monografii, și coautor la 2 capitole din monografii publicate în edituri internaționale, autor/coautor în 7 capitole publicate în tratate și 24 capitole publicate în cărți apărute în edituri naționale. Deasemeni a publicat 33 de articole în reviste indexate ISI și are un indici Hirsch de 10.

Deține funcția de vicepreședinte a Societății Romane de Medicina Muncii, redactor șef al *Romanian Journal of Occupational Medicine.*

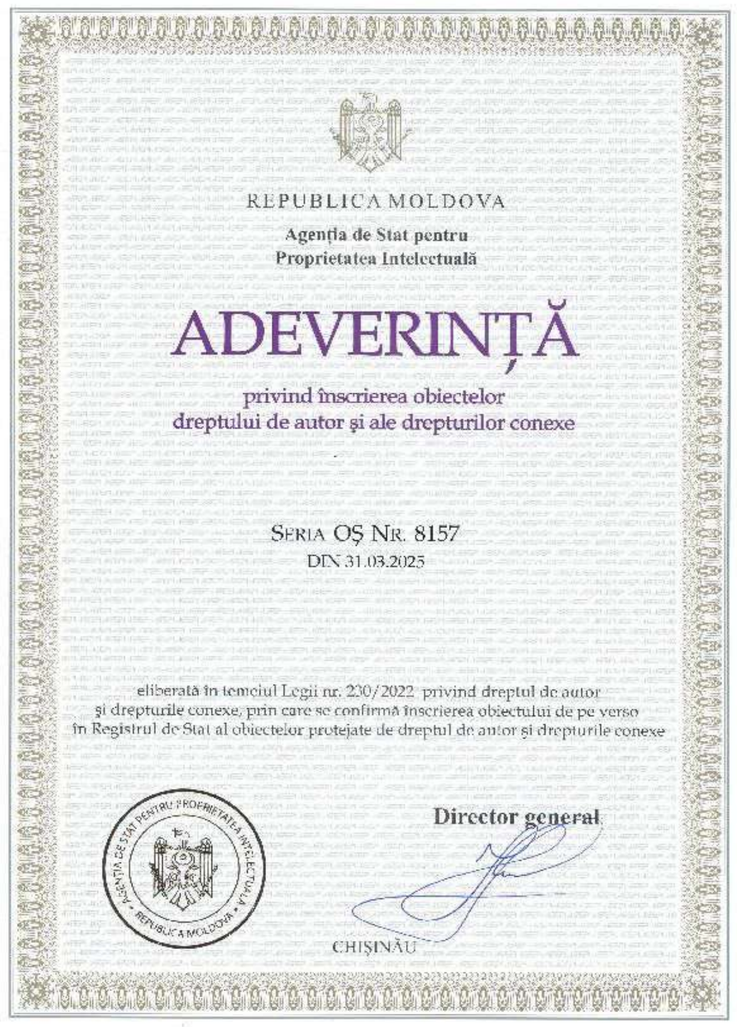
STAREA DE SĂNĂTATE A ANGAJAȚILOR ÎNTREPRINDERILOR DE PROCESARE A CĂRNII ȘI MĂSURILE DE PROFILAXIE

AGENȚIA NAȚIONALĂ PENTRU SĂNĂTATE PUBLICĂ
UNIVERSITATEA DE STAT DE MEDICINĂ ȘI FARMACIE „NICOLAE TESTEMIȚANU"
UNIVERSITATEA DE STAT DE MEDICINĂ ȘI FARMACIE „CAROL DAVILA"

Iurie Pînzaru
Grigore Friptuleac
Agripina Rașcu

STAREA DE SĂNĂTATE A ANGAJAȚILOR ÎNTREPRINDERILOR DE PROCESARE A CĂRNII ȘI MĂSURILE DE PROFILAXIE

CHIȘINĂU, 2024



REPUBLICA MOLDOVA
Agenția de Stat pentru
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ADEVERINȚĂ

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SERIA OȘ NR. 8157
DIN 31.03.2025

eliberată în temeiul Legii nr. 230/2022 privind dreptul de autor
și drepturile conexe, prin care se confirmă înscrierea obiectului de pe verso
în Registrul de Stat al obiectelor protejate de dreptul de autor și drepturile conexe

Director general

CHIȘINĂU

Contact: iurie.pinzaru@ansp.gov.md

Monitoring of exposure to ionizing radiation of professionally exposed personnel and the public with the development of radioprotection measures

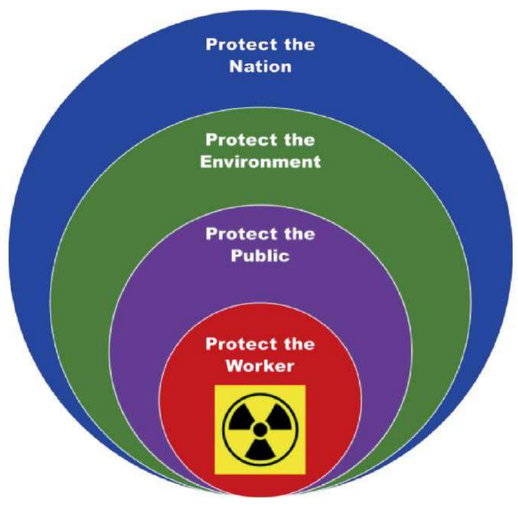
Project number: Institutional subprogram 1301.02

Coreţchi Liuba, Bogdan Marina, Overcenco Ala, Apostol Ion, Capaţîna Angela, Ababii Aurelia, Şargu Valentin, Romanciuc Parascovia

The purpose of the study in the framework of the subprogram in the framework of the National Agency for Public Health (NAPH) research program is to assess the health status of those professionally exposed and the public to ionizing radiation, with the development of measures to control/reduce radiation risk to health at workplaces in the Republic of Moldova.

Project objectives:

- Assessment of the health status of those professionally exposed to ionizing radiation, involved in radiological diagnostic practices/TRI/radiological interventions, including through oncological diseases.
- Assessment of individual doses of those professionally exposed to ionizing radiation.
- Detection of medical-biological effects (immunological/genetic-molecular) in those professionally exposed to ionizing radiation.
- Characteristics of the distribution of radon concentrations in the air of homes and educational institutions in the main geographical areas of the country: North, Center and South.
- Risk assessment and descriptive analysis of the results of exposure to natural radiation, caused by radon in the air of homes and public buildings, with the establishment of exposure doses of the population and children, in relation to physical factors indoors and outdoors under the conditions of regional climate change.
- Elaboration of radiation protection measures and risk control to which medical personnel in the radiological field (and the population) are exposed with proposals for the development of a Register of personnel professionally exposed to ionizing radiation jointly with specialists from National Agency for Regulation of Nuclear and Radiological Activities and Institute of Oncology.



State of development: The study is in progress

Contact: liuba.koretski@ansp.gov.md

National Agency for Public Health webpage:
https://ansp.md/control_radon/

FaceBook page:
https://www.facebook.com/profile.php?d=100082203806764

INTEGRATED TOOL FOR ASSESSING AND MANAGING OCCUPATIONAL RISKS FROM IONIZING RADIATION IN THE MEDICAL FIELD

ANSP

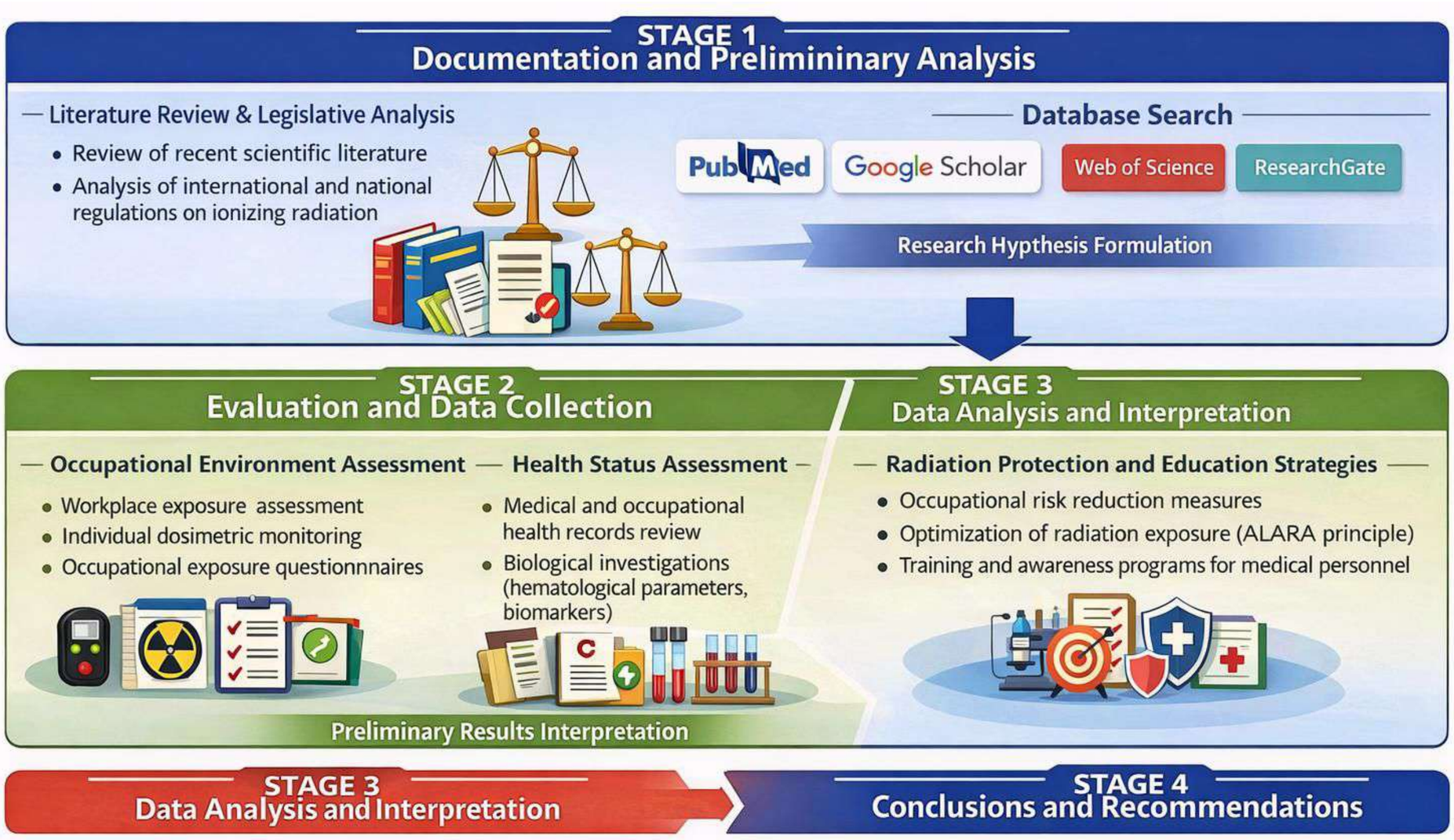
PhD research project – specialization code 331.02 Hygiene

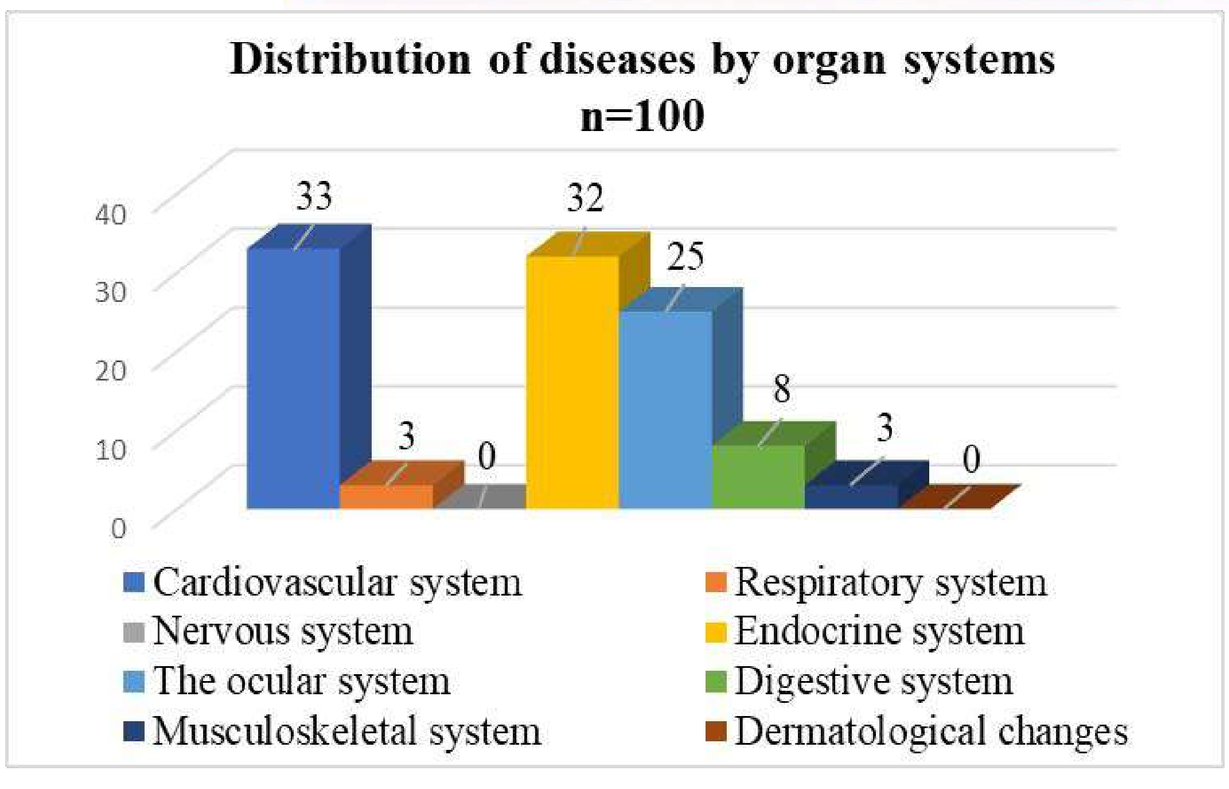
BOGDAN Marina, COREȚCHI Liuba

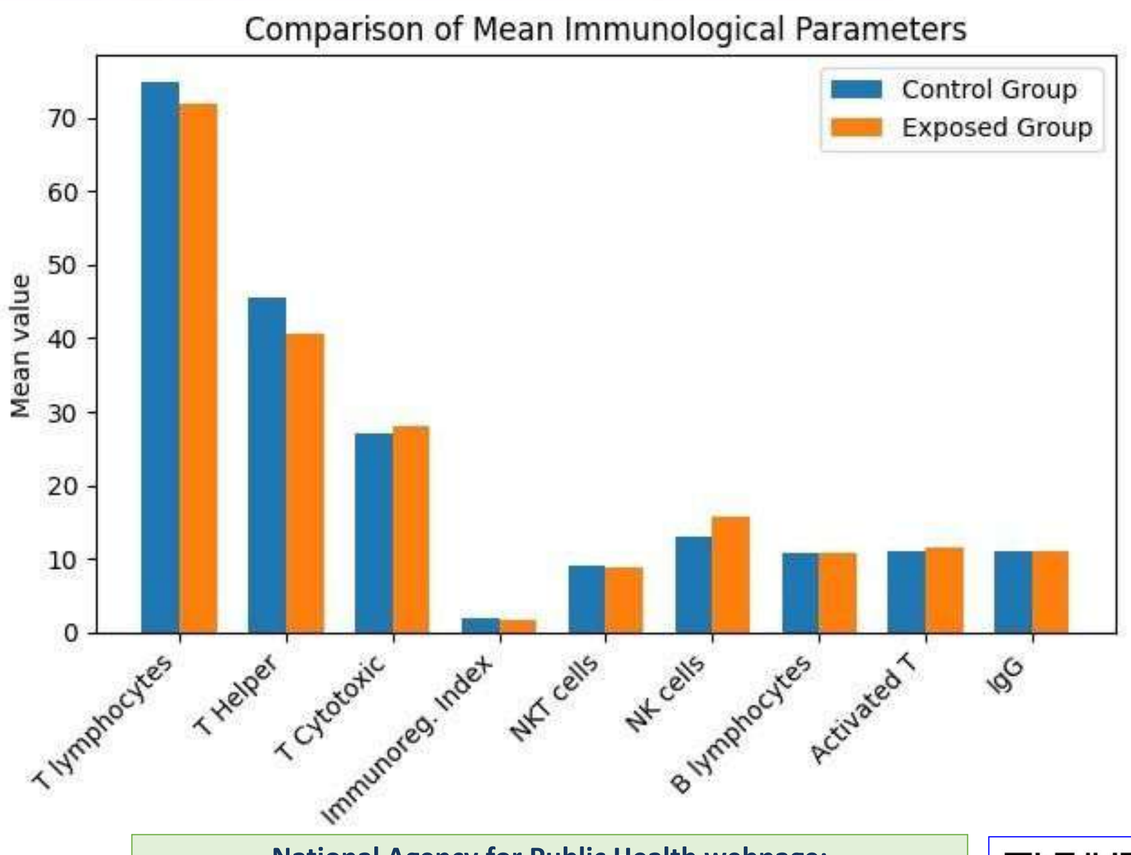
Occupational exposure to ionizing radiation poses a significant health risk to medical personnel working in fields such as radiology, nuclear medicine, and radiotherapy.

This study aims to assess and manage the health risk associated with occupational exposure to ionizing radiation among medical personnel in order to support effective radiation protection measures.

The research is in the implementation phase, with methodologies finalized and approved, and the data collection and analysis process is ongoing. **The expected results** will contribute to improving occupational health surveillance and developing a national model for radiological risk management.







Contact: liuba.koretski@ansp.gov.md

National Agency for Public Health webpage:
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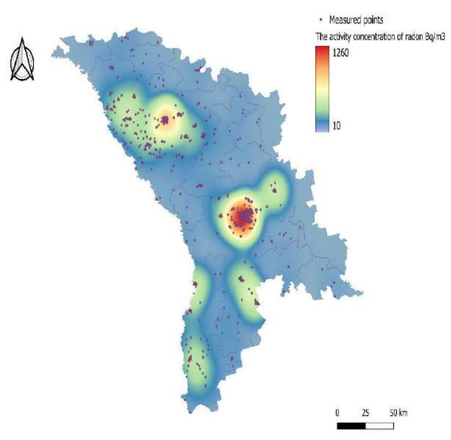
Quantification of health risk associated with radon exposure

PhD research project – specialization code 331.02 Hygiene

& bilateral Project RO MD

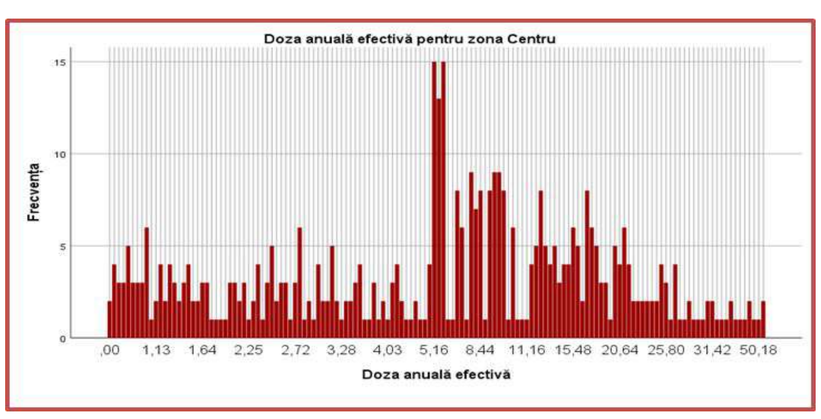
ABABII Aurelia, COREȚCHI Liuba, RADALESCU Ileana

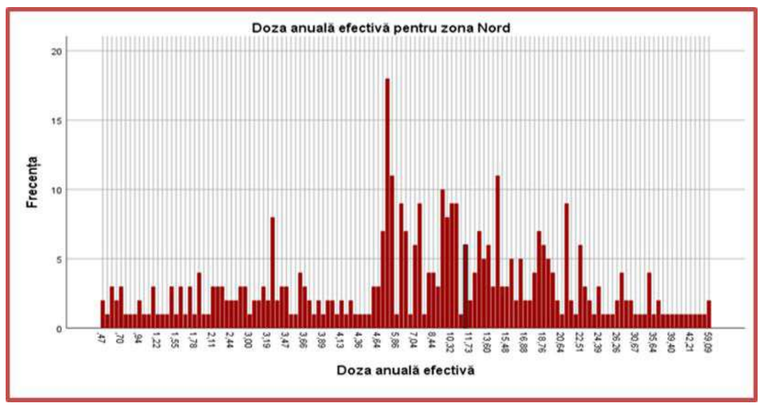


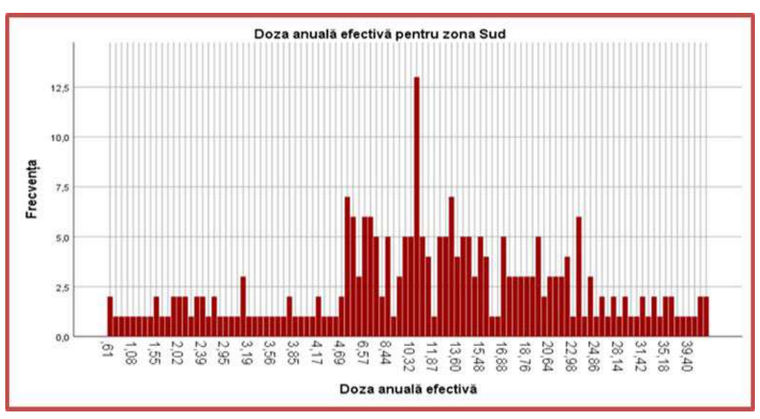
Radon represents the most important source of natural radiation of the population, whose harmful effect has a cumulative character and synergism with other risk factors such as tobacco consumption. In the Republic of Moldova, based on a study measuring the radon concentration in a sample of 1,100 homes using RADTRAK2 passive detectors, the population exposure doses to radon were calculated. Following the statistical processing of the collected data, the following results were obtained for a uniform distribution of the data, thus maximum values of 1160 Bq/m3 are recorded for the Center area, 1260 Bq/m3 for the North area and 950 Bq/m3 for the area north. South. The average concentration of radon in the indoor air is 211.67 Bq/m3; 240.55 Bq/m3 and 285.57 Bq/m3 for the Center, North and South. The share of homes that exceeded the reference level of radon (300 Bq/m3) constituted 25.3% for the Center area, 31.06 North and 38.58% - South.

This study aims to assess and manage the populations health risk associated with exposure to radon in order to support effective radiation protection measures.

The research is in the implementation phase, with methodologies finalized and approved, and the data collection and analysis process is ongoing.



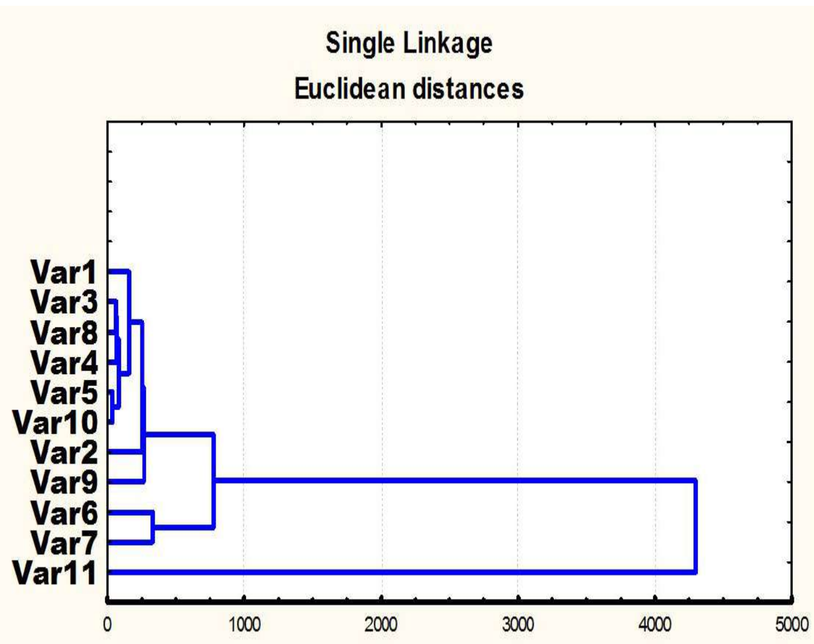


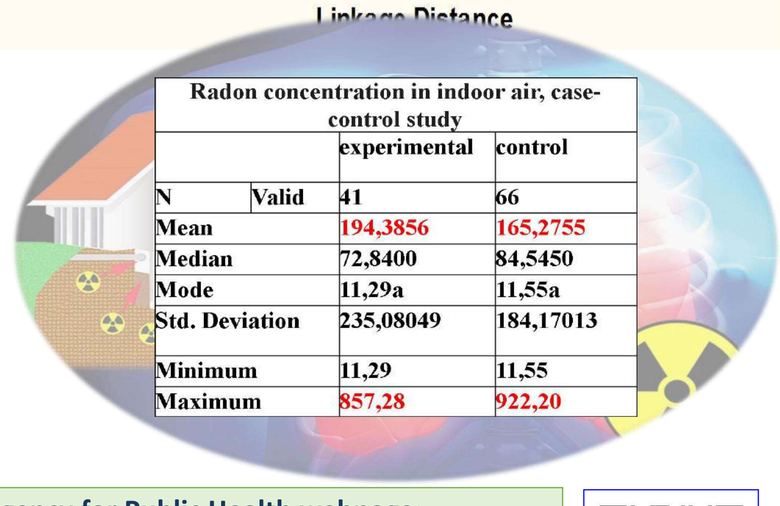


Studying the dependence of radon concentration on the abiotic factors of the environment of the existence of a close correlation link with the formation of the cluster with the large Euclidean distance, and the linkage distance constituting 4250 for the radon concentration and the maximum air temperature and the soil surface temperature.

At the same time, the case-control study on the influence of radon on the occurrence of lung cancer revealed the following concentrations for the experimental group, the average value of the concentration of radon in the indoor air of 194.3 Bq/m3, and the maximum value 857.2 Bq/m3, value. average recorded for the control lot is 165.2 Bq/m3, and the maximum value 922.2 Bq/m3.

The fundamental study through cluster analyzes of the "radon x smoking" interaction influence detected significant interactions between the





Radon concentration in indoor air, case-control study			
		experimental	control
N	Valid	41	66
Mean		194,3856	165,2755
Median		72,8400	84,5450
Mode		11,29a	11,55a
Std. Deviation		235,08049	184,17013
Minimum		11,29	11,55
Maximum		857,28	922,20

Contact: liuba.koretski@ansp.gov.md

National Agency for Public Health webpage:
https://ansp.md/control_radon/

FaceBook page:
https://www.facebook.com/profile.php?d=100082203806764

Informational Brochure

“Best Practices in Genomic Sequencing”

Project number: Project number: 130103. Institutional subprogram „Antimicrobial resistance surveillance in human biosubstrates and environmental components based on metagenomic technology” Strategic priority: Health

Author/s: Olga Burduniuc, Elena Chesov, Svetlana Colac, Stela Racoviță, Veronica Burlac, Valeria Ceban, Svetlana Ivanova.

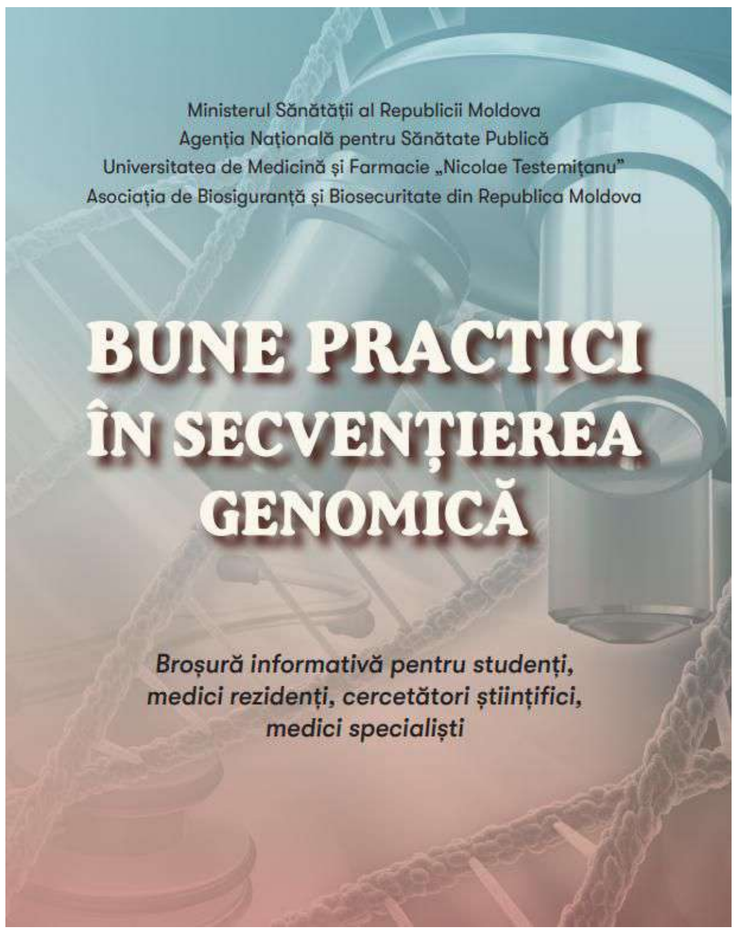
OBJECTIVE. To provide a comprehensive overview of the biological foundations and technologies underlying Next-Generation Sequencing (NGS), highlighting its applications in microbiology and genomic epidemiology, while emphasizing the importance of quality standards, biosafety, biosecurity, and good laboratory practices.

DESCRIPTION. Genomic sequencing has become an essential technology in modern diagnostics and epidemiological surveillance. Technological advancements and significant cost reductions have transformed Next-Generation Sequencing (NGS) into a practical tool for the identification of pathogens, characterization of antimicrobial resistance, diagnosis of genetic diseases, and personalization of treatment. The integration of this technology into routine laboratory practice requires adequate infrastructure, trained personnel, and strong bioinformatics capabilities.

TARGET USERS. This publication is primarily addressed to students in the fields of biology and medicine, medical residents, scientific researchers, as well as specialists involved in molecular diagnostics. Within the pages of this brochure, readers will find a clear, concise, and practical guide designed to facilitate the understanding of the principles of Next-Generation Sequencing (NGS) technology and its proper application in professional practice.

IMPLEMENTATION.

- Institute of Pneumology “Chiril Draganiuc”, Republic of Moldova, National Reference Laboratory in Tuberculosis Microbiology, Year of implementation: 2026
- Raisa Pacalo Excellence College in Medicine and Pharmacy, Republic of Moldova, Year of implementation: 2026
- Nicolae Testemițanu State University of Medicine and Pharmacy (USMF), Republic of Moldova, Year of implementation: 2026



REPUBLICA MOLDOVA

Agenția de Stat pentru Proprietatea Intelectuală

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privind înscrierea obiectelor dreptului de autor și ale drepturilor conexe

SERIA OȘ NR. 8362

DIN 09.12.2025

eliberată în temeiul Legii nr. 230/2022 privind dreptul de autor și drepturile conexe, prin care se confirmă înscrierea obiectul de pe verso în Registrul de Stat al obiectelor protejate de dreptul de autor și drepturile conexe

Director general

CHIȘINĂU

Contact: veronica.burlac@ansp.gov.md

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Project number: RS-ZIS-D-11903 and EU-EUNES-1270-P

F

Author: Dr Miodrag Nikolić

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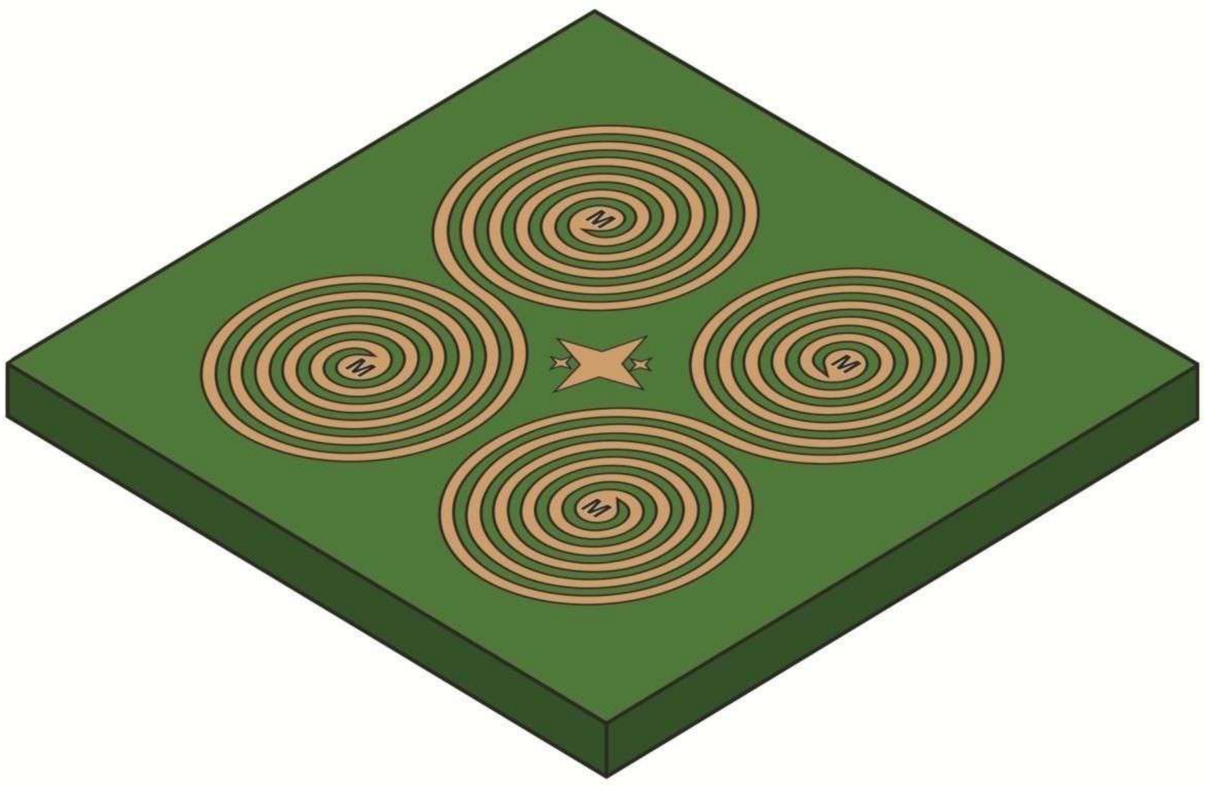

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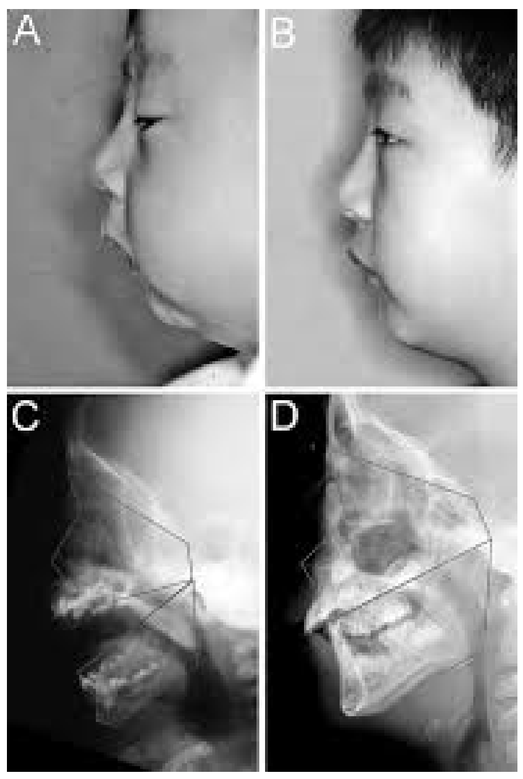
Pierre Robin Sequence:
When a Micrognathic Jaw Shapes a Lifetime

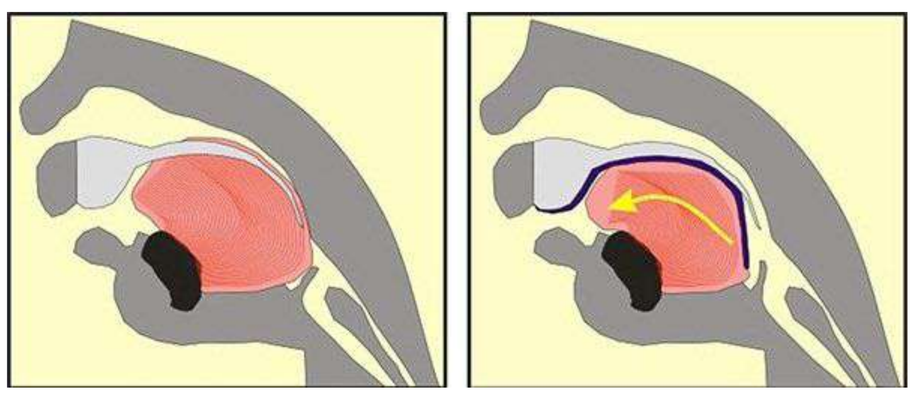
Pivniceru Julia – Denisa[1], Pop Anamaria[1]

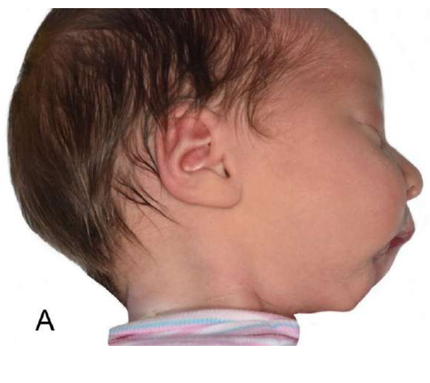
1. "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj – Napoca/ Romania

Pierre Robin Sequence (PRS) is a rare congenital craniofacial condition distinguished by the way a primary mandibular anomaly triggers a cascade of complex anatomical and functional consequences**,** affecting breathing, feeding, and craniofacial development. The characteristic triad of **mandibular micrognathia, glossoptosis**, and **upper airway obstruction**, often accompanied by **cleft palate**, transforms a localized structural defect into a multidimensional condition with life-threatening implications from the earliest days of life**.** PRS may occur in isolation or as part of broader genetic disorders, most commonly Stickler syndrome, affecting approximately 1 in 8,500–14,000 newborns.

What makes PRS particularly striking is the unique interplay between mechanical and genetic factors. Early **mandibular hypoplasia** prevents normal tongue descent, resulting in **glossoptosis** and **impaired palatal fusion**, while genetic mutations in genes such as **SOX9** and chromosomal alterations contribute to clinical variability and the presence of syndromic or non-syndromic forms. This subtle interaction between embryonic development and genetic predisposition creates a complex clinical picture with multiple therapeutic challenges**.** Oral and dental manifestations, often underrecognized, include taurodontism, dental agenesis, malocclusion, and delayed tooth eruption. These features not only complicate prognosis but also provide valuable insights for diagnosis and surgical or orthodontic treatment planning.







Management of PRS is a major clinical challenge and requires a coordinated multidisciplinary approach, combining immediate interventions to maintain airway patency and ensure adequate nutrition with long-term strategies such as cleft palate repair, monitoring of mandibular and craniofacial growth, and comprehensive dental and orthodontic rehabilitation. In severe cases, advanced techniques such as mandibular distraction osteogenesis or tracheostomy are critical for survival, while personalized interventions today allow optimization of both craniofacial and functional development.

Pierre Robin Sequence remains a striking example of a congenital condition in which a primary structural defect produces profound and complex consequences, highlighting the importance of early recognition, genetic diagnosis, and holistic management. Its clinical impact, combined with therapeutic challenges and craniofacial and dental complexity, makes PRS a reference model in neonatal and craniofacial medicine, underscoring the necessity of an integrated, patient-specific care strategy.

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From Wisdom Tooth to Brain Abscess:
Intracranial Complications of Odontogenic Infections

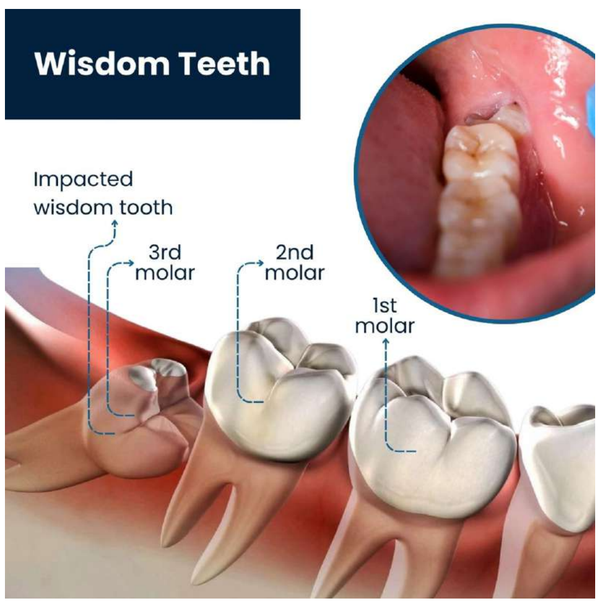
Pivniceru Julia – Denisa[1], Pop Anamaria[1]

1. "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj – Napoca/ Romania

Odontogenic infections are common complications associated with impacted or partially erupted **third molars**. Although most infections remain localized, untreated dental infections may rarely lead to severe systemic complications, including intracranial infections such as **brain abscess**. Odontogenic sources are estimated to account for approximately 3–10% of brain abscess cases, suggesting that the oral cavity may represent an underrecognized source of systemic infection.

This student review aims to examine the potential relationship between infections originating from third molars and the development of brain abscesses, using evidence from peer-reviewed medical literature. Particular attention is given to the etiology, pathophysiological mechanisms, microbiological characteristics, clinical presentation, diagnostic approach, and management strategies associated with odontogenic brain abscesses.

Infections related to third molars most commonly arise from **pericoronitis, dental caries, or periodontal disease** surrounding partially erupted wisdom teeth. Due to the anatomical proximity of mandibular molars to deep cervical fascial spaces and cranial venous structures, oral pathogens may disseminate through fascial planes, hematogenous spread, or retrograde venous transmission through valveless cranial veins. Odontogenic brain abscesses are typically polymicrobial, frequently involving anaerobic organisms such as **Streptococcus anginosus group, Fusobacterium nucleatum, and Prevotella species.**



Patients often present with symptoms that may initially mimic systemic infection, including **headache, fever, nausea, vomiting, and altered mental status**. The classic clinical triad of **headache, fever, and focal neurological deficit** may also be present. Diagnosis relies primarily on neuroimaging, particularly Computed tomography and Magnetic resonance imaging, which typically reveal ring-enhancing intracerebral lesions surrounded by vasogenic edema.

Management requires a multidisciplinary approach involving neurosurgeons, infectious disease specialists, and dental professionals. Treatment generally consists of neurosurgical drainage, prolonged intravenous antibiotic therapy targeting anaerobic and streptococcal organisms, and definitive elimination of the odontogenic source, most commonly through extraction of the infected tooth.

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Dentigerous Cyst Associated with an Impacted Third Molar: Diagnosis and Surgical Management

Pop Anamaria[1], Pivniceru Julia-Denisa[1]

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Dentigerous cyst is a developmental odontogenic cyst that forms around the crown of an **unerupted** or impacted tooth. It results from fluid accumulation between the reduced enamel epithelium and the tooth crown.Dentigerous cysts represent the second most common odontogenic cysts of the jaws, after radicular cysts. They are most frequently associated with **impacted mandibular third molars, maxillary canines, and premolars.** Although many cases are asymptomatic and discovered incidentally on radiographic examination, larger cysts may cause bone expansion, tooth displacement, or delayed eruption. Early diagnosis and appropriate surgical management are important to prevent complications and preserve oral.

The dentigerous cyst is the second most common odontogenic cyst, after the radicular cyst.

- It is most frequently observed in patients aged 10–30 years, often associated with impacted third molars or maxillary canines.

Dentigerous cysts may lead to:

- Displacement of adjacent teeth
- Root resorption of neighboring teeth
- Alveolar bone expansion, which can cause facial asymmetry in large lesions

Radiological Findings

Imaging modalities: Panoramic radiograph (OPG)

Findings:

- Well-defined unilocular radiolucency surrounding the crown of the impacted lower third molar.
- Corticated margins are present, suggesting a slow-growing, benign lesion.
- No resorption of adjacent tooth roots observed.
- CBCT (if performed) shows buccolingual expansion of the alveolar bone and its relation to nearby anatomical structures, such as the mandibular canal.

Treatment

Primary surgical approach:

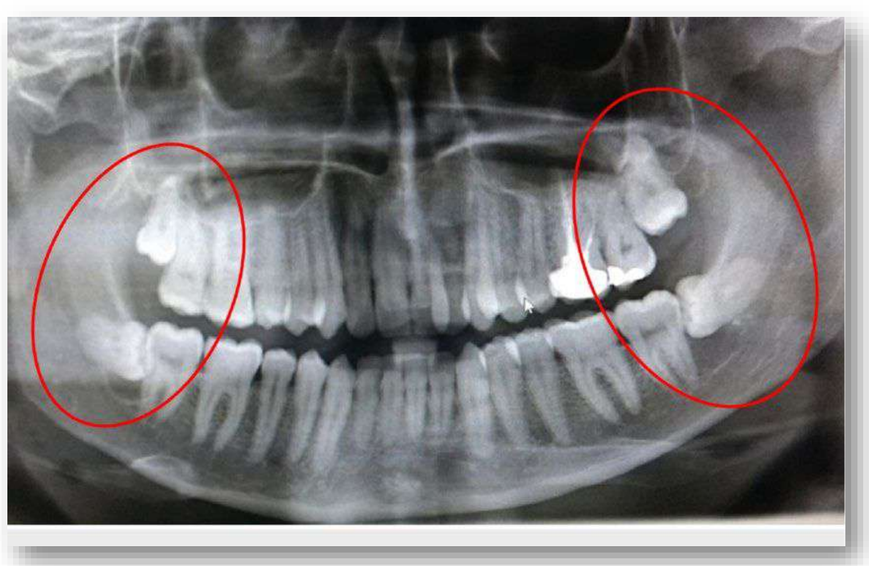
- Enucleation of the cyst along with extraction of the associated impacted tooth.
- This is the standard treatment for most dentigerous cysts to ensure complete removal and prevent recurrence.

Alternative approach:

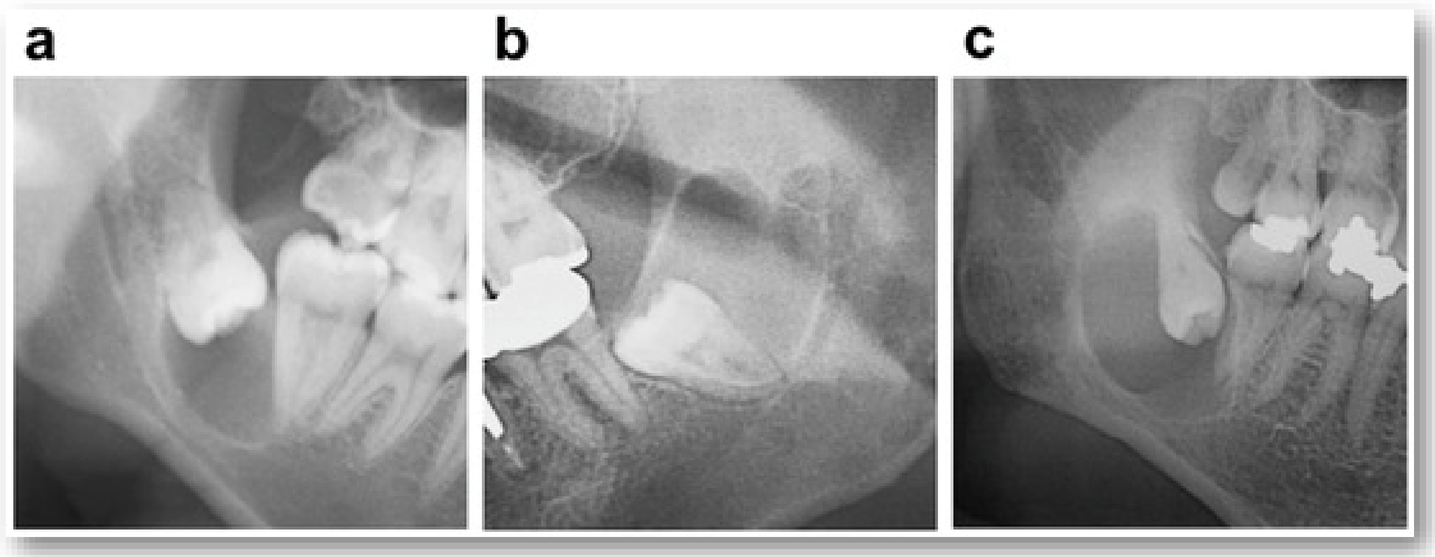
- Marsupialization may be considered for large cysts, especially in young patients, to reduce the size of the lesion before definitive surgery.

Factors influencing treatment choice:

- Size of the cyst: larger cysts may require staged procedures or marsupialization.
- Position of the impacted tooth: accessibility affects surgical planning.
- Patient's age: conservative approaches may be preferred in children or adolescents to preserve developing structures.



Panoramic radiograph showing a unilocular dentigerous cyst associated with an impacted lower third molar.



Periapical radiograph showing a unilocular dentigerous cyst associated with an impacted lower third molar.

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Eagle Syndrome: Diagnosis and Surgical Management

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Eagle syndrome is a rare clinical condition characterized by elongation of the styloid process or calcification of the stylohyoid ligament complex. The styloid process is a slender bony projection extending from the temporal bone, normally measuring approximately 20–25 mm in length. When the styloid process exceeds 30 mm, it is considered elongated and may compress nearby neurovascular structures, including the glossopharyngeal nerve, facial nerve, and carotid arteries, resulting in a variety of cervicofacial symptoms.

The syndrome was first described by Watt Weems Eagle in 1937. Because the symptoms overlap with many other head and neck disorders, the condition is often underdiagnosed or misdiagnosed.

Patients with Eagle syndrome may experience various symptoms, depending on which structures are affected.
Common symptoms include:

- Persistent pain in the throat or neck
- Difficulty swallowing (dysphagia)
- Sensation of a foreign body in the throat
- Ear pain (otalgia)
- Headache or facial pain
- Pain that worsens when turning the head, chewing, or swallowing

In some cases, symptoms may radiate to the **ear, jaw, or temporal region**.

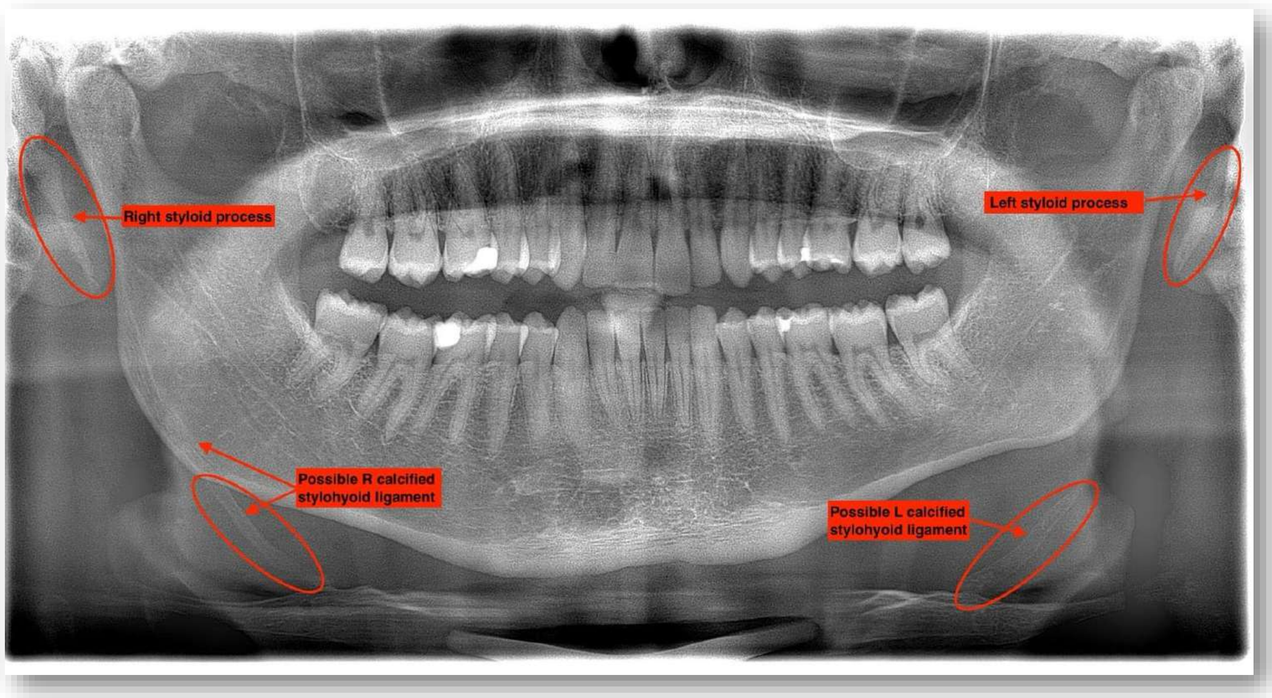
Two clinical forms have been described:

- Classic Eagle syndrome, which usually appears after tonsillectomy and causes throat pain and dysphagia.
- Carotid artery syndrome, which occurs when the elongated styloid process irritates the carotid arteries and may cause severe facial pain or headache.

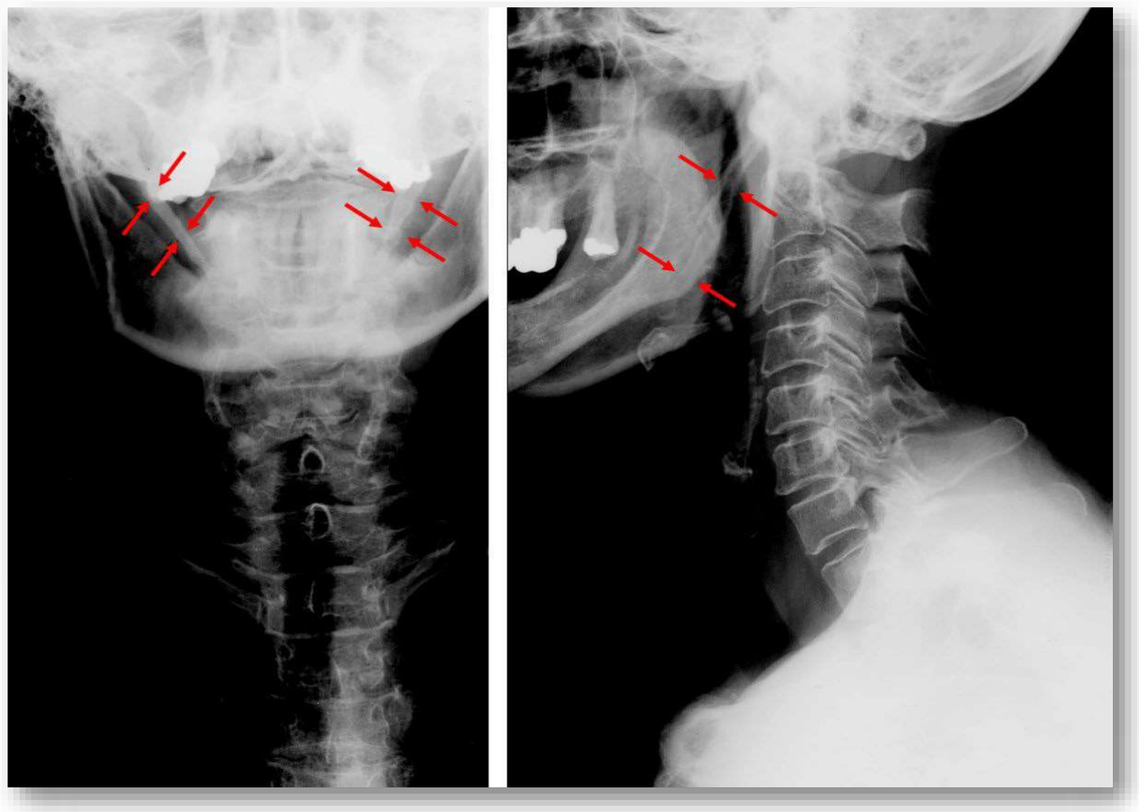
Diagnosis is based on both clinical examination and imaging studies.
During physical examination, gentle palpation of the tonsillar region may reproduce the patient's pain if the elongated styloid process is present.

Differential Diagnosis

Because the symptoms can resemble other head and neck disorders, Eagle syndrome must be differentiated from conditions such as: Temporomandibular joint disorder, Trigeminal neuralgia, Glossopharyngeal neuralgia, chronic tonsillitis, cervical spine disorders.
A careful clinical and **radiological evaluation is therefore necessary**.
Treatment depends on the severity of symptoms. Conservative management may include: analgesics, anti-inflammatory medication, local steroid injections.
However, these methods usually provide only temporary relief.
The most effective treatment is **surgical removal** of the **elongated styloid process**, a procedure known as styloidectomy



Radiograph showing elongated styloid process



Calcified stylohyoid ligament visible on imaging

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MEDICAL ROD FOR FRACTURE STABILISATION AND MONITORING USING ULTRASOUND

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Coordinator: Professor Aurel Mihail TITU

Scientific Research Project

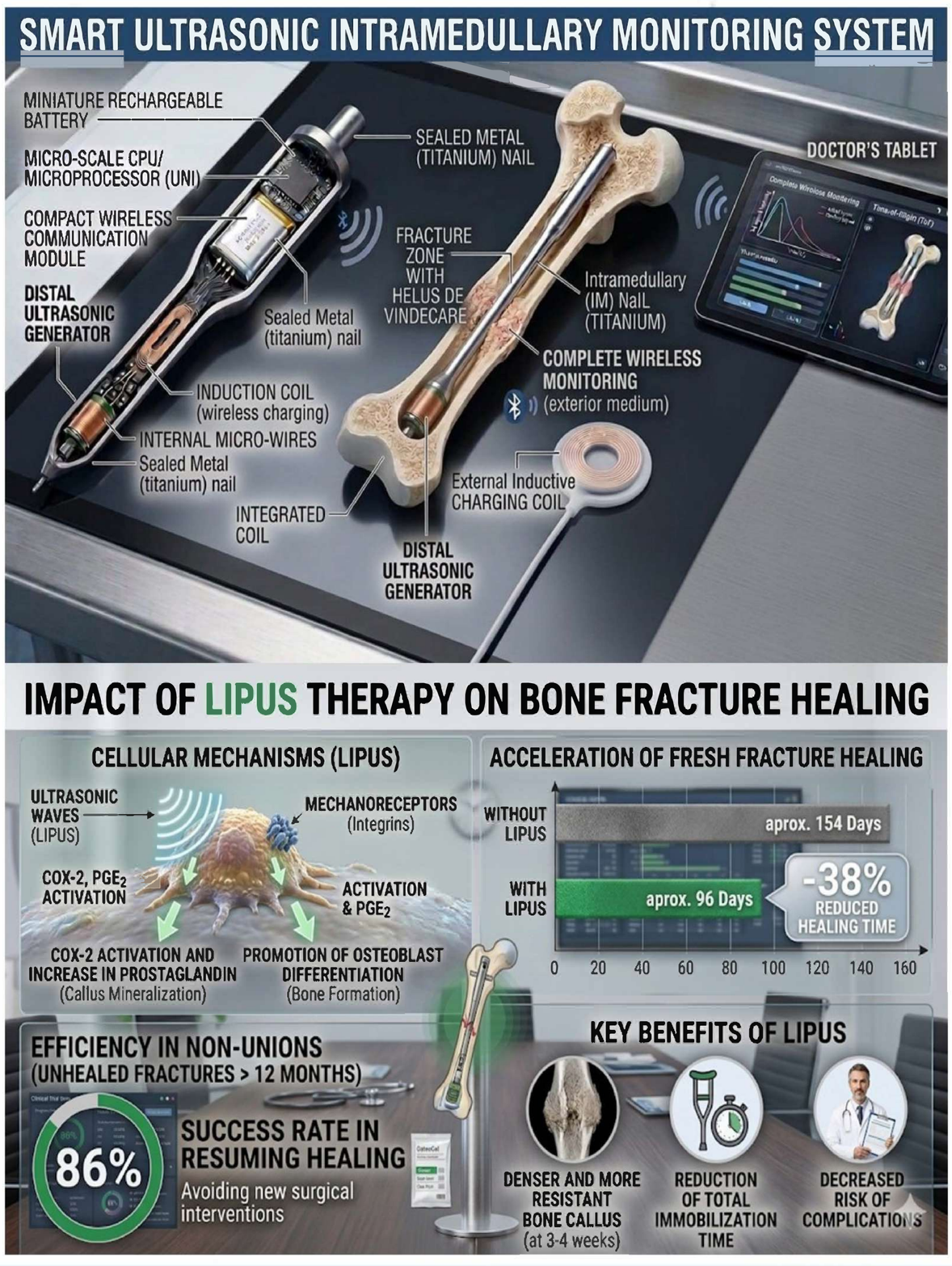
DESCRIPTION

Intramedullary rod is an orthopedic implant designed to stabilise long bones fractures. The rod is inserted into the medullary canal of the bone to keep bone fragments aligned during healing process. The invention consists of a rod incorporated with **sensors and ultrasonic transducers** integrated at both ends of the implant. The system enables **the transmission and reception of ultrasonic waves through the bone** in order to supervise the fracture consolidation process.

The operating principle is based on integrating an **ultrasound generator at one of the rod** and an **ultrasound receiver at the other end**. The generator produces ultrasonic signals that passes through the fractured bone and the implant material. The receiver detects these signals and measures the **time of flight** of ultrasound waves between transmitter and reciever. Time of flight is an essential information which reflects **mechanical and structural properties** of the affected area in the bone. As the bone heals and mineralises, the way ultrasound propagates through the bone tissue is changing. Thus, measuring variations of this parameter in time, the system can provide an objective assessement of the current state of bone healing process, thereby identifying potential complications (e.g. delayed fracture consolidation) and can aid clinical decision-making while avoiding frequent radiation exposure.

Steps

1. **Ultrasound emission** – An ultrasonic transducer integrated at the distal end of the intramedullary rod converts the electrical signal into ultrasonic waves. These waves represent high-frequency mechanical vibrations capable of propagating through biological tissues and bone structure.
2. **Wave propagation through bone** – The ultrasonic waves propagate through the bone and across the fracture site. The propagation velocity and transmission characteristics depend on bone density and microstructural properties, as ultrasonic waves travel differently through intact bone, fractured bone, and bone undergoing the healing process.
3. **Ultrasonic signal reception** – At the opposite end of the rod, an ultrasonic receiver detects the waves transmitted through the bone. The receiver converts the mechanical vibrations back into electrical signals for further processing and analysis.
4. **Time of flight calculation** – The electronic system measures the time required for the ultrasonic wave to travel from the emitter to the receiver. This parameter correlates with bone status and the degree of callus formation during fracture healing.
5. **Data interpretation** – The acquired data are analyzed to evaluate the progression of the healing process.



ADVANTAGES

1. Absence of ionizing radiation
Ultrasound does not employ ionizing radiation—unlike conventional radiography or computed tomography (CT). Consequently, it can be used repeatedly without exposing the patient to radiation-related risks, making it suitable for frequent monitoring and safe for vulnerable populations such as pediatric patients and pregnant women.

2. Non-invasive and safe
Ultrasonography is a non-invasive diagnostic modality that does not require traumatic procedures or invasive instrumentation. The examination is generally well tolerated, comfortable for the patient, and can be repeated multiple times without known adverse biological effects.

3. Accessible and rapid
Ultrasound devices are typically more compact and cost-effective than magnetic resonance imaging (MRI) or CT systems. This facilitates broader clinical accessibility, allowing their use in hospitals, outpatient clinics, and even resource-limited or rural healthcare settings.

4. Real-time assessment
Ultrasonography provides real-time imaging and quantitative data regarding bone structure and fracture healing progression. This immediate feedback enables clinicians to make prompt clinical decisions without waiting for delayed image processing or interpretation.

5. Continuous monitoring
Unlike radiographic examinations, which are usually performed at relatively long intervals (e.g., every 6–8 weeks), ultrasound can monitor fracture healing from very early stages. It is capable of detecting early callus formation within the first two weeks after injury, allowing earlier and more detailed assessment of the healing process.

6. Early detection of complications
Ultrasound may reveal early alterations in soft tissue and developing bone callus earlier than conventional radiography. This facilitates the early identification of complications such as delayed union or insufficient callus formation.

APPLICATIONS

- **Orthopedics and Traumatology**
  Management and stabilization of long-bone fractures, including those involving the femur, tibia, and humerus.
- **Monitoring of bone healing**
  Ultrasonography can identify early callus formation and assess the progression of fracture consolidation during the healing process.
- **Sports medicine**
  Evaluation of skeletal recovery in athletes following fractures or bone-related traumatic injuries.
- **Physical and rehabilitation medicine**
  Monitoring the progression of bone healing throughout treatment and during the rehabilitation phase.
- **Modern orthopedic surgery**
  Development of smart orthopedic implants capable of real-time monitoring of bone status and fracture healing.
- **Biomedical research**
  Investigations focused on bone regeneration and the development of advanced technologies for monitoring fracture healing.

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MOBILE STRETCHER WITH AUTOMATIC MECHANICAL BRAKING SYSTEM FOR INCLINED SURFACES

Authors: Catalin GRUMAZESCU, Bianca Cassiana GRADINARU

Coordinator: Professor Aurel Mihail TITU

Scientific Research Project

DESCRIPTION

The invention consists of a medical stretcher equipped with an integrated mechanical system designed for automatic braking, created with the purpose of reducing the negative health effects and the stressful effects of uncontrolled acceleration during transport on ramps. Based on its facilities, the system allows at certain times the automatic interruption of gravitational movement when a critical inclination is detected, by controlled interposing of certain short time sequences in which the motion is subjected to braking effects. These sequences physically and by means of stabilization compensate the cumulative effects of gravitational acceleration that could otherwise lead to spinal damage or accidents during prolonged or steep descents. According to the invention, the stretcher consists as shown in figure 1 and figure 2 of an ergonomic assembly 1 with a layout for transporting a person seated or lying down, which is additionally equipped with a sub-assembly 3 for independent gravitational detection. The system features an assembly 4 with folding levers to engage the braking action on the wheels 5, a control panel for operating the working sequences, and an electronic module 5 created around a micro-controller to create the automatic and programmable working sequences of the braking phase. Furthermore, the assembly includes a safety sub-assembly 2 with belts to stabilize the torso of the human body 7, ensuring that the patient remains securely partially suspended or fixed during the active phase of action. This is the active and intended phase of action which uses gravitational force to ensure the safety of the human body 7 by preventing the stretcher from sliding or accelerating on the ramp 6. After the period allocated for the stabilization and safe passage of the incline, the braking assembly is brought back to the resting position by electric or mechanical command, as in figure 1, being lifted or released to allow the human body to be transported in a normal in a normal position under its lower back as in any standard movement on flat surfaces.

Fig.1

Fig.2

Fig. 4

ADVANTAGES

- the stress of working on ramps is significantly reduced by automatic braking.
- productivity is enhanced by the efficiency of the stabilization effects.
- -maintaining the health of workers by reducing physical strain on inclines.
- -recovering and protecting the safety of patients during transport

Fig. 3

APPLICATIONS

The system may be added to stretchers currently being manufactured, providing an immediate safety upgrade without requiring radical structural changes.

The mechanism may become a core part of new types of high-performance stretchers, specifically engineered to optimize automatic braking on inclined surfaces.

A third application is the all-terrain mobile stretcher destined for emergency maneuvers in varied environments and not exclusively for hospital corridors, ensuring patient safety in any transport condition.

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HEARTBEAT MONITORING DEVICE

Authors: Paul Gheorghe ISTRATE, Marius Ioan MUREȘAN, Robert Adrian CIUCIU, Tudor Andrei SUMULENCIU, Andrada Maria IANC

Coordinator: Professor TITU Aurel Mihail

Scientific Research Project

Description

The Heartbeat Monitoring Device is an advanced non-invasive cardiac monitoring system, integrated directly into the steering wheel of the vehicle. It uses state-of-the-art sensors to detect heartbeat, heart rate and through complex algorithms, can estimate blood pressure variations and the risk of major cardiovascular events, such as myocardial infarction, in real time while driving. The system was designed to increase road safety by early detection of severe heart problems while driving. The main goal is to prevent accidents caused by the driver's sudden incapacity for medical reasons by providing early warning and actively intervening in critical situations. It also offers drivers a discreet way to monitor their heart health during their daily commute.

Sensor location:

The sensors are subtly integrated on the sides of the steering wheel, in areas where the driver naturally holds their hands (positions "9 and 3" or "10 and 2"). This ensures constant contact and accurate measurement, without interfering with the driving experience. The sensors can be optical or use technologies based on pressure and conductivity sensors, depending on the generation of the device.

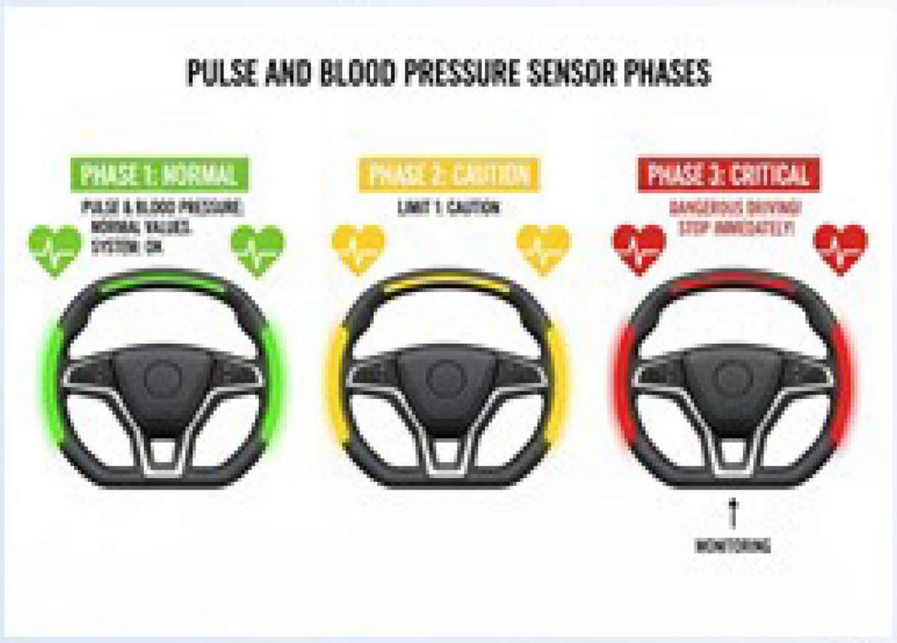
How it shows the status

The steering wheel-mounted display uses an intuitive color system:

Green (Normal): Indicates that the monitored cardiac parameters are within normal limits. You can concentrate on the road with confidence.

Yellow (Caution): Appears when the system detects a slight deviation from normal, such as an increased heart rate or blood pressure variations that require attention. It is a signal to adopt a more relaxed driving style, breathe deeply or consider a short break.

Red (Critical): If the pulse exceeds a set critical limit or signs of a heart attack are detected, the display quickly changes to a flashing red, accompanied by a loud audible warning and the clear text message: "EMERGENCY STOP! MAJOR RISK!". At this point, the automatic controlled stop procedures are activated instantly.



Advantages

Accident Prevention: By detecting the imminent risk of a heart attack or dangerous increases in blood pressure, the system can trigger safety procedures to stop the car in a controlled manner, preventing collisions.

Early Warning: Gives you valuable time to pull over, call for help or take medical action before the situation becomes critical.

Passive Monitoring: Monitors your heart constantly, without the need for additional wearable devices, giving you an overview of your cardiac health while driving.

Life Saving: In the event of a critical event, the system automatically initiates emergency procedures, including calling emergency services (112), which can make the difference between life and death.â

Aplications

Traffic Stress Management: The device can be used to monitor the driver's stress level in urban traffic conditions. If sensors on the sides of the steering wheel detect low heart rate variability, the car's computer can automatically suggest changing the music to relaxing music.

Monitoring Fatigue and Alertness Extreme fatigue is often reflected in changes in pulse rate before the eyes close.

Telemedicine Integration (Digital Medical Record): Since data such as name, age, and address are entered by the user, the device can become a node for collecting medical data.

Parental Controls for Novice or Elderly Drivers: The device can be set to send notifications to family members.

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OCCUPATIONAL HEALTH AND SAFETY STUDY FOR THE WORK ENVIRONMENT OF AN EQUIPMENT DISTRIBUTION OPERATOR

Oana Roxana CHIVU, Augustin SEMENESCU, Andrei Ștefan IACOB, Claudia BORDA, Mădălina Giulia BOBOCEA, Marilena GHEORGHE, Dan Florin NIȚOI

SCIENTIFIC RESEARCH PROJECT

The study presents the occupational risks within SC AC BONT TOOLS SRL, a company specialized in the distribution of industrial equipment.
The main hazards associated with the activity are identified, such as handling heavy equipment, ergonomic risks, exposure to chemicals and transport safety.
Solutions are proposed for the findings, creating work safety, highlighting the importance of periodic training, equipment modernization and optimization.

ADVANTAGES OF THE PROPOSED STUDY

- IDENTIFICATION AND REDUCTIONMOF OCCUPATIONAL RISKS
- OPTIMIZATION OF WORK PROCESSES
- IMPROVEMENT OF LEGAL COMPLIANCE
- INCREASE IN EMPLOYEE SATISFACTION AND PRODUCTIVITY

CONTACT

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DEVELOPMENT OF A HYBRID 3D DYNAMIC SCANNING SYSTEM FOR GAIT AND POSTURE ANALYSIS

Authors: Robert Adrian CIUCIU, Marius Ioan MURESAN, Paul Gheorghe ISTRATE, Tudor Andrei SUMULENCIU, Andrada Maria IANC.

Coordinator: Professor Aurel Mihail TITU

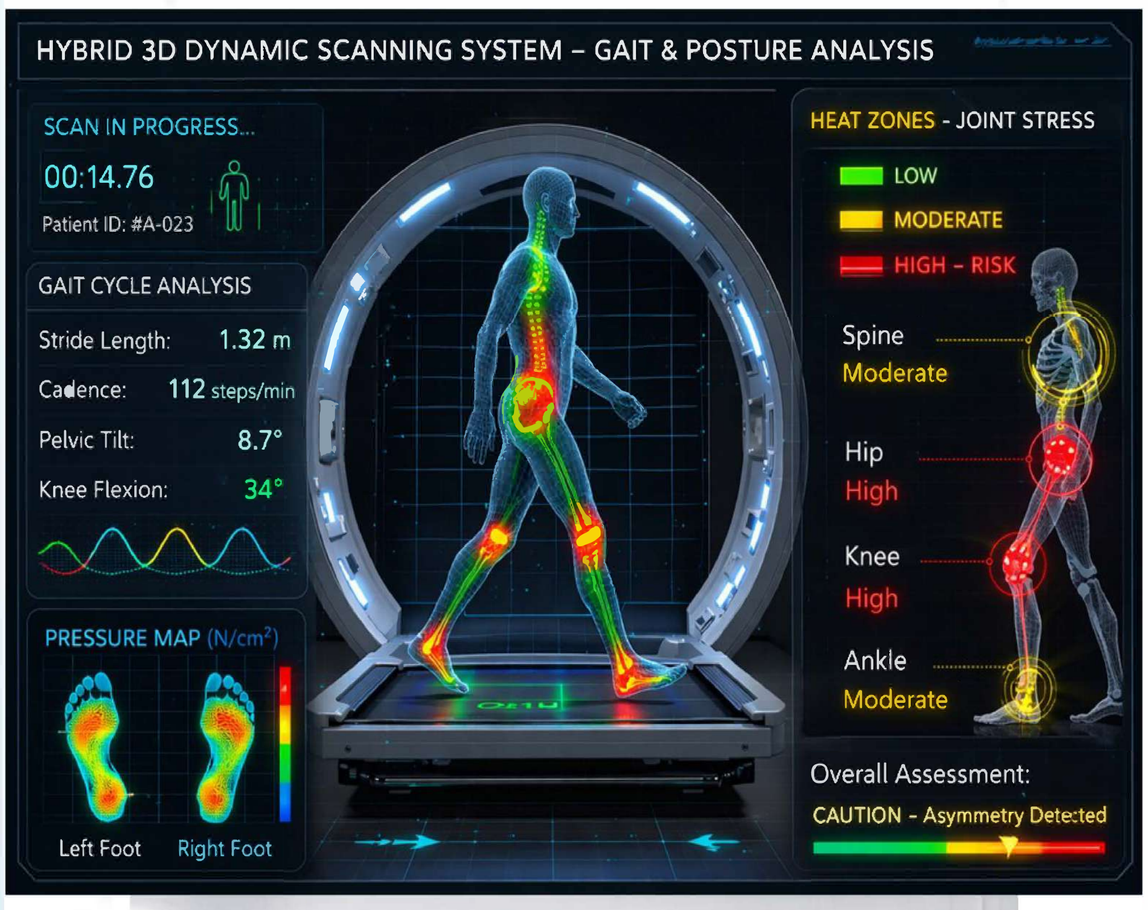
Scientific Research Project

DESCRIPTION

The Hybrid 3D Dynamic Scanning System represents a sophisticated biomechanical diagnostic platform designed to capture a "4D Digital Twin" by merging a high-precision motorized treadmill with a continuously rotating annular gantry. Unlike traditional static imaging modalities like CT or MRI that require patients to remain motionless, this system is explicitly designed to capture volumetric surface geometry and kinematic behavior during functional movement. It utilizes a multimodal sensor fusion of LIDAR for sub-millimeter geometric accuracy and high-speed stereophotogrammetry for rich surface textures and RGB color mapping. By employing an annular scan geometry, the device achieves continuous 360-degree topographical mapping, which effectively eliminates the optical shadows and occlusions that typically plague fixed-camera setups where swinging limbs often obscure key anatomical markers.

The core acquisition mechanism relies on phase-shifted fringe projection, a technique analogous to those described in patent CN112571426A, where mathematically precise sinusoidal patterns are projected onto the subject. These distorted patterns are captured by high-speed cameras and translated into dense Cartesian 3D spatial coordinates using mathematical phase-unwrapping algorithms. To ensure clinical validity, the system accounts for complex helical acquisition paths and employs absolute microsecond time-stamping within a unified middleware framework like the Robot Operating System (ROS) to eliminate motion artifacts and "ghosting" in the point cloud.

Furthermore, the software utilizes advanced machine learning for an automated Anatomical Landmark Marking System, identifying bony structures such as the lateral malleolus or acromion process through voxel density analysis without the need for physical markers. The data processing pipeline also rigorously compensates for Soft Tissue Artifacts (STA)—the deformation of skin and fascia over bone—by applying rigid joint motion constraints to calculate the most mathematically probable trajectory of the underlying skeletal structure.



ADVANTAGES

The primary advantage of this hybrid system is its ability to provide objective precision, replacing the subjective human error and poor repeatability associated with manual marker placement or "eyeballing" joint angles. Because the platform is non-invasive and markerless, it captures the patient's natural and uninhibited gait, ensuring that the resulting data is a true reflection of real-world biomechanics. The rotating gantry provides a unique technological whitespace by maintaining a continuous line of sight, solving the critical issue of swing-foot occlusion where one limb obscures the other during movement.

Safety and reliability are reinforced through advanced mechanical engineering, including the use of high-performance elastomeric isolators, such as Sorbothane, which achieve up to 99% vibration reduction to prevent foot-strike impacts from blurring the optical data. Additionally, the system prioritizes patient security through a fail-safe closed braking architecture that triggers automatically if the software detects a sudden collapse in the patient's Center of Mass (CoM). A mandatory manual safety override lever allows for absolute mechanical decoupling, ensuring the gantry can be rotated by hand to evacuate a patient even during total power or software failure.

To ensure long-term operational integrity, the system incorporates physical mechanical wear indicators rather than relying solely on digital sensors that can fail silently. These indicators, consisting of spring-steel tabs, provide a distinct and infallible acoustic warning (squealing or chirping) when emergency brake pads reach a critical minimum thickness. This facilitates the predictive maintenance of the equipment, ensuring service is performed before a catastrophic braking failure occurs.

APPLICATIONS

The 4D Digital Twin allows for the dynamic measurement of pelvic tilt and knee flexion to predict spinal disorders and osteoarthritis long before structural failure occurs. In geriatrics, the system serves as a critical tool for fall prevention by accurately quantifying "foot clearance" and identifying the threshold of neuromuscular fatigue that increases tripping risks. By integrating the "Skeleton Systems" parameterized modeling method, the scanner executes inverse dynamics to calculate internal joint torques and specific muscle activations.Elite sports science utilizes this data to isolate microscopic "energy leaks" in the kinetic chain, optimizing stride patterns while preventing stress fractures. The system is also applicable to ergonomic workstation design, identifying biomechanical stressors caused by repetitive lifting or prolonged standing. Results are distilled through an intuitive Tri-stage Color-Coded Interface—Green, Yellow, and Red—providing clinicians with an instantaneous visual triage of pathological deviations.

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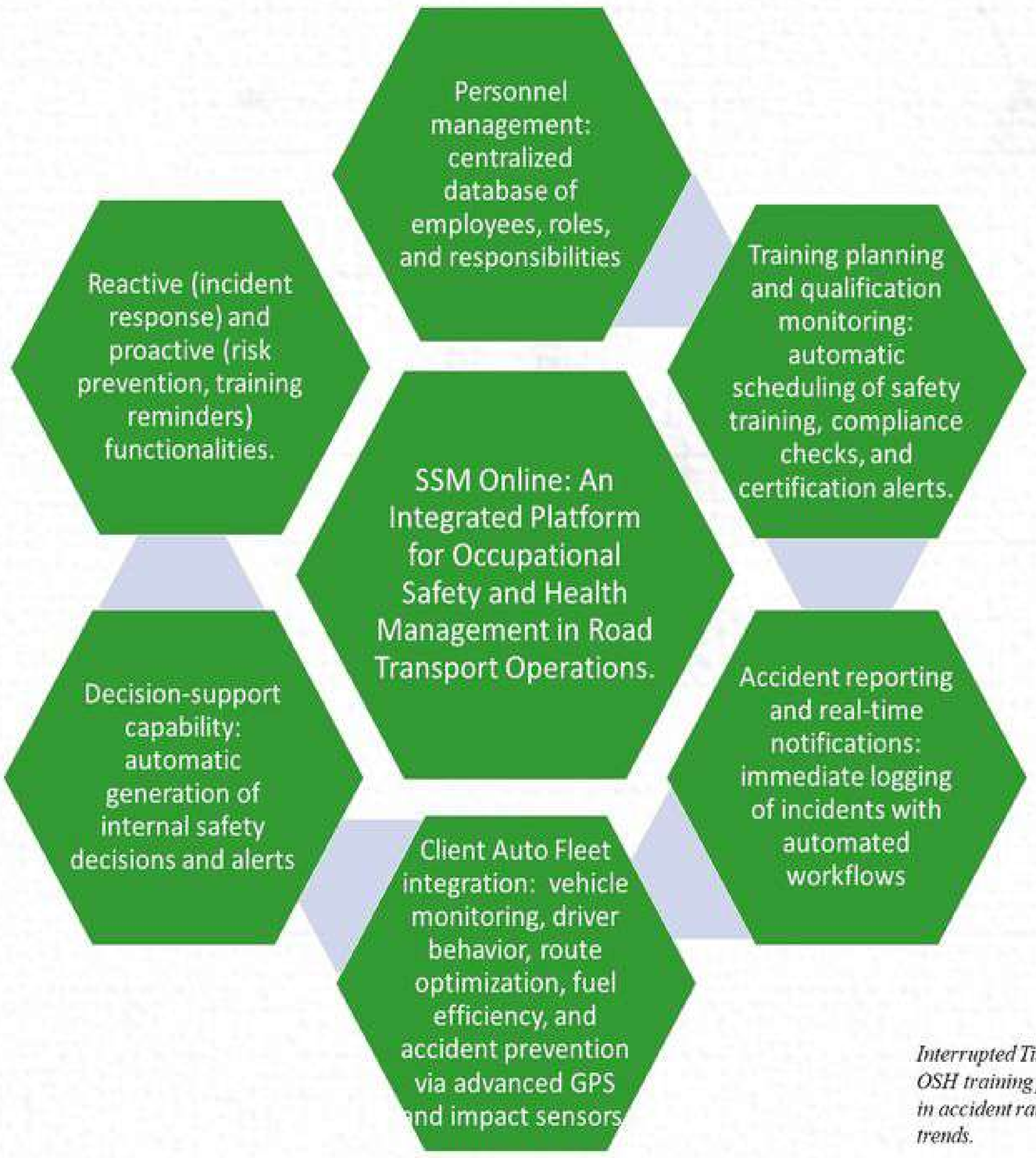
Digital Transformation of Occupational Safety and Health Processes in the Road Transport Industry: An Integrated Workforce Safety, Training, Compliance, and Vehicle Monitoring Digital Platform

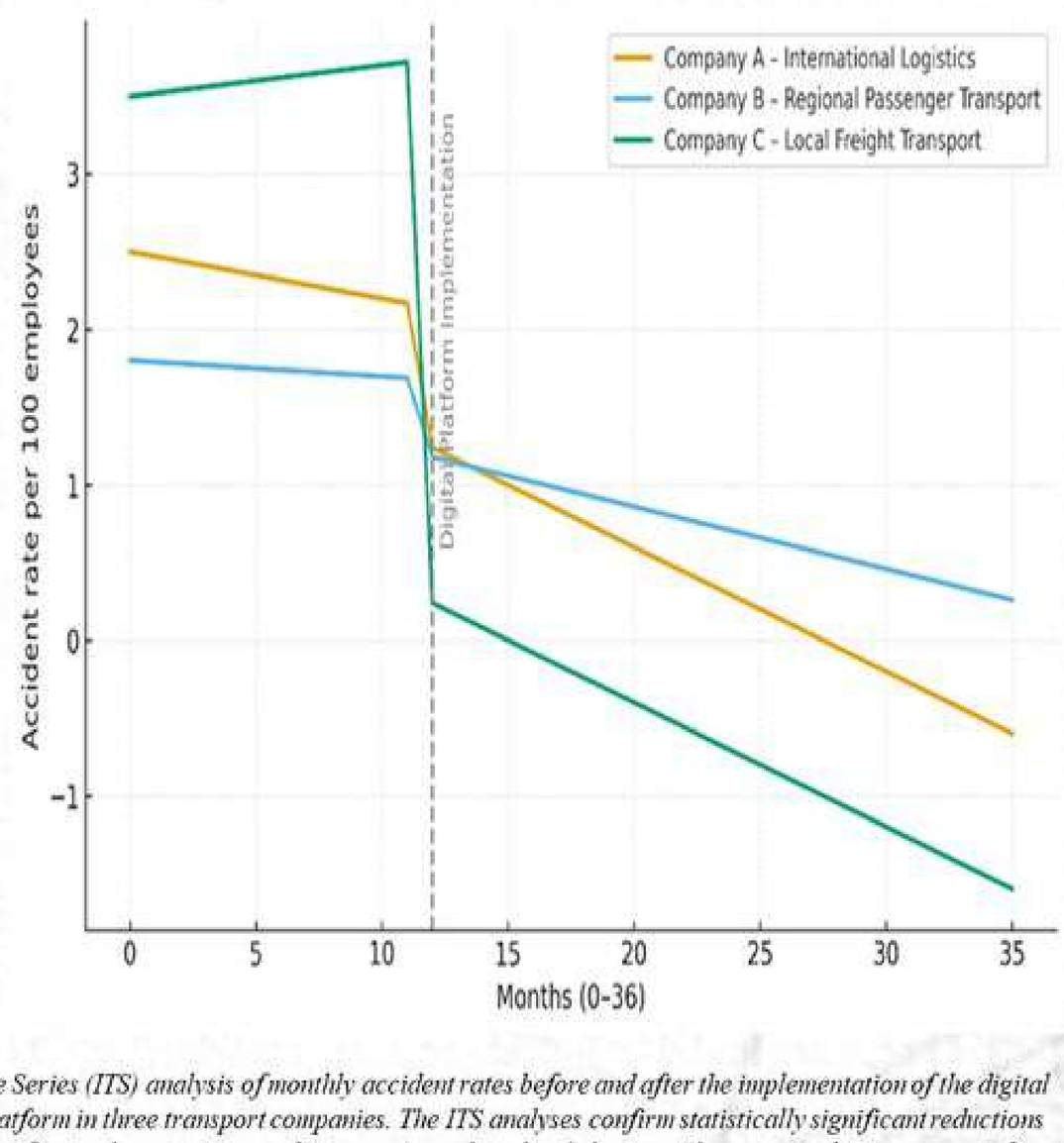
Oana Roxana CHIVU, Andrei Ștefan IACOB, Mihnea COSTOIU, Alina TRIFU, Roland MORARU, Marilena GHEORGHE, Claudia BORDA

SCIENTIFIC RESEARCH PROJECT

The study presents the implementations and validations of the SSM online platform in three road transport companies with different sizes and profiles (small, medium, large), using all four levels of the Kirkpatrick model and an Interrupted Time Series (ITS) design to quantify changes before and after implementation. The study also contains the application of FRAM (Functional Resonance Analysis Method), one of the most effective modern techniques for analyzing complex socio-technical systems, to demonstrate the vulnerabilities of the traditional OSH training process in road transport.

ORIGINALITY AND ADVANTAGES OF THE DIGITAL PLATFORM





Interrupted Time Series (ITS) analysis of monthly accident rates before and after the implementation of the digital OSH training platform in three transport companies. The ITS analyses confirm statistically significant reductions in accident rates after implementation, combining an immediate level change with a sustained improvement of trends.

CONTACT

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Prof. Dr. Habil. Eng. Oana Roxana CHIVU

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METODĂ DE TRATAMENT AL GESTOZEI ASOCIAT CU CANCER MAMAR / TREATMENT METHOD FOR GESTOSIS ASSOCIATED WITH BREAST CANCER

Patent/project number: *HOTĂRÂRE nr.10524 din 2024.10.23, Nr. depozit: s 2023 0103, Data depozit: 2023.12.22*

Author/s: ***URECHE Corneliu, MEREUŢĂ Ion, CARAUŞ Vladimir, CARAUŞ Iurie***

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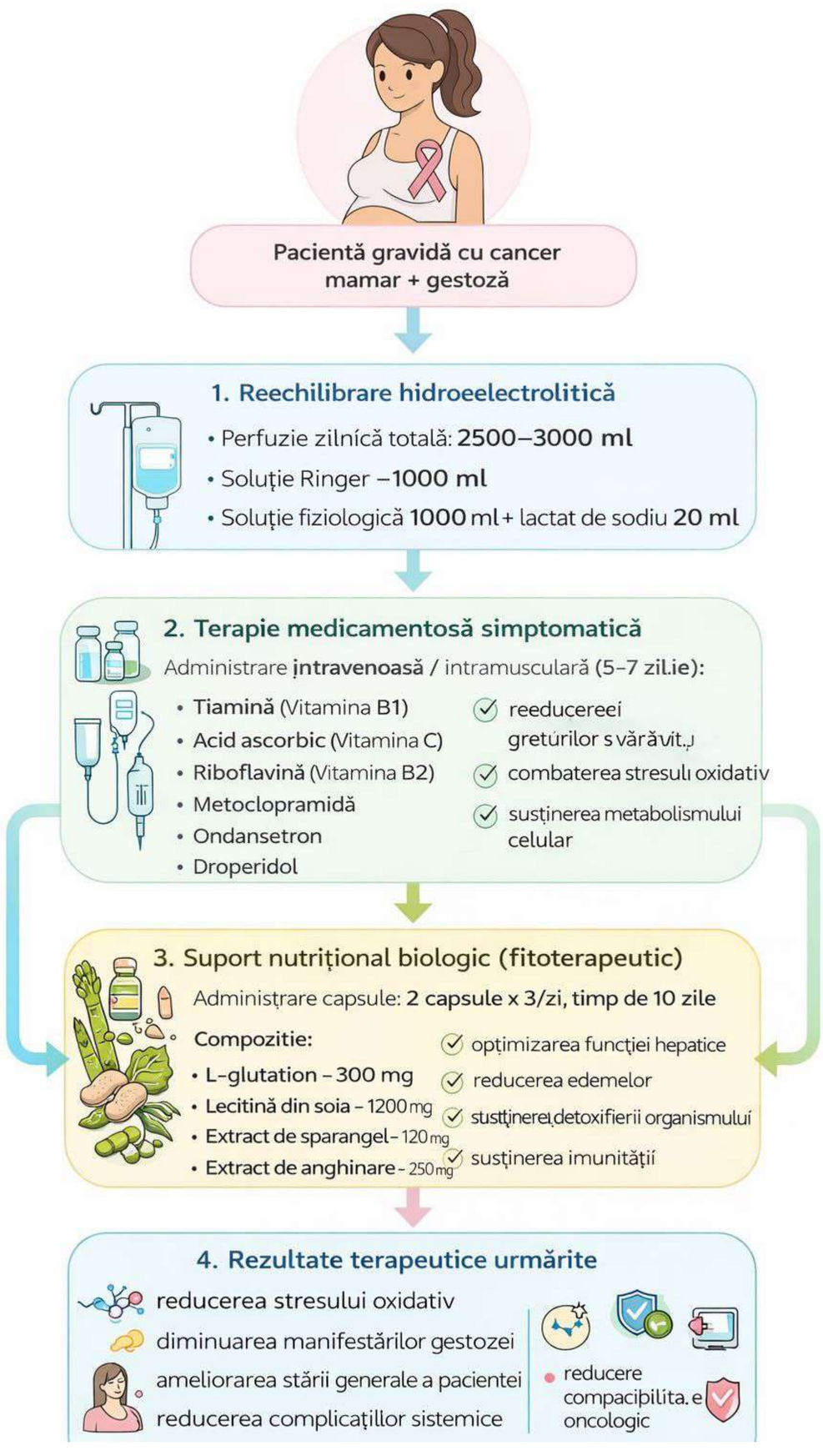
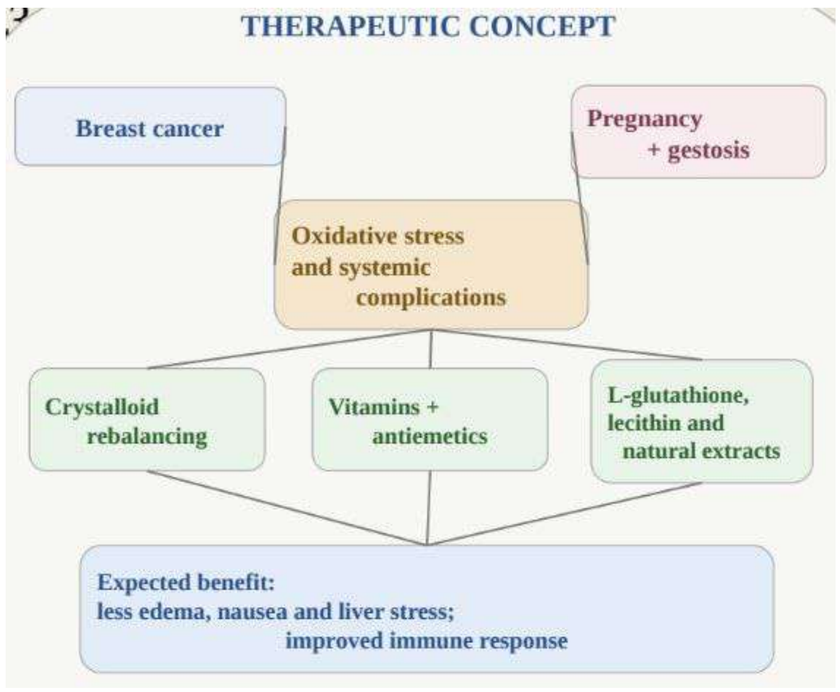
Invenția se referă la o metodă inovatoare de tratament al gestozei asociate cu cancerul mamar, utilizabilă în practica oncologică și obstetricală, cu scopul de a reduce complicațiile sistemice și stresul oxidativ la paciente gravide oncologice.

Metoda constă în administrarea perfuziilor zilnice cu soluții cristaloide în volum total de 2500–3000 ml, incluzând soluția Ringer (1000 ml) și lactat de sodiu 20 ml dizolvat în 1000 ml soluție fiziologică. Pe lângă această reechilibrare hidroelectrolitică, se administrează un complex de vitamine și agenți antiemetici – tiamină, acid ascorbic, riboflavină, metoclopramidă, ondansetron și droperidol – în doze controlate, pe cale intramusculară sau intravenoasă, timp de 5–7 zile.

Inovația adaugă un suport nutrițional biologic printr-un amestec de extracte naturale: L-glutation (300 mg), lecitină din soia (1200 mg), extract de sparanghel (120 mg) și extract de anghinare (250 mg), administrate sub formă de capsule (2 capsule × 3/zi, 10 zile). Această combinație permite optimizarea funcției hepatice, reducerea edemelor, ameliorarea grețurilor și îmbunătățirea răspunsului imun, fără a afecta tratamentul oncologic de fond.





'he invention relates to an innovative method for reating gestosis associated with breast cancer, pplicable in oncological and obstetrical practice, vith the aim of reducing systemic complications and xidative stress in pregnant cancer patients.

'he method consists of daily infusions of crystalloid olutions in a total volume of 2500–3000 ml, ncluding Ringer's solution (1000 ml) and 20 ml of odium lactate dissolved in 1000 ml of physiological aline. In addition to this hydro-electrolytic ebalancing, a complex of vitamins and antiemetic gents—thiamine, ascorbic acid, riboflavin, netoclopramide, ondansetron, and droperidol—is dministered in controlled doses, either ntramuscularly or intravenously, for a period of 5–7 ays.

'he innovation adds biological nutritional support hrough a mixture of natural extracts: L-glutathione 300 mg), soy lecithin (1200 mg), asparagus extract 120 mg), and artichoke extract (250 mg), dministered in capsule form (2 capsules × 3 imes/day for 10 days). This combination enables the ptimization of liver function, reduction of edema, elief of nausea, and improvement of immune esponse, without interfering with the underlying oncological treatment.

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SUPLIMENT ALIMENTAR BIOLOGIC ACTIV CU ACTIVITATE ADAPTOGENĂ / BIOLOGICALLY ACTIVE FOOD SUPPLEMENT WITH ADAPTOGENEOUS ACTIVITY

Patent/project number: *HOTĂRÂRE nr.10524 din 2024.10.23, Nr. depozit: s 2023 0103, Data depozit: 2023.12.22*

Author/s: **MEREUŢĂ Ion, MD; CARAUŞ Vladimir, MD; BALAN Ion, MD**

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Summary:

The invention relates to a bioactive dietary supplement with adaptogenic activity, intended to support homeostasis and prevent physiological imbalances caused by stress, chronic fatigue, and metabolic disorders. The composition includes standardized dry extracts of medicinal plants recognized for their adaptogenic properties: ashwagandha (25%), Siberian ginseng (25%), Rhodiola rosea (25%), Ginkgo biloba (12.5%), and Schisandra chinensis (12.5%). This synergistic combination contributes to the regulation of nervous, cardiovascular, and metabolic functions.

Compared to known solutions, the product offers a much more pronounced adaptogenic effect due to the balanced selection of components and their optimal ratio. The biological activity of the supplement has been validated through clinical experimental studies that demonstrated significant improvements in physiological parameters, such as blood glucose, blood pH, blood pressure, oxygen level, and serum electrolytes.

The product is easy to prepare, being formulated as a powder encapsulated in 400 mg gelatin capsules. The recommended administration is 2 capsules per day for 3 months. Following testing on human subjects, a clear improvement in general condition, physiological performance, and the ability to adapt to stress was noted. The invention thus contributes to broadening the range of adaptogenic supplements, with wide applicability in functional nutrition and preventive medicine.

Rezumat:

Invenția se referă la un supliment alimentar biologic activ cu activitate adaptogenă, destinat susținerii homeostaziei și prevenirii dezechilibrelor fiziologice cauzate de stres, oboseală cronică și tulburări metabolice. Compoziția include extracte standardizate uscate din plante medicinale recunoscute pentru proprietățile lor adaptogene: ashwagandha (25%), ginseng siberian (25%), roiniță (25%), ginkgo biloba (12,5%) și rhodiola (12,5%). Această combinație sinergică contribuie la reglarea funcțiilor nervoase, cardiovasculare și metabolice.

Față de soluțiile deja cunoscute, produsul oferă un efect adaptogen mult mai pronunțat datorită selecției echilibrate a componentelor și raportului optim dintre acestea. Activitatea biologică a suplimentului a fost validată prin studii experimentale clinice care au demonstrat îmbunătățiri semnificative ale parametrilor fiziologici, precum glicemia, pH-ul sanguin, tensiunea arterială, nivelul de oxigen și electroliți serici.

Produsul este ușor de preparat, fiind formulat sub formă de pulbere încapsulată în capsule gelatinoase de 400 mg. Administrarea recomandată este de 2 capsule pe zi, timp de 3 luni. În urma testării pe subiecți umani, s-a evidențiat o îmbunătățire netă a stării generale, a performanței fiziologice și a capacității de adaptare la stres. Invenția contribuie astfel la lărgirea gamei de suplimente adaptogene, cu aplicabilitate largă în nutriția funcțională și medicina preventivă.

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HR EXCELLENCE IN RESEARCH

NEW INHIBITORS OF THE PROLIFERATION OF FUNGI OF THE SPECIES *Candida albicans*

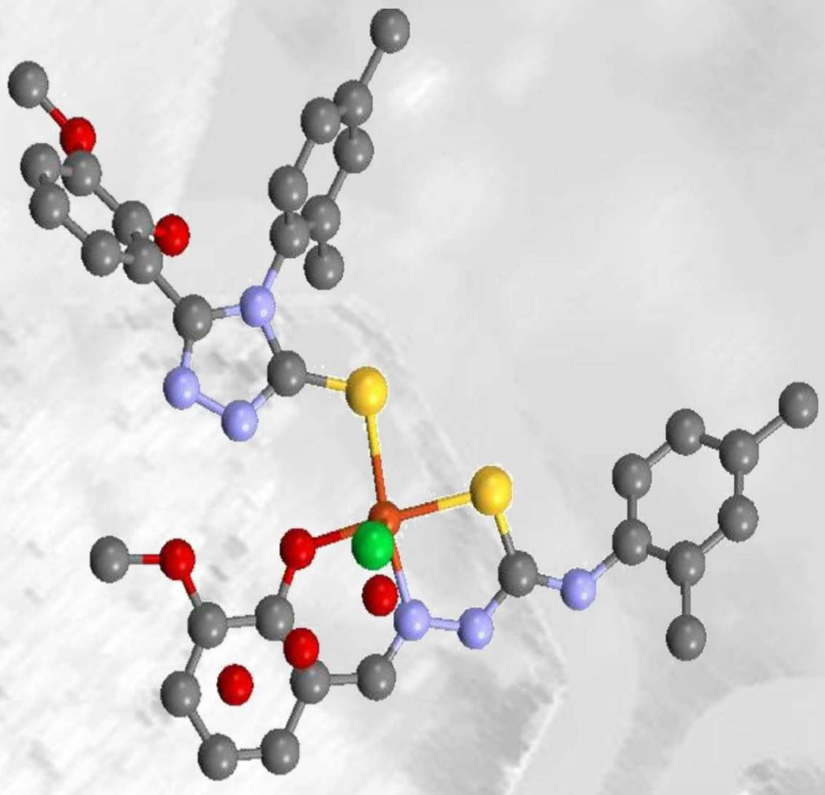
PATENT: MD 4886 / 2024.09.30,
Request for patent MD a 2024 0021 / 2024.06.17

AUTHORS: Aurelian GULEA, Ianina GRAUR, Vasilii GRAUR, Diana CEBOTARI, Sébastien FLOQUE, Victor ŢAPCOV, Greta BĂLAN, Carolina LOZAN-TÎRŞU

APPLICATION FIELDS: Medicine, Paramedical, Pharmacy, Cosmetics, Hygiene. **F**

AIM: Chemical synthesis, characterization of new synthetic antifungal agents that may find application in medicine.

SOLUTION: New synthetic compounds of the thiocarbamide derivatives have been obtained using the directed synthesis methods.



Antifungal activity of the claimed compounds compared to the prototype (µg/mL)

Compound	*Candida albicans* ATCC 10231	
	MIC	MFC
Prototype	0.70	0.70
Claimed substance 1	0.008	0.031
Claimed substance 2	0.004	0.008

MIC – minimum inhibitory concentration
MFC – minimum fungicidal concentration

ADVANTAGES: The described compounds possess fungiostatic and fungicidal activity within the limits of concentrations 0.004-0.031 µg/mL against fungi of the species *Candida albicans*, which exceeds 23-175 times the activity of the prototype. The present inventions expand the arsenal of fungal inhibitors of the *Candida albicans* species with high antifungal activity.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: This research was supported by the institutional project # 010602.

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HR EXCELLENCE IN RESEARCH

NEW SYNTHETIC ANTIFUNGAL AGENT

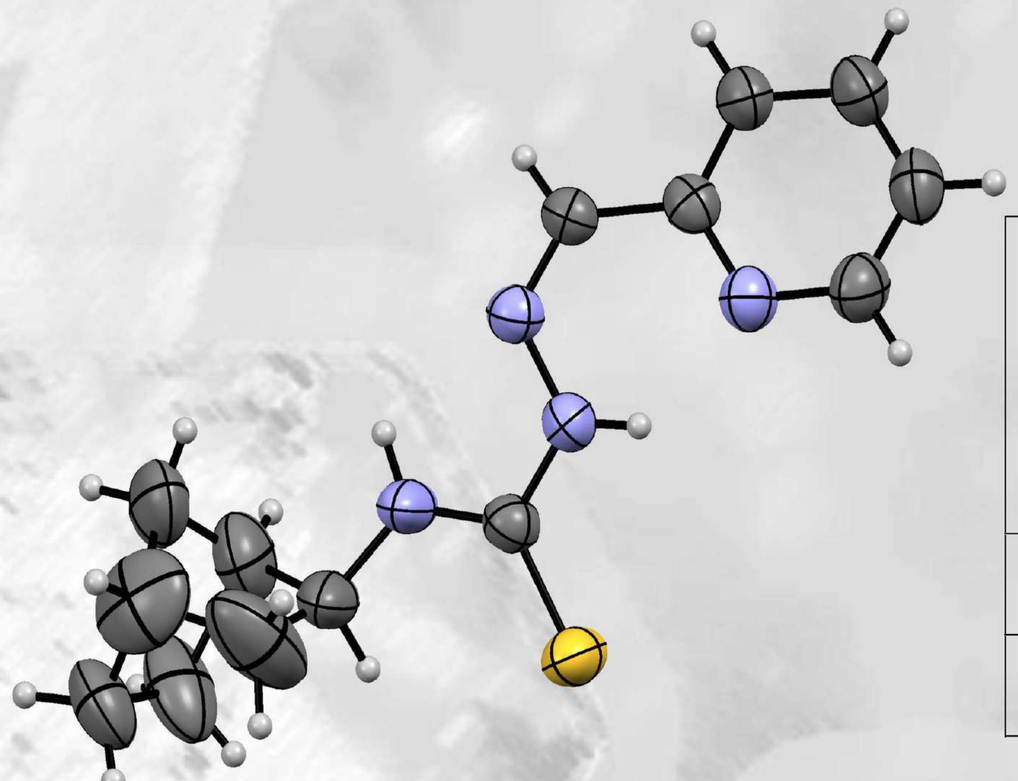
PATENT: MD 4936/2025.09.30

AUTHORS: Aurelian GULEA, Ianina GRAUR, Vasilii GRAUR, Victor ŢAPCOV, Greta BĂLAN, Carolina LOZAN-TÎRŞU

APPLICATION FIELDS: Medicine – pharmacy – cosmetics.

AIM: Chemical synthesis, characterization of new synthetic antifungal agent that may find application in medicine.

SOLUTION: New synthetic compound of the thiocarbamide derivative has been obtained using the directed synthesis method.



Antifungal activity of the claimed compound compared to the prototype (μg/mL)

Compound	*Candida albicans* ATCC 10231	
	MIC	MFC
Prototype	0.70	0.70
Claimed compound	0.008	0.031

MIC – minimum inhibitory concentration
MFC – minimum fungicidal concentration

ADVANTAGES: The described compound possesses fungiostatic and fungicidal activity within the limits of concentrations 0.008-0.031 μg/mL against fungi of the species *Candida albicans*, which exceeds 23-87 times the activity of the prototype. The present invention expands the arsenal of fungal inhibitors of the *Candida albicans* species with high antifungal activity.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: This research was supported by the institutional project #010602.

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NEW COPPER(II) COMPOUNDS AS INHIBITORS OF CANCER CELLS PROLIFERATION

Patent number: MD 4948/2026.01.31

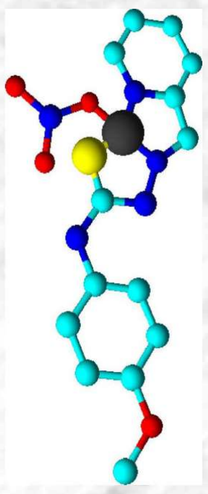
AUTHORS: Aurelian GULEA, Victor ȚAPCOV, Olga GARBUZ, Roman RUSNAC, Aliona PINTEA

APPLICATION FIELDS: Medicine and Pharmaceutics.

AIM: The present invention consists in obtaining new coordination compounds that possess properties of inhibiting the proliferation of cancer cells.

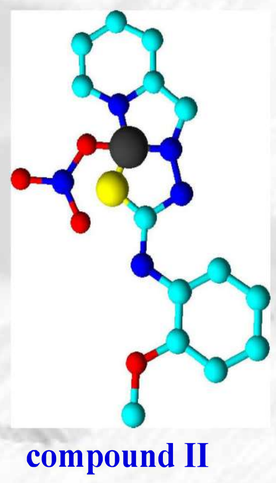
SOLUTION: Synthesis and structural characterization of {N-[(2-methoxyphenyl)-2-(pyridin-2-yl-methylidene)hydrazine-1-carbothioamido)]}copper(II) nitrates (*compound I*) and {N-[(4-methoxyphenyl)-2-(pyridin-2-yl-methylidene)hydrazine-1-carbothioamido)]}copper(II) (*compound II*) as proliferation inhibitors of a cell lines: BxPC-3 – pancreatic cancer, RD – human muscle rhabdomyosarcoma, HeLa – cervical cancer, HL-60 – human myeloid leukemia, LNCaP – human prostate carcinoma cancer, MCF-7 — breast carcinoma cancer, HepG-2 — human liver hepatocellular carcinoma cancer, K-562 —human bone marrow chronic myeloid leukemia cell line.

The IC_{50} (μM) values of anticancer activity of compounds I and II



compound I

Compound	Cell lines							
	BxPc-3	RD	HeLa	HL-60	LNCaP	MCF-7	HepG-2	K-562
Cisplatin	0,5	0,15	0,1	0,08	0,8	0,3	0,2	0,3
I	0,1	0,1	0,8	0,03	0,8	0,1	0,4	0,5
II	0,1	1,2	1,1	0,03	0,3	0,6	0,6	0,03



compound II

*Average results of three experiments, SEM < ±3%.

ADVANTAGES: The invention consists of the establishment of anticancer activity of compounds I and II, which exceeds the cisplatin activity by 17-2.7 times and exceeds the analogous characteristics of the structural analogue by 30-1.1 times.

IMPLEMENTATION STAGE: Design, prototype.

ACKNOWLEDGMENTS: This research was supported by the institutional project #010602.

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DIETARY SUPPLEMENT FOR THE PROPHYLAXIS OF HYPOGLYCEMIA AND FOR MAINTAINING IMMUNE STATUS IN DISORDERS OF CARBOHYDRATE METABOLISM IN RODENTS (RATTUS NORVEGICUS).

PATENT APPLICATION: a 2025 0058/2025.12.17

AUTHORS: Iurie BACALOV, Adriana DRUȚA, Elena CHIRIȚA, Aurelia CRIVOI

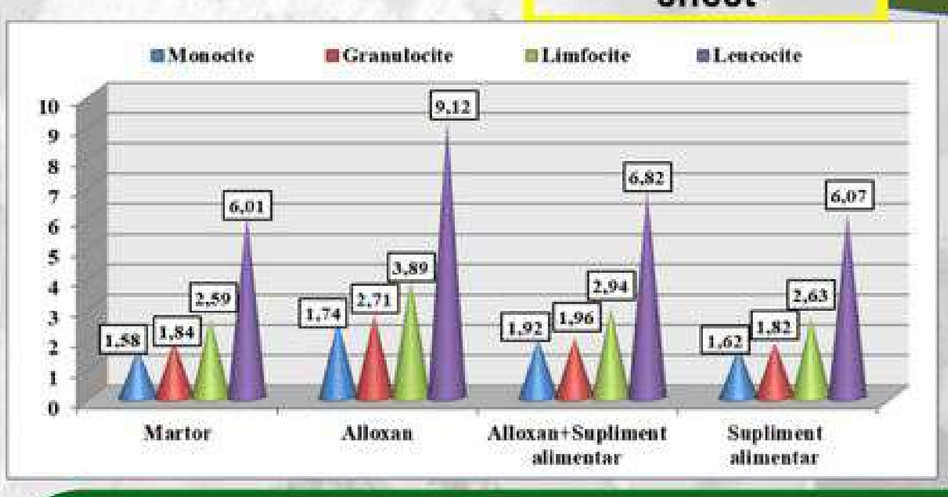
APPLICATION FIELDS: F - Medicine, Paramedical, Pharmacy, Cosmetics, Hygiene.

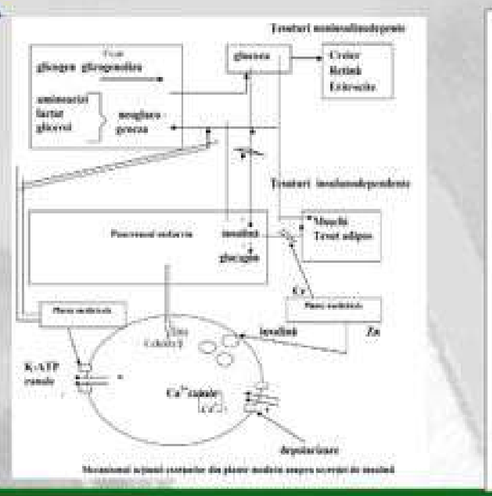
AIM: Maintenance of immune status in disorders of carbohydrate metabolism.

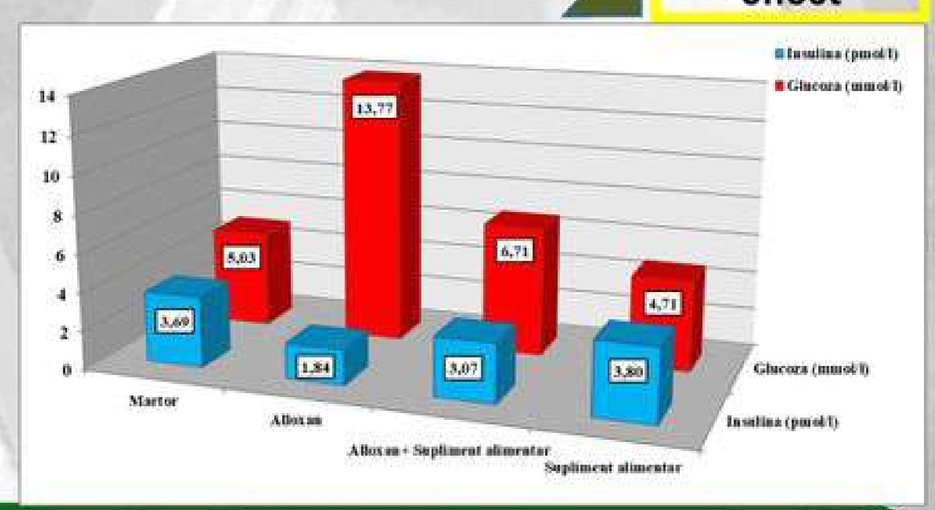
SOLUTION: The invention relates to a dietary supplement with hypoglycemic and immunomodulatory effects, intended for the prophylaxis of disorders of carbohydrate metabolism. The supplement acts by reducing hyperglycemia and maintaining blood glucose within physiological limits, as well as by modulating the immune response, which is often impaired in endocrine pathologies. Through these mechanisms, the supplement helps reduce the risk of complications associated with diabetes and supports the maintenance of immune function. The multiple bioactive properties confer regulatory effects on both carbohydrate metabolism and immune function. The supplement contains bioactive substances in the form of an infusion of Syringa vulgaris flowers, Sambucus nigra flowers, Achillea millefolium flowers, and Vitis vinifera leaves, combined to ensure hypoglycemic and immunomodulatory efficacy.

Immunoprotective effect

Hypoglycemic effect







ADVANTAGES: Compared to other remedies, the proposed dietary supplement exhibits a dual effect (hypoglycemic and immunomodulatory), contributing to the prevention of the onset and progression of complications associated with disorders of carbohydrate metabolism, the maintenance of blood glucose within physiological limits, and the modulation of the immune response, which is frequently impaired in this endocrine pathology.

IMPLEMENTATION STAGE: At the laboratory level.

ACKNOWLEDGMENTS: *This research subproject: 011001.*

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BIOLOGICALLY ACTIVE DIETARY SUPPLEMENT WITH ADAPTOGENIC ACTIVITY

PATENT NUMBER: 1873 (13) Y/2025.08.31

AUTHORS: MEREUŢĂ Ion, CARAUȘ Vladimir, BALAN Ion

APLICATION FIELDS: F - Medicine, Paramedical, Pharmacy, Cosmetics, Hygiene.

AIM: Developing a natural, safe, effective, and easy-to-use product that ensures enhanced adaptogenic activity through an optimal blend of bioactive ingredients derived from natural sources for the health and well-being of the body.

SOLUTIONS: The invention relates to a bioactive dietary supplement with adaptogenic activity, intended to support homeostasis and prevent physiological imbalances caused by stress, chronic fatigue, and metabolic disorders. The composition includes standardized dry extracts of medicinal plants recognized for their adaptogenic properties: ashwagandha (25%), Siberian ginseng (25%), Rhodiola rosea (25%), Ginkgo biloba (12.5%), and Schisandra chinensis (12.5%). This synergistic combination contributes to the regulation of nervous, cardiovascular, and metabolic functions.

Compared to known solutions, the product offers a much more pronounced adaptogenic effect due to the balanced selection of components and their optimal ratio. The biological activity of the supplement has been validated through clinical experimental studies that demonstrated significant improvements in physiological parameters, such as blood glucose, blood pH, blood pressure, oxygen level, and serum electrolytes.

The product is easy to prepare, being formulated as a powder encapsulated in 400 mg gelatin capsules. The recommended administration is 2 capsules per day for 3 months. Following testing on human subjects, a clear improvement in general condition, physiological performance, and the ability to adapt to stress was noted. The invention thus contributes to broadening the range of adaptogenic supplements, with wide applicability in functional nutrition and preventive medicine.

ADVANTAGES: The composition uses biologically active, natural ingredients, reducing the risk of adverse effects, with the following properties: contributes to increasing the body's resistance to physical and mental stress; supports hormonal balance and the immune system; provides exclusivity of the formula and manufacturing process, protecting investments in research and development; offers a competitive advantage in the dietary supplements market; can be used by various age groups and in different health contexts; is suitable for long-term use due to its natural and safe character.

ACKNOWLEDGMENTS: This research was supported by the project within the State Program: 011001.

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DETERMINING THE ROLE OF DANDELION POLYPHENOLS IN MODULATING THE ANTIOXIDANT AND MINERAL STATUS OF THE BODY

RESEARCH PROJECT NUMBER: 011001

AUTHORS: BALAN Ion, CIOCHINA Valentina, ROŞCA Nicolae, BUZAN Vladimir, BALACCI Sergiu, POLEACOVA Lilia, CREȚU Roman, OSIPCIUC Galina, MEREUTA Ion, BACU Gheorghe, FURDUI Vlada

APLICATION FIELDS: F - Medicine, Paramedical, Pharmacy, Cosmetics, Hygiene.

AIM: The study aims to highlight the potential role of polyphenols from dandelion in modulating the antioxidant and mineral status of the body.

SOLUTIONS: Superoxide dismutase (SOD) represents the first line of defense against oxidative stress, catalyzing the dismutation of the superoxide radical into hydrogen peroxide. SOD activity in the experimental/control group (177.02 ± 0.74 U/c (min/L) / 110.93 ± 0.30 U/c (min/L), $p<0.5$) suggests that dandelion polyphenols exert a stimulatory effect on the enzymatic antioxidant system. SOD is a metal-dependent enzyme with several isoenzyme forms: copper-zinc SOD (Cu/Zn-SOD), manganese SOD (Mn-SOD), and extracellular SOD. The increase ($p<0.5$) in zinc concentration (37.42 ± 0.62 µM/L (experimental) vs. 31.32 ± 0.45 µM/L (control)) may partially explain the enhancement of SOD activity, as zinc is an essential cofactor of the Cu/Zn-SOD isoform. Therefore, increased zinc availability may promote the synthesis or activation of this enzymatic isoform. Catalase, in turn, is a hemoprotein containing iron in its active center. The increase in iron concentration (14.53 ± 0.46 µM/L (experimental) vs. 12.15 ± 0.31 µM/L (control), $p<0.5$) correlates with elevated catalase activity, suggesting that dandelion polyphenols may positively influence iron metabolism and, consequently, the activity of this enzyme. Catalase decomposes hydrogen peroxide into water and oxygen, preventing its accumulation and the formation of highly reactive hydroxyl radicals generated in reactions associated with SOD activity. Magnesium (0.771 ± 0.055 mM/L (experimental) vs. 0.674 ± 0.033 mM/L (control)), although not a direct component of the active center of SOD or catalase, plays an important role in stabilizing protein structures and in cellular metabolic processes, potentially contributing indirectly to the optimization of enzymatic activity. Phosphorus (1.56 ± 0.10 mM/L (experimental) vs. 1.45 ± 0.11 mM/L (control)) is involved in energy metabolism (ATP), supporting protein synthesis and enzymatic function. Polyphenols from Taraxacum officinale are known for their antioxidant properties, acting both directly (by neutralizing free radicals) and indirectly (by inducing the expression of antioxidant enzymes). The obtained results support the hypothesis that these compounds may improve antioxidant status through a dual mechanism: increasing the availability of metal cofactors and stimulating the activity of antioxidant enzymes.

ADVANTAGES: These findings suggest that dandelion polyphenols contribute to strengthening the enzymatic antioxidant system and optimizing mineral metabolism, with potential applicability in strategies aimed at reducing oxidative stress.

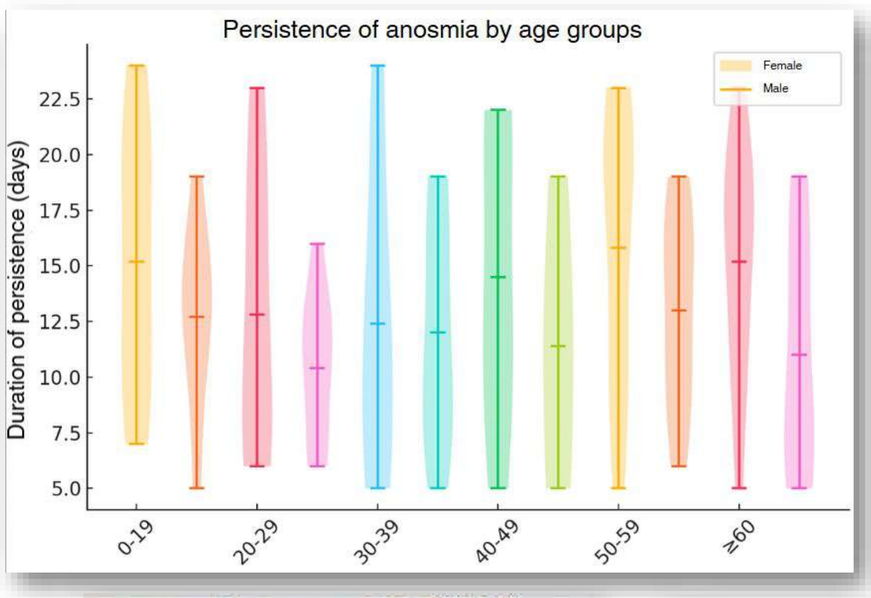
ACKNOWLEDGMENTS: This research was supported by the project within the State Program: 011001.

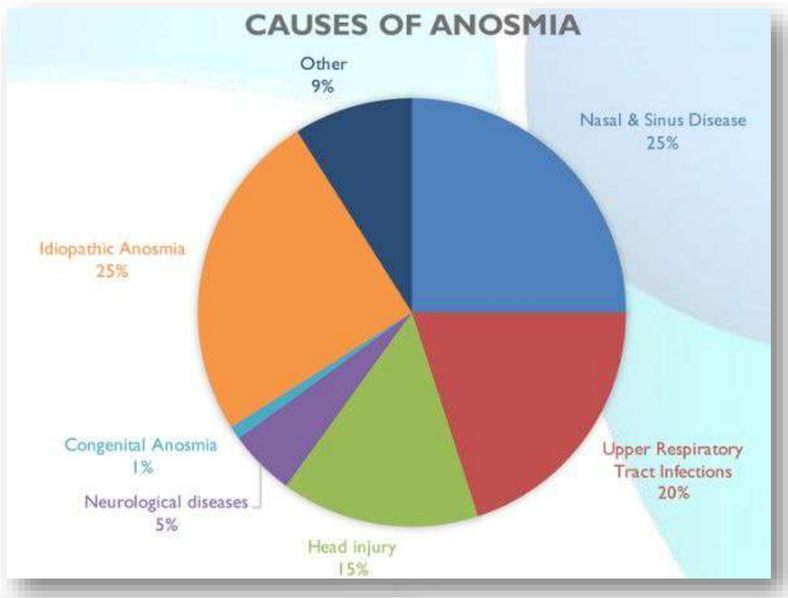
BioSense: Eco-Friendly Detector in the Service of Health

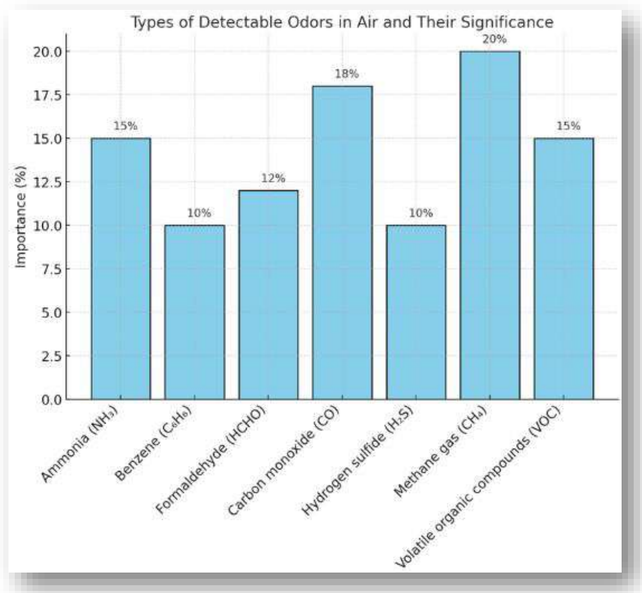
F

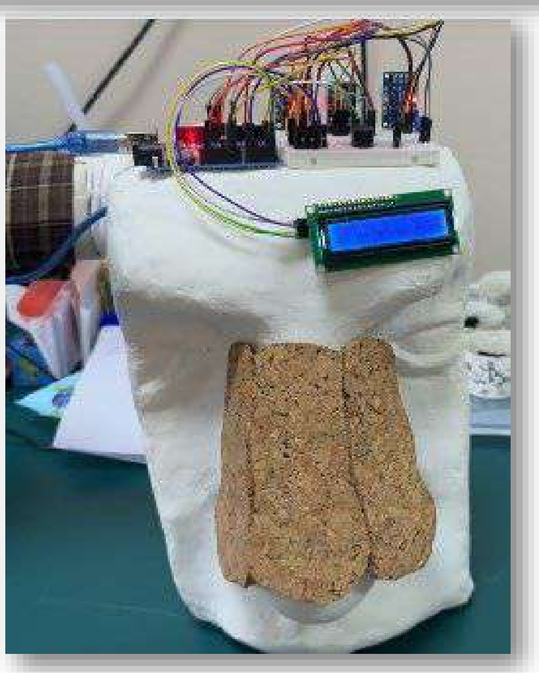
Authors: BOBEICO Svetlana, MUNTEAN Adelina, COJOCARI Sofia, BURNUSUZ Alina
Mentors: BLUDARU Viorica, GÎNCU Eudochia

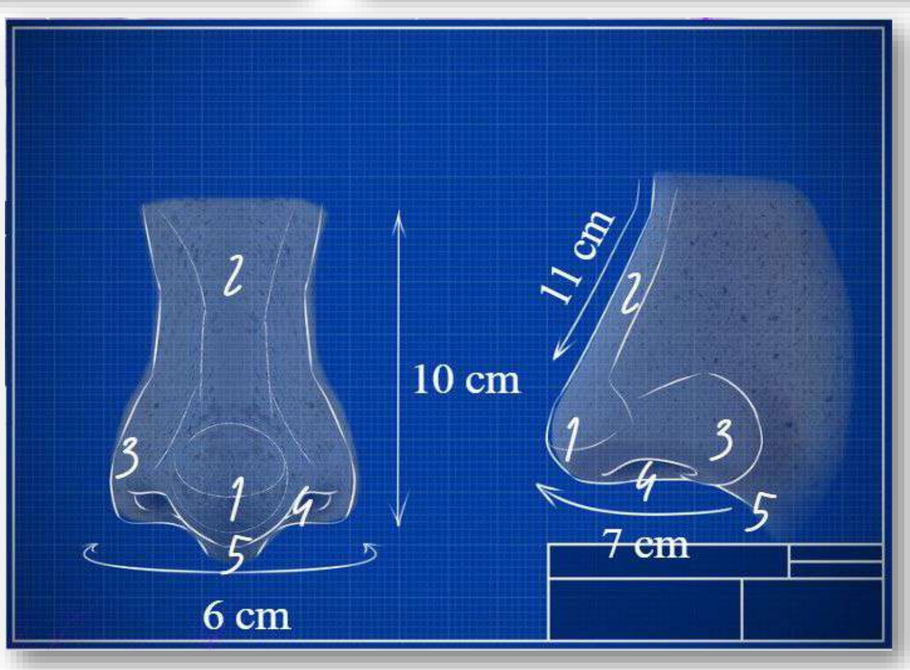
Anosmia — the partial or total loss of the sense of smell — affects millions of people, including 10–15% of the population of the Republic of Moldova. It is frequently caused by exposure to toxic substances, viral infections, head trauma, or neurological disorders. Following COVID-19, between 10% and 20% of infected individuals continued to experience anosmia for extended periods, and some never regained their sense of smell. Currently, there are no effective olfactory prostheses available, and traditional devices are often made from non-recyclable materials, contributing to increased pollution. This highlights the need for innovative and sustainable solutions.











The BioSense installation represents an intelligent olfactory prosthesis designed as a compact device, adaptable at the level of the nose, combining an ecological structure with an electronic detection component. The structural part is made of at least 80% biodegradable materials, primarily cork sheets selected for their flexibility, low weight, porosity, and durability. The elements are assembled using biodegradable adhesive based on natural resins, and during the research stage, the possibility of using coral was also analyzed due to its high biocompatibility and porosity.

The intelligent component includes an Arduino microprocessor, MQ gas sensors, a display screen, and an audio-visual alert system. The sensors identify the presence of chemical compounds in the air and transmit electrical signals to the microprocessor, which processes them to determine the type and concentration of the detected substances. The data are displayed in real time, and if the preset safety threshold is exceeded, the system automatically triggers an alert within a maximum of three seconds. Through this integrated structure, BioSense functions as an eco-friendly intelligent detector, contributing to health protection and increased user safety.

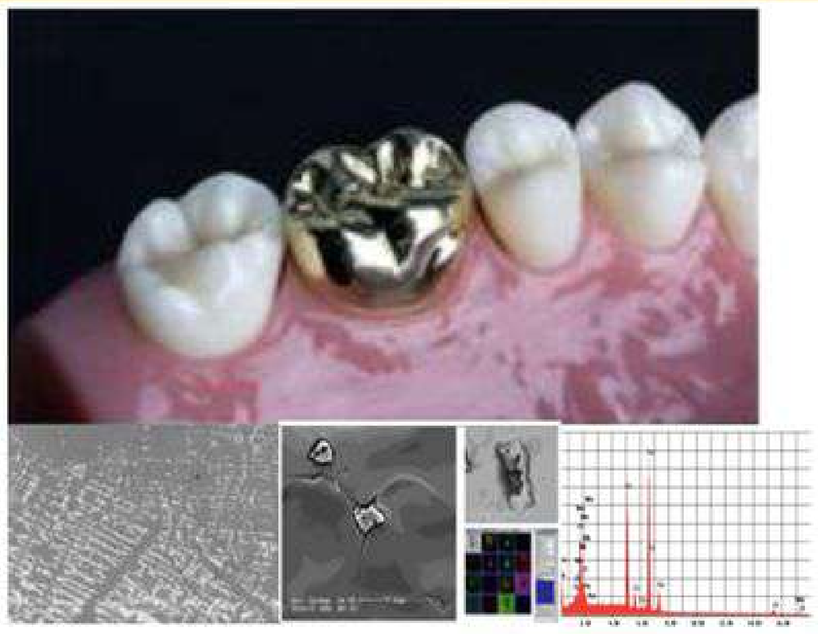
Contact: bludaru.viorica@anenii-noi.edu.md

DENTAL ALLOY OF COBALT-CHROMIUM-MOLYBDENUM TYPE USED FOR MAKING METAL-CERAMIC DENTAL PROSTHESES, COMPRISES COBALT, CHROMIUM, MOLYBDENUM, SILICON, NIOBIUM, RUTHENIUM, ZIRCONIUM AND SILVER (patent no: RO134131)

ANTONIAC Vasilea Iulian,RAU Dzulietta, SEMENESCU Augustin, DAWOD Nazem, GEANTA Victoras, VOICULESCU Ionelia, MATES Ileana Mariana, SOLEA Marina Roxana

Contact persons: augustin.semenescu@upb.ro

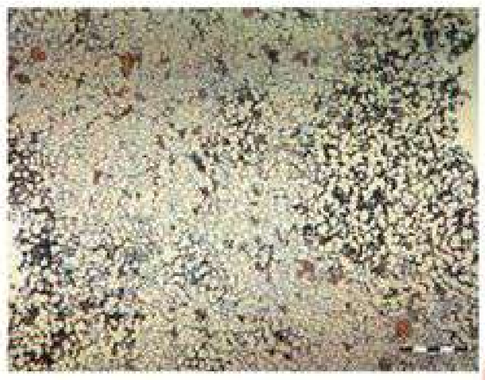
PRESENTATION



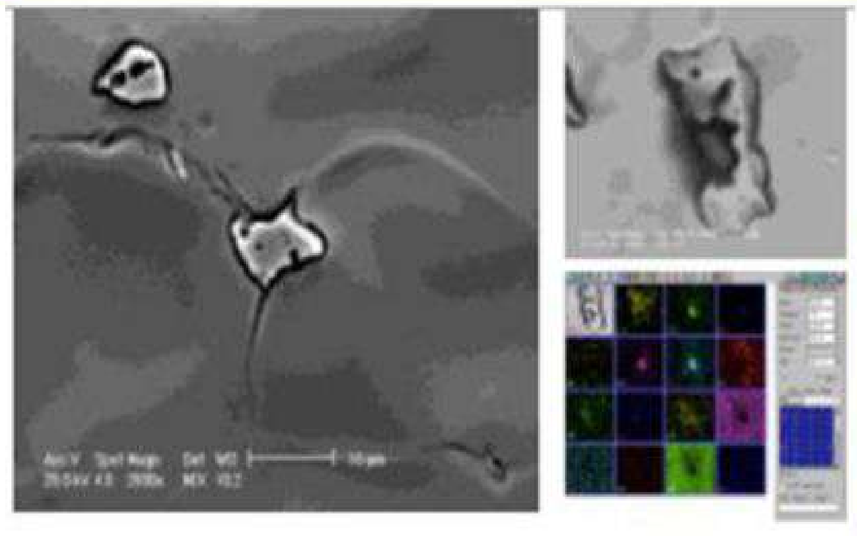
Dental alloy of cobalt-chromium-molybdenum type comprises 47-53 wt.% cobalt, 22-26 wt.% chromium, 4-7 wt.% molybdenum, 0.9-1.2 wt.% silicon, 3-5 wt.% niobium, 0.8-1.1 wt.% ruthenium, 10-14 wt.% zirconium and 2-4 wt.% silver, where the alloy has biocompatible metals comprising molybdenum, zirconium, niobium, silver and ruthenium, and is prepared by elaboration in electric arc furnace in neutral atmosphere.

ADVANTAGES

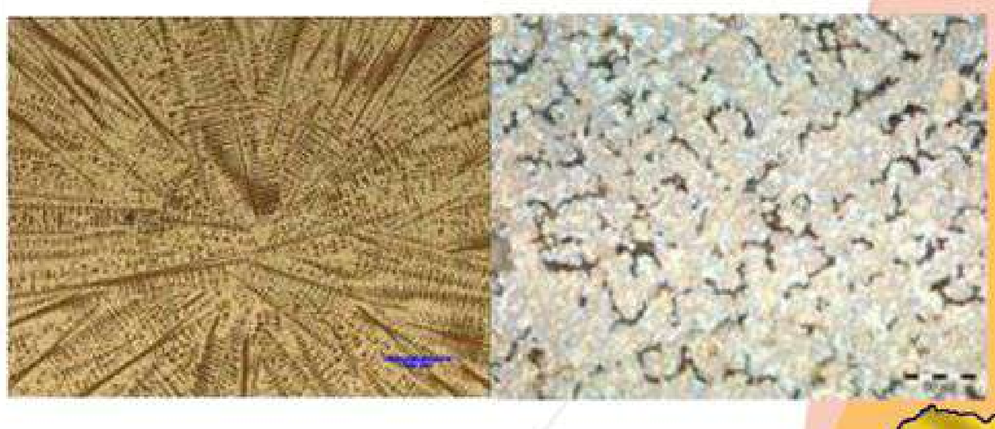
- The alloy exhibits excellent biocompatibility and corrosion resistance.



PROBLEM SOLVED



- The alloy is used for making metal-ceramic dental prostheses.

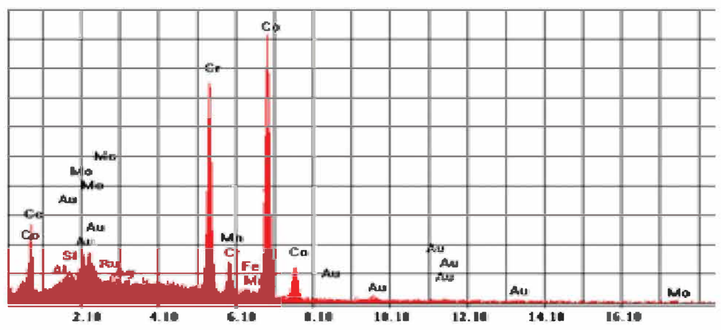


COBALT, CHROMIUM AND NOBLE METAL CONTAINING ALLOY USED FOR MANUFACTURING METAL-CERAMIC DENTAL PROSTHESES, COMPRISES COBALT, CHROMIUM, SILICON, RUTHENIUM, ZIRCONIUM AND SILVER (patent no: RO134132 A0)

ANTONIAC Vasilea Iulian,RAU Dzulietta, SEMENESCU Augustin, DAWOD Nazem, GEANTA Victoras, VOICULESCU Ionelia, MATES Ileana Mariana, SOLEA Marina Roxana

Contact persons: augustin.semenescu@upb.ro

PRESENTATION

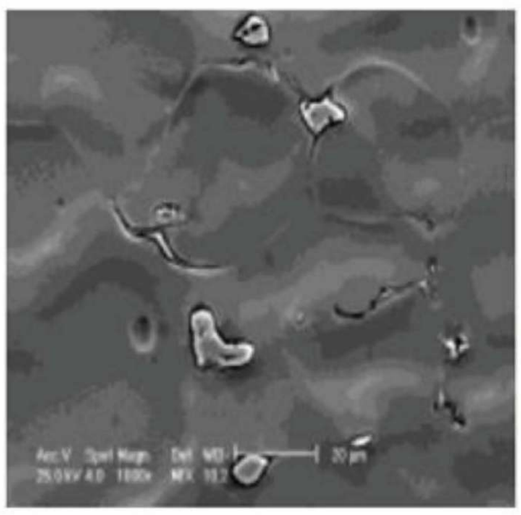


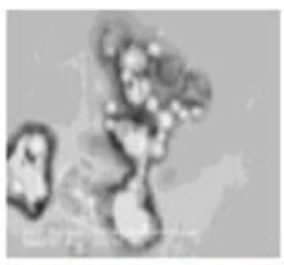
Cobalt, chromium and noble metal containing alloy comprising 58-61 %mass cobalt, 28-30 %mass chromium, 3.4-4.4 %mass silicon, 2-4 %mass ruthenium, 0.7-1.4 %mass zirconium and 0.8-1.2 %mass silver and obtained by elaboration in an electric arc furnace in a neutral atmosphere, with or without magnetic levitation.

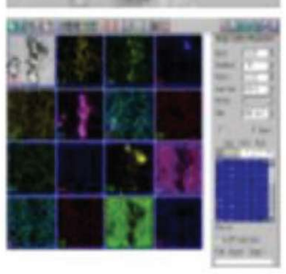
ADVANTAGES

- **The alloy has high biocompatibility. DETAILED DESCRIPTION - Cobalt, chromium and noble metal containing alloy of formula: CoCrMn comprises 58-61 %mass cobalt, 28-30 %mass chromium, 3.4-4.4 %mass silicon, 2-4 %mass ruthenium, 0.7-1.4 %mass zirconium and 0.8-1.2 %mass silver and obtained by elaboration in an electric arc furnace in a neutral atmosphere, with or without magnetic levitation. Cobalt, chromium and noble metal containing alloy of formula: CoCrMn comprises 58-61 %mass cobalt, 28-30 %mass chromium, 3.4-4.4 %mass silicon, 2-4 %mass ruthenium, 0.7-1.4 %mass zirconium and 0.8-1.2 %mass silver and obtained by elaboration in an electric arc furnace in a neutral atmosphere, with or without magnetic levitation**

PROBLEM SOLVED







- The alloy is useful for manufacturing metal-ceramic dental prostheses.

EXPERIMENTAL MODEL FOR BIOFUNCTIONALIZATION OF TI-MO-ZR-TA ALLOYS USED IN ORTHOPEDIC IMPLANTOLOGY

Petrică VIZUREANU[1], Ioana Corina MOGA[2], Mădălina Simona BĂLȚATU[1], Nicoleta Raluca JIANU[2], Andrei Victor SANDU[1]

1 - "Gheorghe Asachi" Technical University of Iasi,
2 - North Giurgiu Technological and Industrial Park SA

INTRODUCTION

- Titanium alloys remain central to biomedical innovation, serving as the primary materials for orthopedic and dental implants due to their strength, corrosion resistance, and biocompatibility. Traditional alloys such as Commercially Pure Titanium (CP Ti) and Ti-6Al-4V are widely used but limited by their high elastic modulus and the toxicity of alloying elements like vanadium. To overcome these drawbacks, research has focused on developing **β-type titanium alloys** with lower elastic modulus and non-toxic compositions, offering improved mechanical compatibility with human bone and greater alloying flexibility.
- Despite their advantages, β-Ti alloys face challenges such as limited wear resistance, prompting efforts to enhance surface durability and incorporate antibacterial and bone-regenerative properties. The key design objective is to minimize the mismatch between the elastic modulus of bone and that of titanium implants, thereby reducing stress shielding and promoting natural bone healing.
- In this context, the development of new Ti-Mo-Zr-Ta alloys represents a promising direction, combining mechanical adaptability with superior biocompatibility and corrosion resistance, while allowing advanced surface functionalization to further improve implant integration and long-term performance.

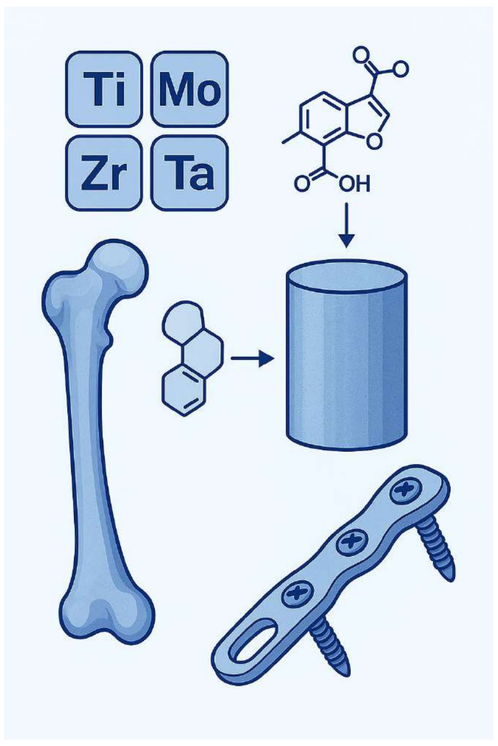
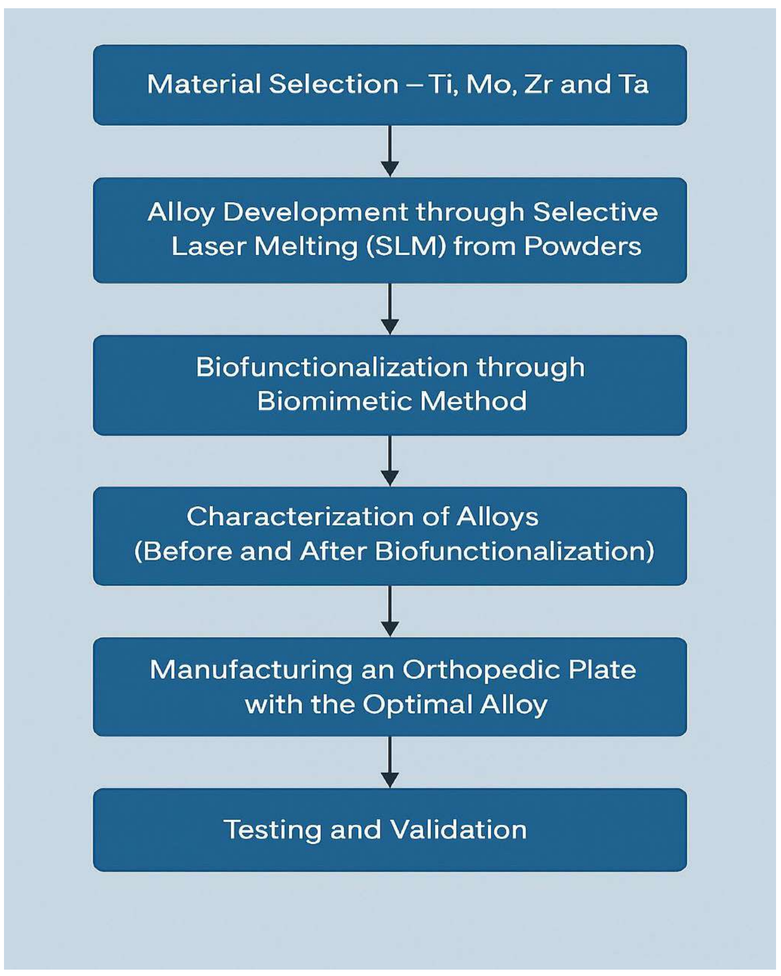


Figure 1. BIO-SIMTIT overview

MATERIALS

- The materials used in this study are titanium-based alloys within the Ti-Mo-Zr-Ta system, selected for their outstanding biocompatibility, corrosion resistance, and mechanical performance.
- Each alloying element contributes specific advantages: molybdenum enhances strength and stabilizes the β-phase, zirconium improves corrosion resistance and biocompatibility, tantalum increases biological stability.

METHODS



Stage 1 – Material Selection
The Ti-Mo-Zr-Ta alloy system is chosen for its synergistic combination of properties. Titanium provides biocompatibility and strength, molybdenum adds durability, zirconium improves corrosion resistance, and tantalum enhances stability and osseointegration.

Stage 2 – Alloy Development through Selective Laser Melting (SLM)
Three alloys are produced using Selective Laser Melting from high-purity powders. This method ensures precise control of composition and microstructure, enabling the fabrication of uniform materials with tailored mechanical and biological performance.

Stage 3 – Biofunctionalization through Biomimetic Method
Alloys are biofunctionalized with hydroxyapatite through a biomimetic approach to enhance surface bioactivity and bone integration. This coating mimics natural bone mineralization, improving cell adhesion and reducing the risk of implant rejection.

Stage 4 – Characterization of Alloys
Each alloy is characterized before and after biofunctionalization to evaluate structural, mechanical, and biological changes. Chemical composition, microstructure, and biocompatibility are analyzed to determine the most promising material.

Stage 5 – Manufacturing of the Orthopedic Plate
The alloy with optimal properties is selected to manufacture an experimental orthopedic plate, serving as a model for assessing practical performance and manufacturability.

Stage 6 – Testing and Validation
The orthopedic plate undergoes mechanical, structural, and biological testing to validate its performance. The tests focus on strength, stability, and interaction with biological tissues to ensure safety, effectiveness, and long-term compatibility. This stage provides essential data for assessing the potential clinical applicability of the newly developed alloy system.

RESULTS

- The project will deliver a comprehensive set of scientific and technological results supporting the development of Ti-Mo-Zr-Ta alloys for orthopedic applications. A detailed **simulation and elaboration methodology report** will define the modeling and process optimization strategy, followed by the **production of three innovative Ti-Mo-Zr-Ta alloys** using Selective Laser Melting (SLM), with a total of nine ingots fabricated and validated through quality assurance procedures.
- Extensive **testing and analysis reports** will address the structural, mechanical, surface, corrosion resistance, and biocompatibility properties of the alloys, demonstrating their suitability for biomedical use. A **biomaterials trends report** will highlight current challenges, opportunities, and innovation pathways in the field, while a **standards compliance analysis** will ensure alignment with medical device regulations and identify expected benefits.
- The project will also result in the **design and fabrication of at least 3 orthopedic implant plates**, supported by an **experimental testing report** for all lab-scale prototypes and a **production cost analysis** evaluating total manufacturing expenses.
- Dissemination outcomes will include **three research papers in Web of Science journals**, **participation in at least four international conferences or innovation exhibitions**, **two dedicated workshops**, and **a project website** to promote visibility and knowledge transfer. Together, these deliverables will confirm the scientific maturity and practical potential of the developed alloys for advanced orthopedic implant applications.

CONCLUSIONS

- The application of eco-friendly hybrid magnetic nanomaterials in flotation offers a highly efficient and sustainable approach to wastewater treatment.
- Through improved bubble–particle attachment and enhanced froth stability, the process ensures superior removal of organic and inorganic contaminants while reducing the need for chemical reagents.
- The magnetic nature of the nanomaterials allows for their easy recovery and repeated reuse, contributing to resource efficiency and lower operational costs.
- Operating under mild, environmentally safe conditions, this technology not only minimizes secondary pollution but also integrates smoothly with complementary treatment methods, supporting the development of circular and resilient water management systems.

ACKNOWLEDGEMENT

This work was funded by the Ministry of Research and Innovation, within National Project PN-IV-P7-7.1-PED-2024-0080, (PNCDI IV).

TESTING AND TRAINING / RECOVERY DEVICE FOR PEOPLE WITH NEURODEGENERATIVE DIFFICULTIES / DISORDERS

Patent application number: a 2025 00074

Author/s: Borcoși Ilie, Popescu L.G, Nedelcuță M.C, Borcosi C.A, Calina D.L, Borcoși A., Borcoși A., Popa R.G, Bălăcescu A., Rădulescu C., Runceanu A., Gilca G., Ionescu M., Lupulescu A.E.

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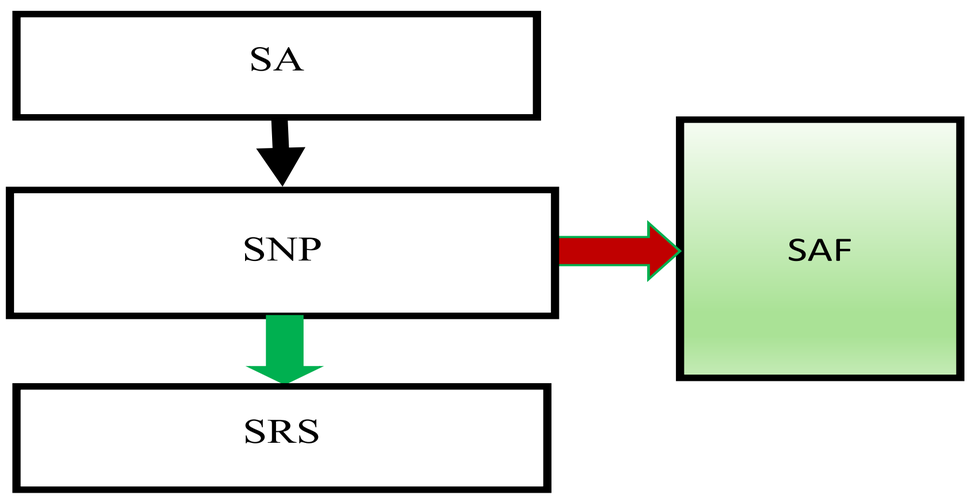
PURPOSE/OBJECTIVES OF THE PATENT

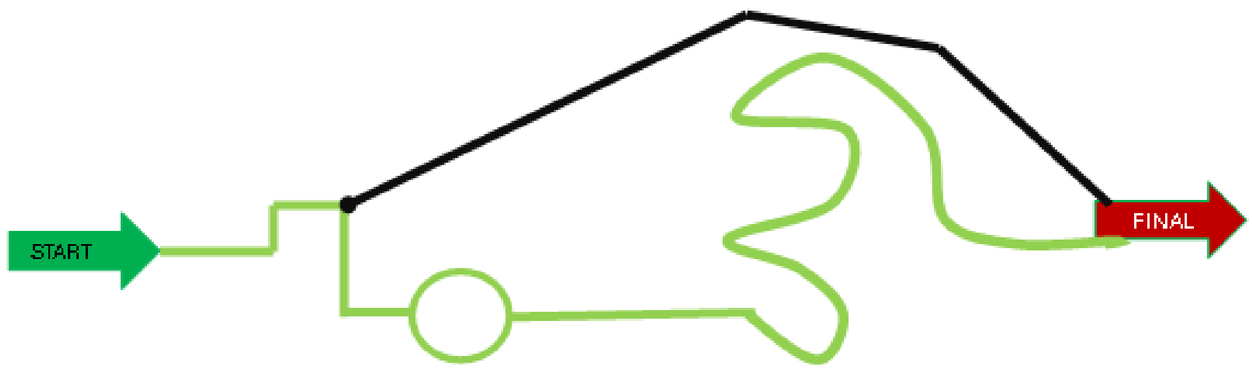
- early detection of manifestations of neurodegenerative disorders (Alzheimer's, Parkinson's), ensuring the possibility of early and effective interventions
- evaluating and monitoring the evolution of the disease through standardized and reproducible methods
- supporting the recovery process and stimulating neurogenesis through personalized and repeatable exercises and real-time feedback
- promoting equity in care in areas with limited medical resources.

NOVELTY / BENEFITS:

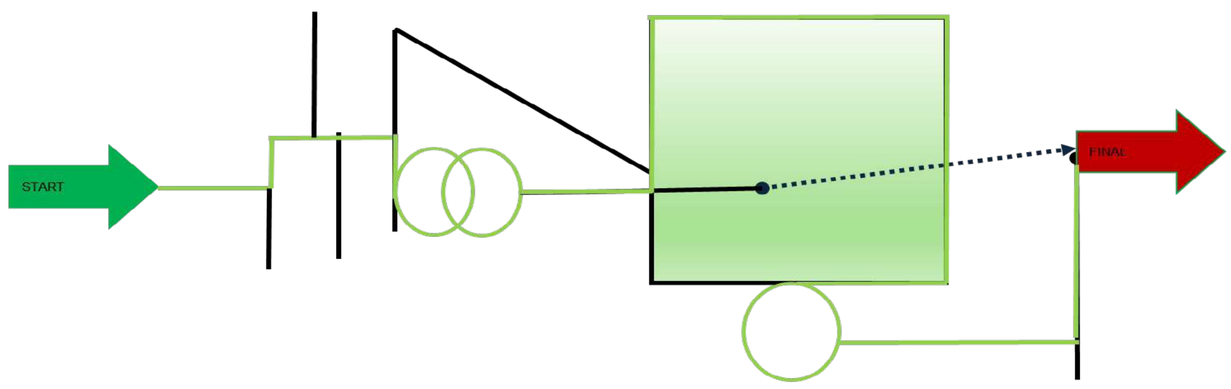
- Creating those "feel-good states" through motivation to increase attention, concentration for hand movement or motor skills
- testing people for neurodegenerative disorders (as well as testing the degree of presence of the disorder), which can sometimes be achieved through an extensive clinical investigation
- treatment through training / recovery or prophylaxis of people who may present these neuro-degenerative difficulties / disorders
- can be used for testing, but also for training / recovery of people with neuro-degenerative difficulties / disorders
- can determine the existence and level/degree of development of the disorder
- features elements to attract and motivate people, for example musical (audio) elements and attractive colors
- people can do testing and personalized training/recovery at home and not necessarily in a clinical setting
- allows following (through direct contact with the display) personalized colored routes, selecting certain levels, tests or routes, but also testing/verifying the completion of these routes and then associating a result (which can take into account the time required to complete the route, deviations from the route, completing a certain portion of the route).



Device structure



Personalized route 1



Personalized route 2

Contact: ctt.ucb@gmail.com

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Dr. Nicoleta-Simona COLEAȘĂ
Allergology and Clinical Immunology

MEDICAL TOURISM IN BRÂNCUȘI'S HOMELAND, WITH ALLERGOLOGY AT HEART

Author: Nicoleta-Simona COLEAȘĂ

F

The project **"Medical Tourism in Brâncuși's Homeland, with Allergology at Heart"** promotes an innovative approach that combines specialized medical services with the cultural and tourism potential of the Gorj region, Romania.

The initiative is coordinated by **Dr. Nicoleta-Simona Coleașă**, specialist in **Allergology and Clinical Immunology**, who provides diagnosis, treatment and monitoring of allergic diseases within a dedicated medical practice in Târgu Jiu. The cabinet offers services for patients of all ages and focuses on personalized medical care, using modern diagnostic methods and standardized allergological tests.

The medical practice provides **personalized care using modern diagnostic techniques**, contributing to both **patient well-being and regional development through health tourism**.

Medical Services
- Diagnosis and treatment of allergic diseases
- Allergic rhinitis, asthma and urticaria
- Food and drug allergies
- Atopic dermatitis and allergic conjunctivitis

Diagnostic Methods
- Skin prick tests for respiratory and food allergens
- Patch tests for contact allergies
- Spirometry and respiratory functional testing
- Allergen-specific immunotherapy

Impact
- Improved quality of life for patients with allergies
- Promotion of preventive medicine
- Development of **medical tourism in Gorj County**
- Integration of **healthcare, culture and tourism**

Contact
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SCAN ME

Hydrogen Sulfide Adsorbent Product and The Procedure for Its Obtaining

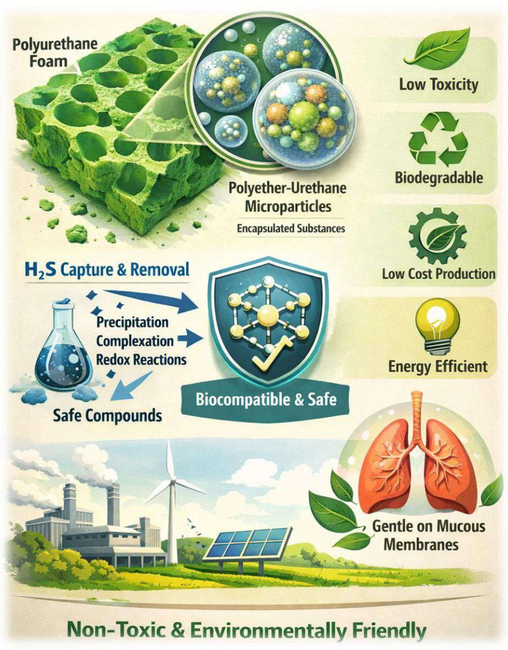
Patent RO133956

UMF Timisoara (LC Borcan, FG Popescu, F Borcan, EA Pauncu, MC Tomescu, CA Dehelean)

F

Abstract

The invention pertains to a product derived from a flexible, open-cell polyurethane foam, intended for use as personal protective equipment by employees in thermal baths or wastewater treatment facilities, as well as the process for its production. The product, as described in the invention, incorporates polyether-urethane microparticles containing a mixture of active substances—zinc oxide, disodium salt of ethylene-diamine-tetraacetic acid, and amorphous ferric oxide—in a molar ratio of 1:1:1.5. This composition is capable of reducing the concentration of hydrogen sulfide in an air stream by facilitating its conversion through chemical reactions such as precipitation, complexation, and redox processes.



ROMÂNIA

DUPLICAT

ELIBERAT INVENTATORULUI
în baza Art.34 alin.(2),
din Legea nr.64/1991 republicată

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

BREVET DE INVENȚIE

Nr. 133956

Acordat în temeiul Legii nr.64/1991 privind brevetele de invenție, republicată în Monitorul Oficial al României, Partea I, nr.613, din 19 august 2014.

Titular: UNIVERSITATEA DE MEDICINĂ ȘI FARMACIE "VICTOR BABEȘ" DIN TIMIȘOARA, TIMIȘOARA, TM, RO

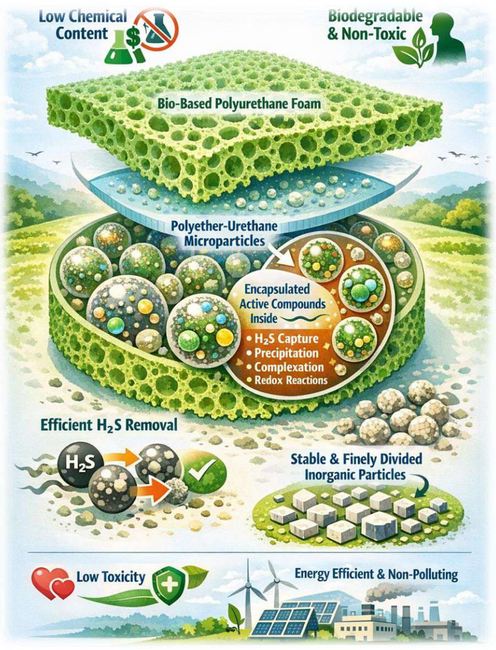
Titlul invenției: PRODUS ABSORBANT PENTRU HIDROGEN SULFURAT, ȘI PROCEDEU DE OBȚINERE A ACESTUIA

Inventatori: BORCAN LIVIA CRISTINA, TIMIȘOARA, TM, RO; POPESCU FLORINA GEORGETA, TIMIȘOARA, TM, RO; BORCAN FLORIN, TIMIȘOARA, TM, RO; PĂUNCU ELENA ANA, TIMIȘOARA, TM, RO; TOMESCU MIRELA CLEOPATRA, TIMIȘOARA, TM, RO; DEHELEAN CRISTINA ADRIANA, TIMIȘOARA, TM, RO

Descrierea invenției, revendicările și desenele la care se face referință în acestea, fac parte integrantă din prezentul brevet de invenție.
Durata brevetului de invenție este de 20 ani, cu începere de la data de 25/01/2019, cu condiția plății taxelor anuale de menținere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea și aplicarea sigiliului
Director General

București, Data eliberării 30/03/2021



Advantages

The absorbent product is characterized by a low content of chemicals, which reduces manufacturing cost and toxicity.

The absorbent product is characterized by the fact that the organic components (both the flexible, open-cell foam and the microparticles) are of the same type - polyurethanes, biocompatible with the human body and biodegradable.

The absorbent product is characterized by the fact that the mixture encapsulated inside the polyether-urethane microparticles plays a complex role in capturing hydrogen sulfide through precipitation, complexation and redox reactions.

The use of polyether-urethane microparticles determines the stabilization of inorganic substances in a finely divided state, avoiding excessive growth of crystallites, which contributes to the kinetics of hydrogen sulfide retention / conversion processes.

The use of polyether-urethane microparticles determines the fixation of inorganic substances in a finely divided state, which contributes to reducing the impact of the absorbent material on the mucous membranes and the possibility of its use for long periods of time.

The product has a low toxicity.

The technique is non-polluting and does not require high energy consumption.

Contact: Florin Borcan fborcan@umft.ro; +40722371025

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UNIVERSITATEA DE MEDICINĂ ȘI FARMACIE VICTOR BABEȘ TIMIȘOARA

FOREARM MOLD FOR PRACTICING ARTERIAL PUNCTION AND CATHETERIZATION

F

Ovidiu Alexandru MEDERLE, Dumitru ȘUTOI, Bogdan Alexandru PUȘCAȘ, Daian Ionel POPA, Cosmin Iosif TREBUIAN, Cosmin LIBRIMIR, Octavian Marius CREȚU, Augustin SEMENESCU

This mold claims to be used for practicing arterial punction and catheterization by Seldinger method.
Medical students and resident doctors especially intensive care and anaesthesiology and emergency medicine physicians can practice for gaining experience by learning this method.
This invention imitates the anatomy of anterior face of right forearm, which has as principal element radial artery with its pulsative waves that can be felt by practicioners during the procedure.
It is formed by a solid basement, surrounded by a soft material, similar to adipose and lax connective tissue. In interior, we imitate from the right to the left: radial bone, radial groove, radial artery which is more superficial than radial groove, tendon of radial flexor of carpus, median nerve and cubital bone.
The positive pressure is given manually, by a closed circuit with a 50 ml syringe filled with serum and red ink, by pushing the syringe piston.

The technical problem solved by the invention consists in reducing the training time of resident doctors for catheter insertion by Seldinger method, giving the chance for gaining experience before practicing on patients and decreasing the chance of developing complications

ADVANTAGES

1. It is affordable
2. It decreases the training time
3. It improves the asepsia and antisepsia
4. Low manufacturing cost and time saving;
5. It reduces the risk of developing complications during and after clinical procedure.
6. It offers a simillar anathomical, sensitive and practicing experience as in clinical practice .
7. It gives the opportunity for gaining practical experience and confidence, because inserting a catheter intravascular by Seldinger method has a high level of difficulty.

Contact: 0726839049 / sutoidumitrusd@gmail.com

Comparative Evaluation of Injectable Platelet-Rich Fibrin with and Without Microneedling in Periodontal Regeneration: A Prospective Split-Mouth Clinical Study

Iulia Muntean , Alexandra Roi , Lavinia Cosmina Ardelean, Laura-Cristina Rusu

1 University Clinic of Oral Pathology, Multidisciplinary Center for Research, Evaluation, Diagnosis and Therapies in Oral Medicine, "Victor Babes" University of Medicine and Pharmacy Timisoara, 2 Eftimie Murgu Sq., 300041 Timisoara, Romania; iulia.sauciur@umft.ro (I.M.); alexandra.moga@umft.ro (A.R.); laura.rusu@umft.ro (L.-C.R.)
2 Academic Department of Technology of Materials and Devices in Dental Medicine, Multidisciplinary Center for Research, Evaluation, Diagnosis and Therapies in Oral Medicine, "Victor Babes" University of Medicine and Pharmacy Timisoara, 2 Eftimie Murgu Sq., 300041 Timisoara, Romania

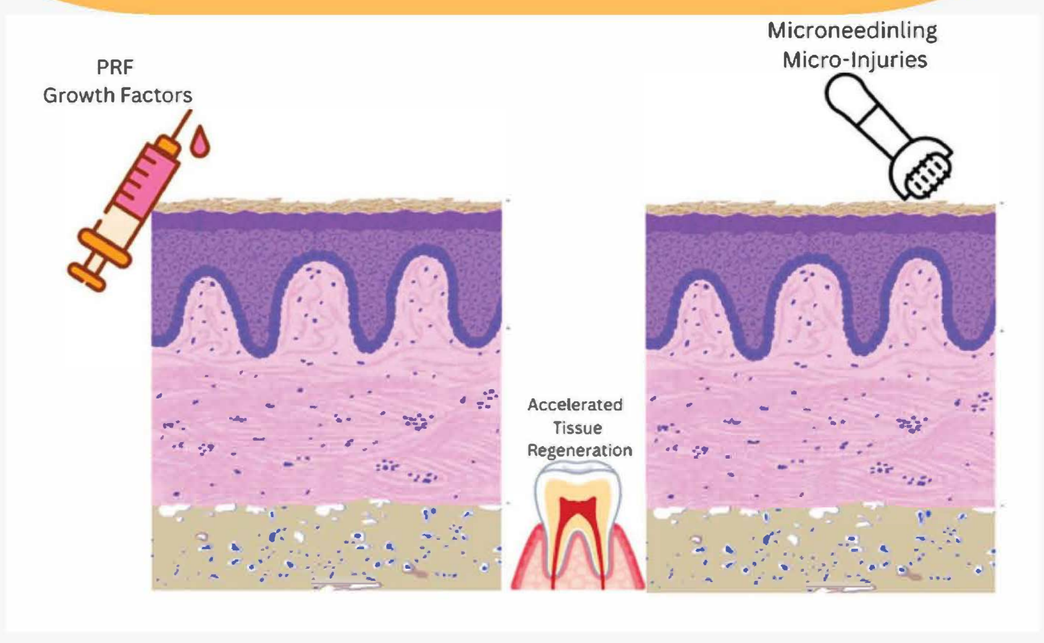
F

Periodontal disease is one of the most prevalent chronic inflammatory conditions affecting oral health, impacting approximately 1.07 billion people worldwide according to the Global Burden of Disease Study 2021. Its prevalence has increased over recent decades and is expected to continue rising. Periodontal disease mainly includes two forms: gingivitis, a reversible inflammation of the gingiva, and periodontitis, a more severe and irreversible condition characterized by destruction of the periodontal ligament and alveolar bone, which may ultimately lead to tooth loss.
The etiology of periodontal disease is multifactorial and involves the interaction between bacterial biofilm and the host immune response. Several risk factors contribute to its development, including smoking, poor oral hygiene, diabetes, obesity, age, genetic predisposition, and low socioeconomic status.

Scaling and root planing (SRP) is considered the standard non-surgical treatment for early and moderate stages of periodontitis. However, in advanced stages, additional regenerative therapies may be required. Recently, minimally invasive regenerative approaches such as microneedling (MN) and platelet-rich fibrin (PRF) have gained increasing attention. Microneedling stimulates collagen production and tissue healing, while injectable PRF (i-PRF) provides growth factors that promote angiogenesis and tissue regeneration.

The present study aims

Evaluate the clinical efficacy of a combined periodontal treatment protocol consisting of SRP followed by microneedling and i-PRF application, compared with SRP combined with i-PRF alone, in patients with stage II and III periodontitis. Clinical parameters such as bleeding on probing and gingival edema will be assessed during follow-up evaluations at 1, 3, and 6 months.



- **The present study evaluates for the first time the clinical efficacy of a combined minimally invasive protocol (SRP + i-PRF + microneedling) compared with SRP + i-PRF in the treatment of patients with stage II–III periodontitis.**
- **The results show that both therapeutic protocols produced significant improvements in periodontal parameters (CAL, BOP, and PI) during the 6-month follow-up period.**
- **The combined protocol (SRP + i-PRF + microneedling) demonstrated a slightly greater gain in clinical attachment level (CAL), suggesting a possible adjunctive effect of microneedling in periodontal regeneration.**
- **The integration of minimally invasive techniques and autologous biomaterials, such as i-PRF, may represent a promising strategy for stimulating tissue regeneration and improving the outcomes of periodontal therapy.**

IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE IN OPTIMIZING RURAL TOURISM MANAGEMENT

Theodor Muntean; Larisa-Elena Briscan; Tiberiu Iancu; Ramona Ciolac; Tabita Adamov

[1]University of Life Sciences "King Mihai I" from Timisoara, Faculty of Management and Rural Tourism, Romania

F

Rural tourism plays a vital role in supporting local economies and preserving cultural heritage. However, it faces challenges such as seasonal fluctuations, inefficient resource use, and changing tourist preferences. The integration of Artificial Intelligence (AI) offers powerful tools to address these issues. By using machine learning, neural networks, and smart technologies like chatbots and recommender systems, rural tourism can improve visitor experiences, optimize operations, and promote sustainable development. This study investigates how AI is transforming rural tourism management and contributing to economic, social, and ecological growth.

THE FUTURE SOUNDS LIKE THIS...

AI is reshaping rural tourism by enhancing experiences, managing resources, and ensuring sustainability. Key benefits include personalized itineraries, optimized resource use, and environmental protection. However, limitations such as poor infrastructure, skill gaps, and high costs exist. Solutions include phased AI implementation, stakeholder collaboration, and targeted investment. Long-term, AI can transform rural destinations into efficient, sustainable, and attractive tourist hubs.

The Future of Rural Tourism is Intelligent

The implementation of artificial intelligence (AI) in rural tourism has demonstrated a transformative potential across operational, economic, and environmental domains. This study shows that AI not only enhances the efficiency of tourism management but also contributes significantly to the sustainable development of rural areas. By employing tools such as machine learning algorithms, chatbots, predictive analytics, and geographic information systems (GIS), rural tourism operators can make data-driven decisions that improve service quality, anticipate visitor trends, and optimize resource usage.

Opportunity
CORNELIUGROUP
Research-Innovation Association
INVENTCOR
Power of Creative Mind
Creation
Realization
Deva ROMANIA

PureSTEPS
TECHNOLOGY

INTERNATIONAL INVENTION INNOVATION COMPETITION IN CANADA
iCAN
TORONTO, CANADA

THE **GRAND PRIZE WINNER**

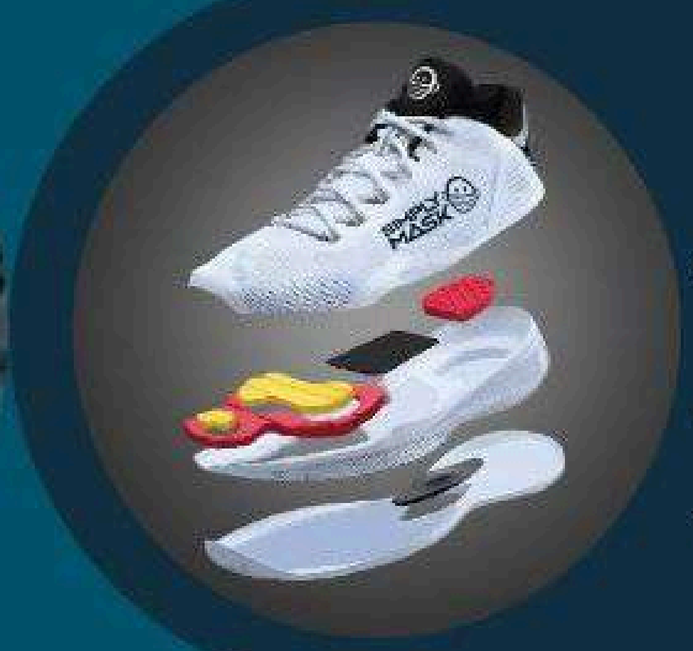
SELECTION OF THE 1ST HIGHEST HONOUR IN iCAN 2025 (P57)

F

Disinfecting Shoe Soles for Safer Public Spaces

1. MAIN PROBLEMS

- **Winter's Hidden Threat:** Pathogens on floors, spreading with every step;
- **Traditional Cleaning Fails:** Can't keep up with high-traffic areas.



2. SOLUTION

- **PureSTEPS Technology:** Shoe soles with antimicrobial nano-composites;
- **Kills 99%** of Pathogens in a short time;
- **Disinfects** with every step.

3. KEY BENEFITS

- **Clean Floors, Safe Air:** Even in crowded winter conditions;
- **Reduces Flu Spread:** Effective in high-density environments.

4. PROOF OF EFFECTIVENESS

Hong Kong MTR Simulation:

- **90.97%** pathogen reduction in 60 seconds
- **98.32%** in 120 seconds

Hong Kong MTR Simulation Test Results:

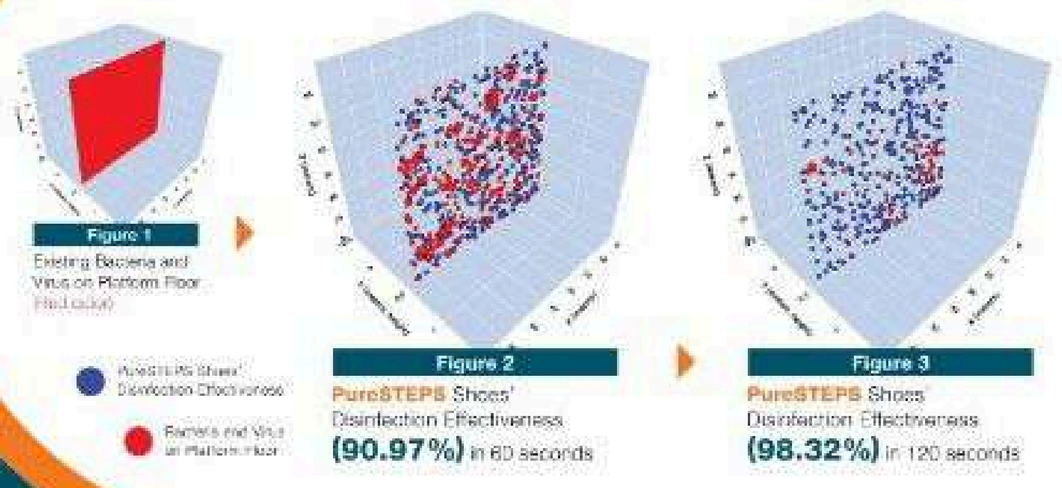


Figure 1
Existing Bacteria and Virus on Platform Floor
(Red color)

Figure 2
PureSTEPS Shoes' Disinfection Effectiveness
(90.97%) in 60 seconds

Figure 3
PureSTEPS Shoes Disinfection Effectiveness
(98.32%) in 120 seconds

PureSTEPS is being virually tested at Hong Kong's Admiralty MTR station (L3 platform). The platform has initial microbial contamination, and our simulation tracks 300 people per second wearing **PureSTEPS** shoes. AI technology models how **PureSTEPS** footwear reduces pathogen spread in this high-traffic environment. This shows how our shoes can lower health risks.

5. APPLICATIONS

FOR:
Metro Commuters, Medical Staff, Students, Retail Workers, First Responders

IN:
Metros, Hospitals, Schools, Retail Stores, Public Areas...

6. COLLABORATION & FUNDRAISING

Our current progress is patent pending, and we are looking for R&D collaboration and fundraising partners.

Let's prepare well together for the next pandemic outbreak!

7. WHO WE ARE?

SimplyMask

The pioneer of Anti-pandemic Solutions.

- Won more than 70 invention & innovative awards
- Promoted anti-pandemic solutions in more than 10 countries

Contact details for inquiries or collaboration:
Email: info@simplymask.com.hk

SIMPLY MASK

Opportunity
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Deva ROMANIA

TUIASI
"Gheorghe Asachi" Technical University of Iasi

Iasi, Romania

PEDIATRIC DEVICE FOR DETERMINING LOWER LIMB LENGTH DISCREPANCY

F

Patent/project number: a 2024 00436

Authors: Dimitrie-Cristian FODOR[1], Cristian AGHION[2], Neculai-Eugen SEGHEDIN[1]

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[2] Faculty of Electronics, Telecommunications and Information Technology, "Gheorghe Asachi" Technical University of Iași

Novelty and Originality

The invention concerns a pediatric device designed to determine limb length discrepancy (LLD) in both intact and amputated pediatric patients. It is applicable in the fields of preventive medicine and prosthetics, being useful for the continuous monitoring of children's physical development. The device is capable of detecting limb length differences (Master Component) and, when functionally connected to an adaptable prosthesis, can also perform corrective adjustments (Slave Component).

Master Component

Description of the Invention

This invention aims to address the technical limitations of current methods used to evaluate LLD in pediatric patients. Conventional approaches are often hindered by the subjectivity of clinical assessments, poor repeatability and traceability, and dependence on expensive, invasive imaging techniques such as X-rays for routine anthropometric monitoring. The proposed device enables objective, non-invasive quantification of leg length discrepancy based on data acquired from the patient—either in a clinical environment or at home. Furthermore, when integrated with a self-adaptive prosthesis, the system allows autonomous adjustment of the prosthetic limb length, ensuring alignment with the contralateral biological limb.

Slave Component

Master Component without orthoses

Master Component stabilized with orthoses

Conclusions

The integration of such technology could catalyze the evolution of novel standards in medical engineering, thereby facilitating the development of more efficient and customized devices that are tailored to the individual needs of patients. By enabling objective, repeatable, and non-invasive assessment of LLD—even outside clinical settings—and allowing autonomous adjustment of self-adaptive prostheses, this approach represents a significant step forward in pediatric rehabilitation and preventive care.

References

Contact: cristifodorbim@gmail.com

Adaptogenic biscuits adjuvant in maintaining astronauts' homeostasis

Patent: A 00083/ 2026

Author/s: Irina M. Matran, Claudia V. Bănecu, Alexandra M. Șipoș

F

Description: The invention relates to **adaptogenic biscuits adjuvant in maintaining astronaut homeostasis**. The field of human space travel is in the midst of a revolution. Future missions aim to push the limits of space travel, with plans to travel longer distances and durations than ever before. Due to the negative health effects of microgravity, the time period and conditions in the International Space Station or other space vehicles, the health of astronauts or space hikers is seriously affected. Under these conditions, their bodies may suffer the following serious changes: musculoskeletal (muscle and bone atrophy, delayed wound healing), neurological (spatial motion sickness, alterations in smell and taste, and self-reported congestion, internal jugular vein thrombosis, motion sickness after flight, neurodegenerative disorders and central nervous system changes), immunological (reactivation of latent viruses, hypersensitivity), gastroenterological (dysbiosis of good microbiota, gastroesophageal reflux, constipation), cardiovascular (accelerated atherosclerosis), ophthalmological (radiation-induced cataracts), pneumological (lung adenocarcinomas and squamous carcinomas), dermatological (melanoma and non-melanoma skin cancers), traumatological (increased risk of traumatic injuries during construction, accidental acceleration of large masses in zero gravity conditions, impaired physiological responses to hemorrhage and shock in zero gravity conditions, bone demineralization increases the risk of traumatic fractures). Space radiation induces cancer in most astronaut systems, in skeletal muscles, it remodels bone cells, hematological (acute hematopoietic effects, space-related hemolytic anemia). Microgravity also has negative effects on mental health (psychological suffering, depression, isolation, immobilization, lack of social interaction), circadian rhythms that it alters (circadian desynchronization and sleep loss), auditory exposures).

The technical problem solved by the invention consists in establishing the natural components and association ratios within the adjuvant adaptogenic biscuits in maintaining astronauts' homeostasis.

Adaptogenic biscuits, adjuvants in maintaining astronauts' homeostasis, eliminate the aforementioned disadvantages by being made of white wheat flour 0.01...29%, dehydrated chicken meat 0.01...9.50%, dehydrated onion flakes 0.01...2.5%, coconut oil 0.01...12.5%, red pepper flakes 0.001...2%, parsley root flakes 0.001...2%, dehydrated carrot 0.01...2%, *Cordyceps sinensis* mushroom powder 0.01...2.5%, *Maitake mushroom* powder 0.01...2.5%, Shiitake mushroom powder 0.01...2%, chicken eggs 0.01...37%, spice 0.01...3.5%.

The advantages of the spice are given by its composition: salt 0.01...30%, turmeric 0.01...30%, mustard powder 0.01...8%, garlic powder 0.01...16%, sweet paprika 0.01...3%, cumin powder 0.01...2.5%, anise powder 0.01...1%, cardamom powder 0.01...2%, chili pepper powder 0.01...2.5%, nutmeg powder 0.01...0.5%, cinnamon powder 0.01...5%, ginger powder 0.01...3.5%, coriander powder 0.01...2.5%, black pepper powder 0.01...0.5%.

Adaptogenic biscuits, adjuvants in maintaining astronauts' homeostasis

By applying the invention, the following advantages are obtained: • They have a composition rich in macronutrients (carbohydrates, lipids, proteins); • **The composition is complex (flour/dough, vegetable fat, chicken, eggs, vegetables and spices), ensuring all essential amino acids**; • They contain **soluble fiber**; • **They are adaptogens**; • They are adjuvants in maintaining normal homeostasis of the astronauts' body; • They are adjuvants in preventing neurological, musculoskeletal and psychological changes; • The spices used **stimulate the astronauts' taste and olfactory receptors**, which in microgravity conditions are greatly diminished. • **They can be certified organic and/or Halal**; • They do **not contain dyes and preservatives**; • They do **not contain added sugar**; • They do **not contain palm or sunflower oil**; • They do **not contain synthetic additives that can cause adverse reactions or drug interactions**; • They have a **glycemic index of 17, which means that they release glucose slowly, keeping blood sugar stable.** This **is an advantage for preventing prediabetes or type 2 diabetes, due to microgravity**; • **They are antacids**; • They contribute to preventing the occurrence of gastroesophageal reflux or episodes of heartburn; • They prevent the erosion of hard dental structure; • **They do not require special conditions (refrigeration/freezing) for storage;** • They are individually **vacuum-packed**, which is a great advantage, because astronauts can consume as many biscuits as they want and the rest of the biscuits remain packaged, preserving their validity. • The fact that they are **individually packaged also gives them the advantage of not damaging the equipment and instruments in the International Space Station or other space vehicles**. • Coconut oil offers countless health benefits due to its content of essential vitamins, such as vitamin A and vitamin E. These help improve vision, immunity, and growth. In addition to these properties, coconut oil helps manage blood sugar, obesity, and cholesterol levels. • **The mushrooms and certain spices used have adaptogenic properties and improve the immunity of the human body;** • The biscuits can also be consumed by soldiers/military personnel, performance athletes or the general population; • **They can be consumed as such, at any time of the day/night, or as an aperitif biscuit, with tea, or as a dessert, in combination with a rum-flavored prebiotic cream**.

Sensory analyses: • **External appearance:** regular shape with a matte upper surface, with well-relieved layers without bubbles; • **Sectional appearance:** well baked, fine porosity, without voids; • **Colour:** light brown to dark brown on the surface and light brown in the section; • **Taste:** pleasant, specific to the spices used; • **Smell:** pleasant, specific to the spices used; • **Consistency:** homogeneous, specific to the assortment.
Physico-chemical analyses: • **Water activity:** 0.5; • **Neutralization capacity:** 5 frames of ground and homogenized biscuits neutralized at least 25 ml of hydrochloric acid (HCl) n/10 after 30 minutes of reaction at a temperature of 37°C in the presence of bromphenol blue indicator, which means that the biscuits adjuvant in maintaining astronauts' homeostasis are antacids. **This result was surprising/unexpected and represents a distinct advantage for these biscuits, in that they can prevent gastroesophageal reflux or heartburn episodes that can be caused by microgravity. Also, because they are antacids, these biscuits prevent erosion of the astronauts' hard dental structure (teeth). As a result, the surprising effect of the biscuits is that of protecting the astronauts' gastrointestinal tract during space missions in microgravity conditions.**

Microbiological analyses: • Yeasts and molds <10 CFU/g.

The nutritional values for 100g of cookie dough are: 327.31 kilocalories, 1374.04 kilojoules, 27.07, grams of total carbohydrates, 2.56 grams sugars, 16.89 grams of total fat, 16.03 grams protein, 3.49 grams fiber, 2.47 grams salt.

State of development: Prototype

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TITLE

AUTOMATED MEDICAL INSTRUMENT FOR RADIOFREQUENCY ABLATION

INVENTOR/S - CONTACT

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doina.pisla@mep.utcluj.ro

PATENT/PROJECT

Patent OSIM no.: RO132965- B1 / 28.11.2025

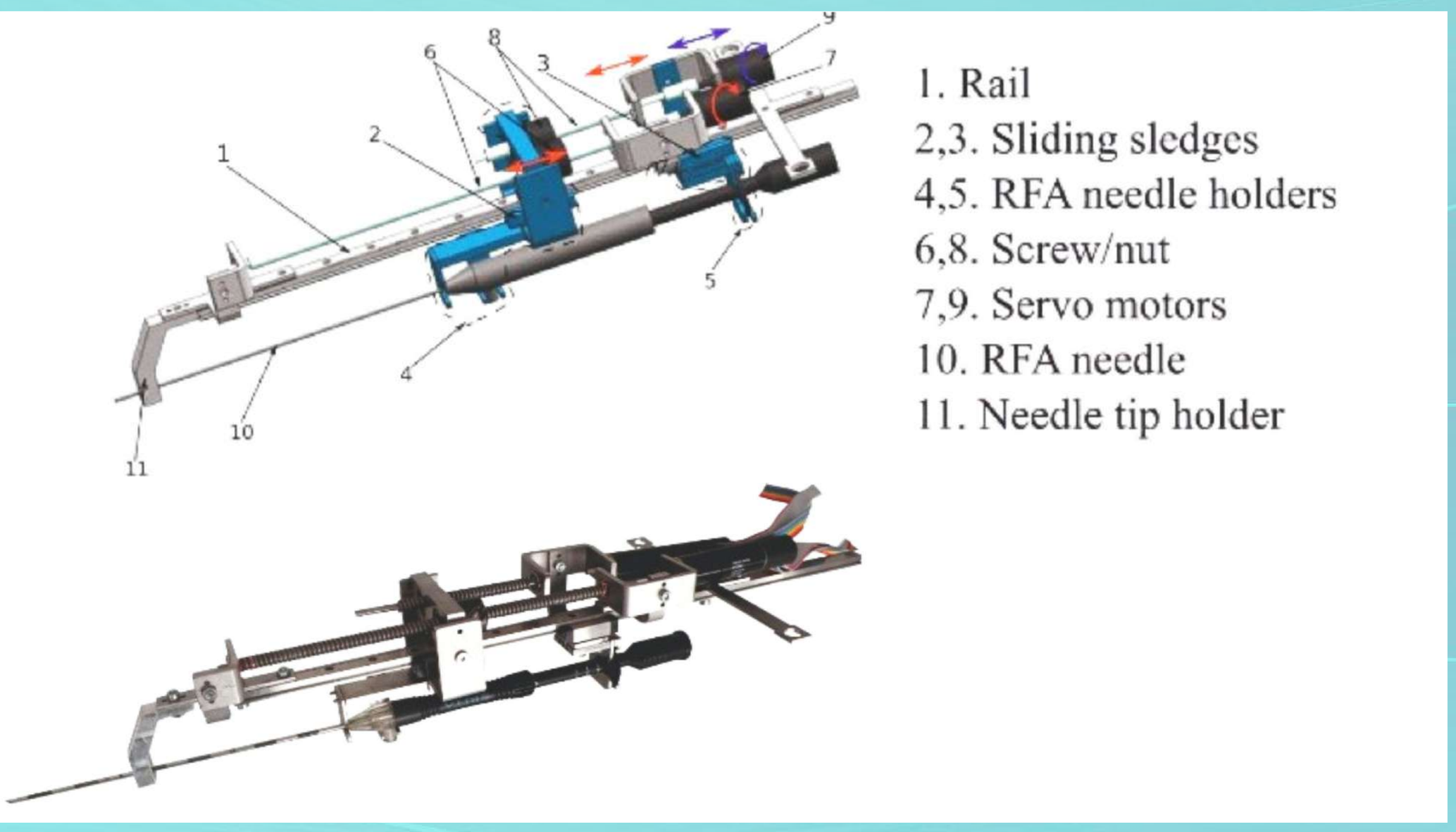
SHORT PRESENTATION

The invention presents an automated medical instrument for radiofrequency ablation which employs an ablation needle mounted in the instrument holder, having two degrees of mobility. The first degree of freedom is for inserting and retracting the needle, and the second one is for inserting and retracting the antennas inside the ablation needle cannula. The instrument is designed to be guided by a positioning and orientation device relative to the patient's position, which may be a hand-held setting device or a medical robot that fixes the instrument prior to insertion and keeps it fixed throughout the entire period of the ablation procedure, thus increasing the precision of needle positioning for the ablation procedure.

APPLICABILITY

The proposed device can be used for robotic assisted or manual treatment of hepato-carcinoma (liver tumours) through radiofrequency ablation (RFA) in a minimally invasive approach

IMAGES



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TITLE

AUTOMATED MEDICAL INSTRUMENT WITH MULTIPLE NEEDLES INSERTED ON PARALLEL TRAJECTORIES FOR INTERSTITIAL BRACHYTHERAPY

INVENTOR/S - CONTACT

Iosif Bîrlescu, Bogdan George Gherman, Alin Burz, Doina Liana Pîsla
doina.pisla@mep.utcluj.ro

PATENT/PROJECT

Patent OSIM no.: RO134940-B1 / 30.10.2025

SHORT PRESENTATION

The proposed device is an automated medical instrument capable of sequentially loading and inserting multiple brachytherapy needles without repeated repositioning after each insertion. Its architecture combines three coordinated modules: a needle insertion and release module, a needle storage module, and a tip-guidance module. Two motors generate the required linear and rotational motions. A screw-nut transmission moves the insertion carriage along a rail, while a cable-driven drum mechanism aligns and couples each new needle from the storage magazine. A dedicated guidance element with a hole matrix stabilizes the needle tip during penetration and helps reduce buckling. By automating successive insertions, the system can improve targeting precision, repeatability and procedural efficiency.

APPLICABILITY

The invention is applicable to interstitial brachytherapy and other precision needle-placement procedures in oncology. It is relevant for research laboratories, robotic-assisted treatment platforms and medical prototypes where several needles must be inserted with high positional accuracy, repeatability and safety. The modular concept can be adapted to different needle arrangements and tumor geometries.

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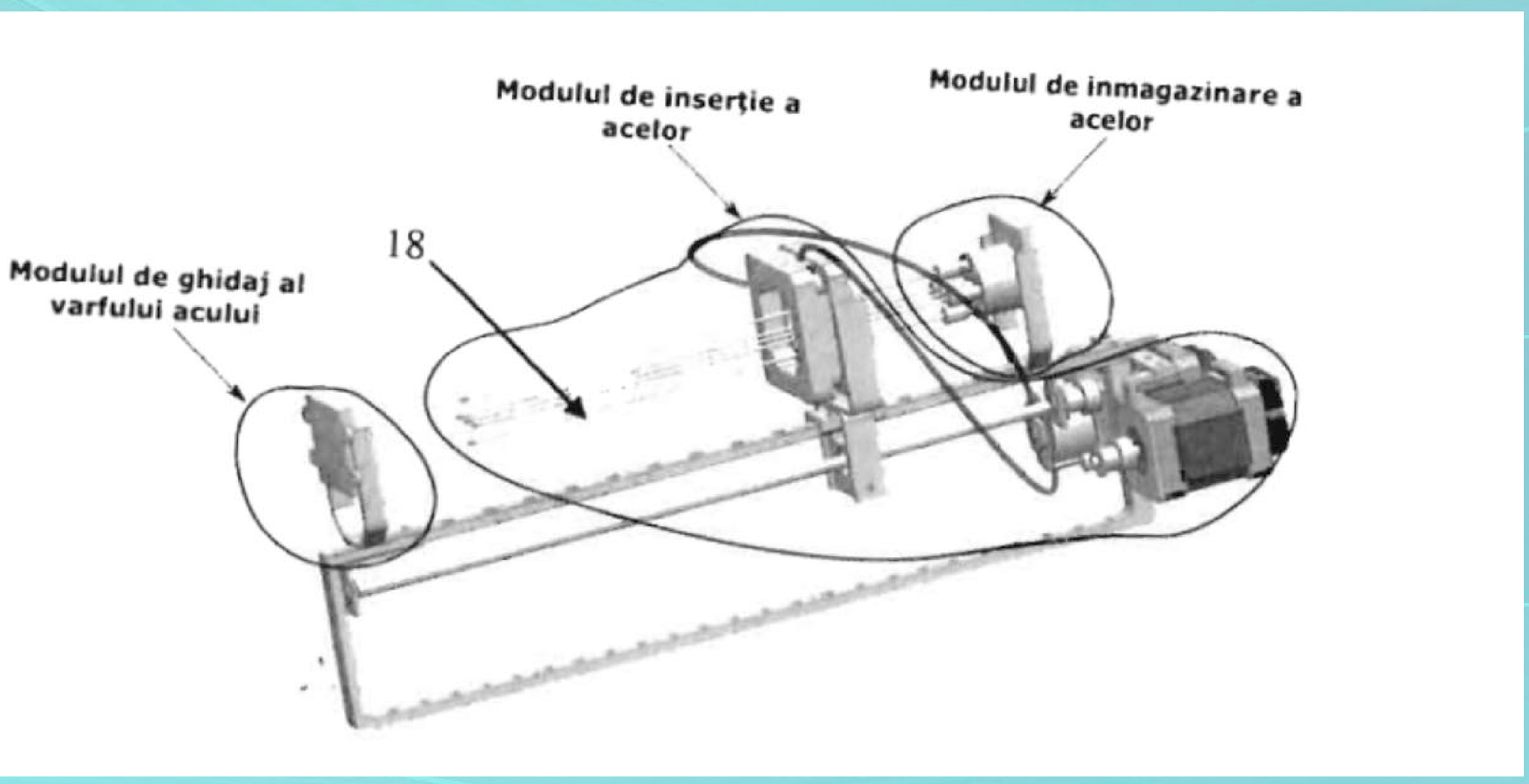

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TITLE

APPARATUS AND METHOD FOR LINEARIZATION OF CONTROL CODE-OSCILLATION FREQUENCY CHARACTERISTIC FOR MULTI-BAND DIGITALLY CONTROLLED OSCILLATORS AND APPARATUS CUSTOMIZATION FOR A FREQUENCY-LOCKED LOOP

INVENTOR/S - CONTACT

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PATENT/PROJECT

Patent OSIM no.: RO134011-B1/ 28.03.2025

SHORT PRESENTATION

This invention describes a system and method for improving the accuracy of digitally controlled oscillators (DCOs). A DCO generates a signal whose frequency is set by a digital control code. Ideally, changes in the control code would result in proportional (linear) changes in frequency. However, in practice, the relationship between control code and output frequency is often nonlinear. This invention corrects that problem by automatically measuring and compensating for the oscillator's nonlinear behavior.

The system includes three main parts: a digital frequency converter, a control algorithm, and a linearization block. The linearization block operates in two modes: a calibration (or activation) mode and a normal operation mode. A calibration unit selects the mode and controls a multiplexer that switches between signal paths.

APPLICABILITY

A numerically controlled oscillator can be used to generate clock signals used by digital systems (e.g. microcontrollers, microprocessors, application-specific integrated circuits, programmable areas, programmable logic areas, but not limited to those mentioned) or in telecommunications systems where it is necessary to generate a local oscillation (hereinafter called local oscillator signal) for modulating/demodulating signals or data received or transmitted.

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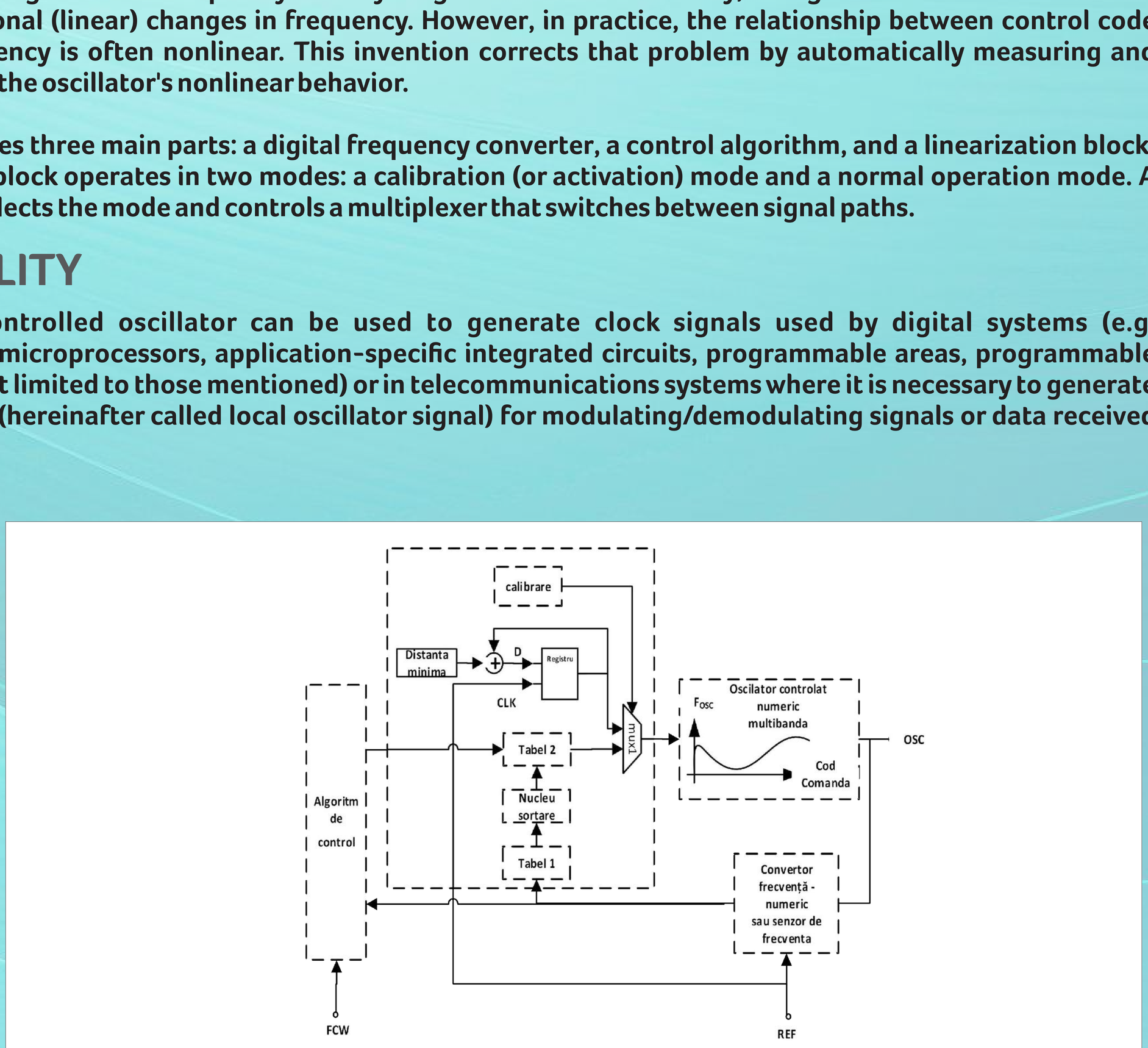


"Ya Odt Ya Ba Effervescent Tablets"

Novel Approaches in Amphetamine Withdrawal Treatment: Medical Innovations to Enhance the Quality of Life for Drug Addiction in the Public Health Service System

This paper was financially supported by Thailand's Science, Research, and Innovation (SRI) Fund according to grant number FFB660056/0011. PETTY Patent Application: 2303003213 and 2503001310

Theerathorn Sungrai (B.Pharm.) and Asst. Prof. Maleeruk Utsintong (Ph.D.)

About 90% showed significant improvement

SAVE €300 billion /year

Introduction

In 2020, 34.07 million people worldwide used amphetamines, with the highest rates in the Americas, Asia, and Europe. Long-term abuse can lead to severe brain and cardiovascular damage, and there is no pharmacotherapy currently available for amphetamine addiction.

Objectives

This product offers a novel approach, demonstrated through drug discovery at the molecular level, green technology in the pharmaceutical industry, cellular studies, and clinical trials.

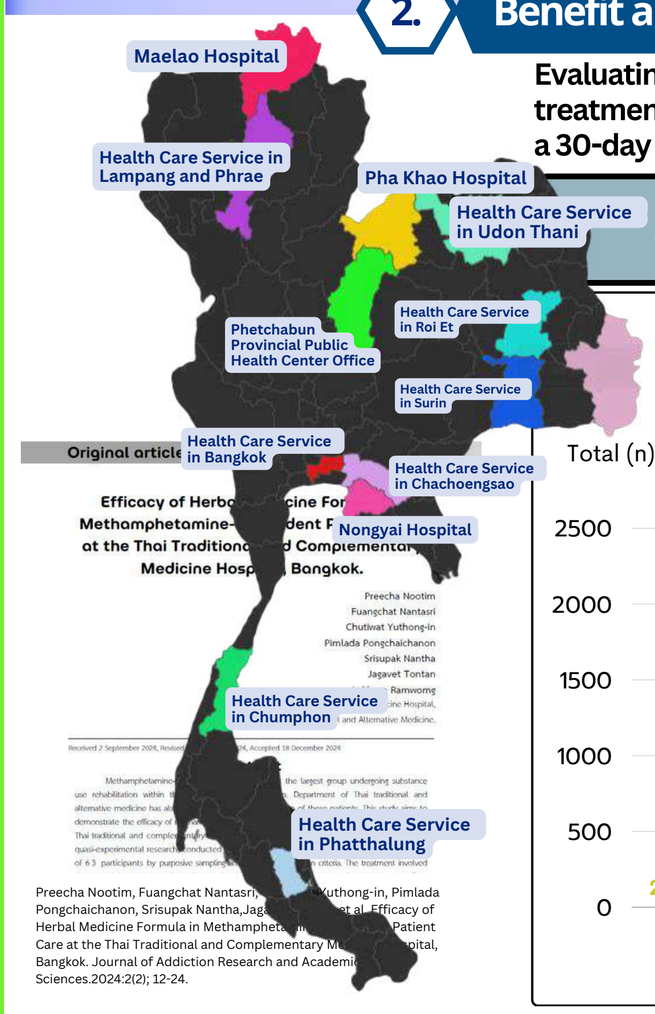
Discussions/Conclusions

Cellular studies confirmed the product's efficacy and safety, demonstrating neuroprotective activity by promoting autophagy in SH-SY5Y cells. It also showed no neurotoxicity after treatment. In 2,832 patients, the product significantly reduced amphetamine withdrawal symptoms such as reporting cravings, pain, insomnia, headaches, and fatigue, about 90% improvement and no severe side effects. Moreover, the product significantly reduced the score on the amphetamine withdrawal questionnaire, with a statistically significant improvement from 4.68 ± 4.42 to 3.70 ± 3.46, and no severe adverse events were reported in methamphetamine-dependent patients.

We have fully implemented industrial-scale production, and 450,000 tablets have been distributed to healthcare services nationwide and saved approximately 300 billion euros globally each year

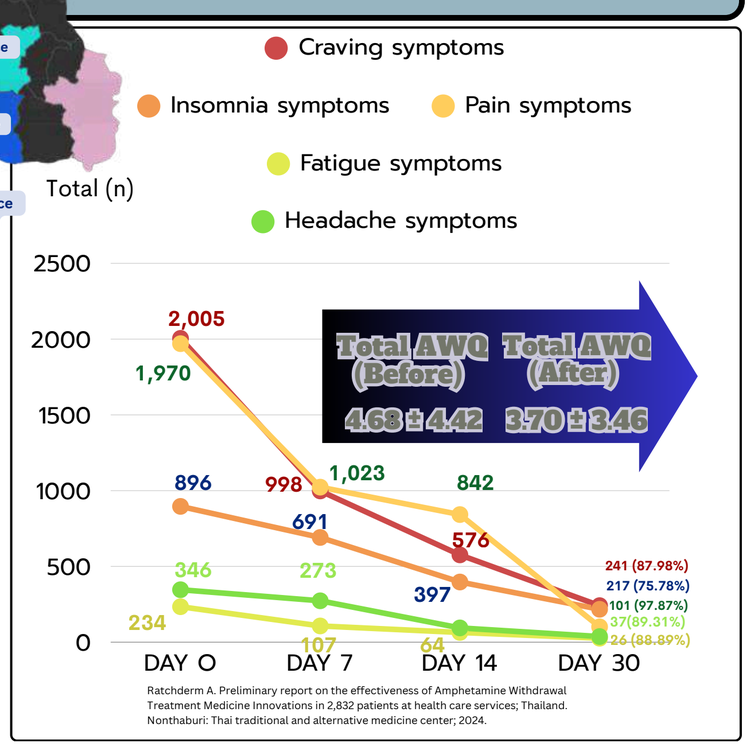
2. Benefit areas of the community and society

Evaluating the impact of Amphetamine withdrawal treatment medicine innovations: a 30-day study with 2,832 patients



Preecha Nootim, Fuangchat Nantasri, Xuthong-in, Pimlada Pongchaichanon, Srisupak Nantha,Jaga et al. Efficacy of Herbal Medicine Formula in Methamphet Patient Care at the Thai Traditional and Complementary M spital, Bangkok. Journal of Addiction Research and Academi Sciences.2024:2(2); 12-24.

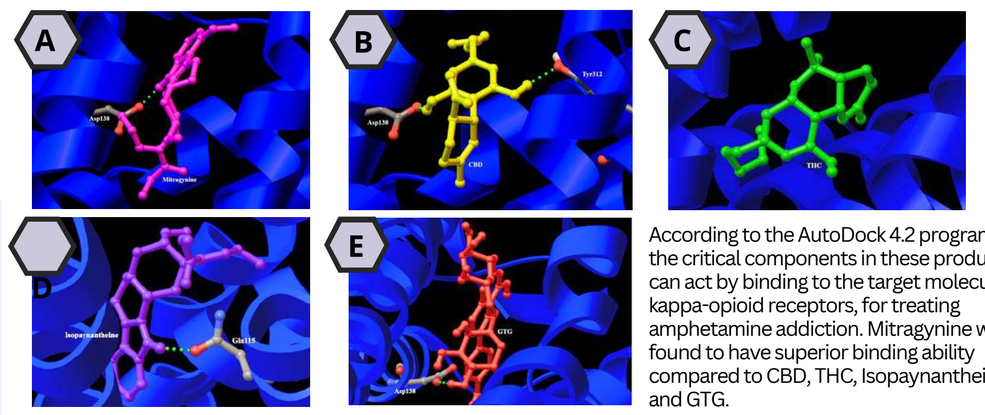
impact of Amphetamine Withdrawal Treatment Medicine Innovations



Ratchderm A. Preliminary report on the effectiveness of Amphetamine Withdrawal Treatment Medicine Innovations in 2,832 patients at health care services; Thailand. Nonthaburi: Thai traditional and alternative medicine center; 2024.

1. Innovation and supporting results

Section 1.1 Predicting the mechanism of action of substances to target molecule (kappa-opioid receptors) with molecular docking (*in silico* study)



According to the AutoDock 4.2 program, the critical components in these products can act by binding to the target molecule, kappa-opioid receptors, for treating amphetamine addiction. Mitragynine was found to have superior binding ability compared to CBD, THC, Isopaynantheine, and GTG.

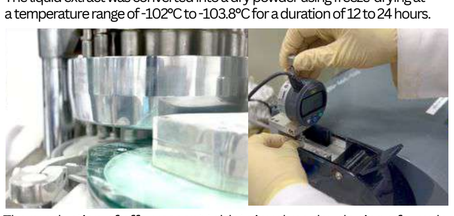
These results support novel approaches to treating amphetamine addiction by maintaining dopamine secretion levels in the central nervous system, helping to reduce drug addiction and alleviate withdrawal symptoms from amphetamines.

Compounds	Results		
	Binding energy (Kcal/mol)	%Member in cluster	H-bond
A. Mitragynine	-8.03	50	Asp138 C=O---HN
B. Cannabidiol (CBD)	-7.32	72	Asp138 C=O---HN Tyr312 H-O---H-O
C. Tetrahydrocannabinol (THC)	-7.60	64	-
D. Isopaynantheine	-7.58	57	Gln115 C=O---HN
E. Genistein-7-O-[α-rhamnopyranosyl-(1→6)]-β-glucopyranoside (GTG)	-5.32	20	Asp138 C=O---H-O

Section 1.2 The physical, chemical and microbial properties

Khun Sophit Bannalak's Traditional Thai Medicine Recipe, Volume 3 presents a formula for opium deprivation using a blend of kratom, jewel wine and cannabis, consumed as a substitute for smoking opium.

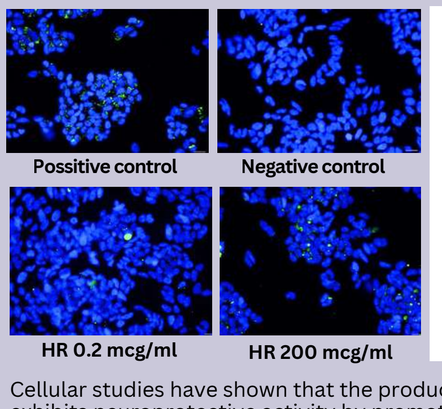
The liquid extract was converted into a dry powder using freeze-drying at a temperature range of -102°C to -103.8°C for a duration of 12 to 24 hours.

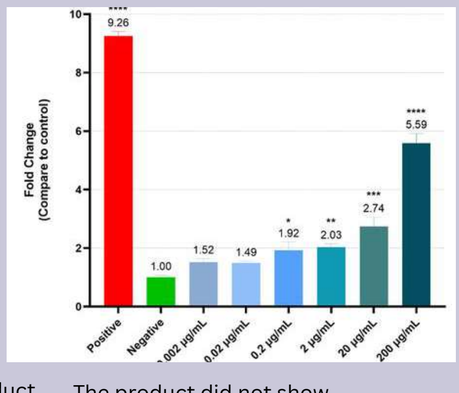


The production of effervescent tablets involves developing a formula with an angle of repose under 25 degrees, ensuring excellent powder flowability. The average tablet hardness is 10.042 kg, and friability is 0.0407%, indicating no tablet breakage during transportation. All 6 tablets disintegrate within 5 minutes, meeting international standards for effervescence tablets.

Test items	Results
Physical properties	
Appearance	White to almost white tablets with specified scent
Thickness	7.39±0.04 mm
Hardness	5.82±1.22 N
Diameter	12.77±0.01 mm
Disintegration time	1 minutes
Friability	0.1180% with no capping
Weight variation	1.1641±0.0262 g (Min 1.1120-Max 1.1974 g)
Chemical properties	
Mitragynine content	0.024 mg/tablet
Isopaynantheine content	0.004 mg/tablet
CBD content	0.002 mg/tablet
THC content	0.032 mg/tablet
CBN content	0.001 mg/tablet
Heavy metal contamination	
Arsenic (As)	ND
Cadmium (Cd)	<0.018 mg/kg
Lead (Pb)	<0.050 mg/kg
Mercury (Hg)	0.089 mg/kg
Pesticide contamination	
Carbamate group	ND
Organochlorine group	ND
Organophosphate group	ND
Pyrethroid group	ND
Microbial properties	
Total aflatoxin	ND
Aflatoxin B_1	ND
Aflatoxin B_2	ND
Aflatoxin G_1	ND
Aflatoxin G_2	ND
Microbial contamination	
Aerobic plate count (cfu/g)	<10
Yeast and molds (cfu/g)	<10
Bile-tolerant gram negative bacteria	<10
Staphylococcus aureus (in 1 g)	ND
Salmonella spp. (in 25 g)	ND
Clostridium spp. (in 1 g)	ND
Escherichia coli (in 1 g)	ND

Section 1.3 Determination of HR on autophagy induced in SH-SY5Y cell

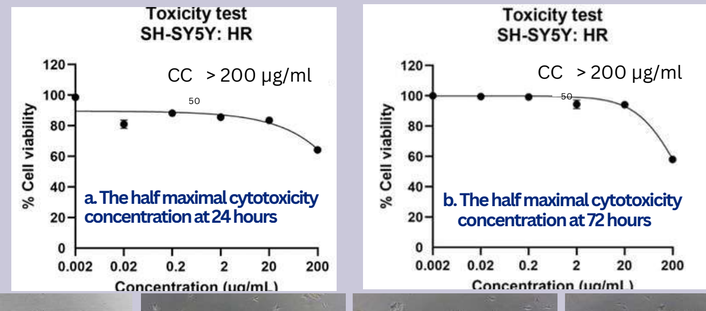


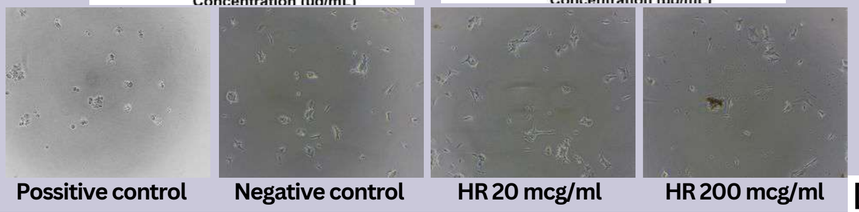


Cellular studies have shown that the product exhibits neuroprotective activity by promoting the autophagy process in SH-SY5Y cells.

The product did not show neurotoxicity after treatment over 24 and 72 hours.

Section 1.4 Determination of the cytotoxic effect in SH-SY5Y cell





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HemaDerm™

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กรมการแพทย์แผนไทยและการแพทย์ทางเลือก Department of Thai Traditional and Alternative Medicine
คณะเภสัชศาสตร์
สำนักงานคณะกรรมการส่งเสริมวิทยาศาสตร์ วิจัยและนวัตกรรม

delivers targeted epidermal action in a fast-absorbing, non-staining, steroid-free emulsion for plaque psoriasis.

This paper was financially supported by Thailand's Science, Research, and Innovation (SRI) Fund according to grant number FFB640003. PETTY Patent : 20441

Theerathorn Sungrai (B.Pharm.), Asst. Prof. Maleeruk Utsintong (Ph.D.) and Thippwan Simsum-ang (B.ATM)

Novel steroid-free topical nano-emulsion from traditional medicine

SAVE

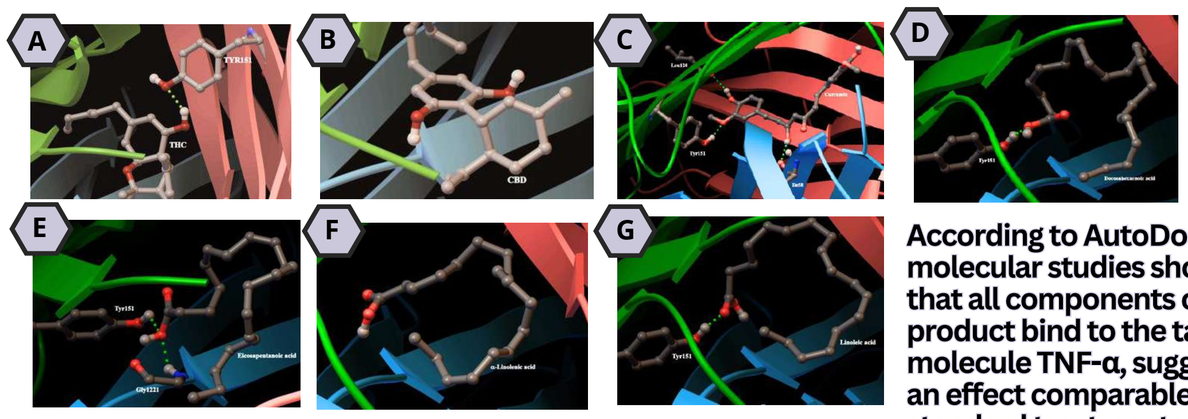
€2.8 billion/year from the global topical steroid market

Clinical efficacy comparable to topical corticosteroids with improved safety

Hemaderm Emulsion is a novel steroid-free topical therapy derived from Thai traditional medicine, developed using a rapid and environmentally friendly extraction process yielding high levels of bioactive compounds. It targets TNF-α at the molecular level, inhibits NF-κB in human keratinocytes, and suppresses nitric oxide production in macrophages. Formulated as a nanoemulsion, it enhances skin penetration without staining, shows clinical efficacy comparable to corticosteroids, improves quality of life, and has the potential to global commercialization.

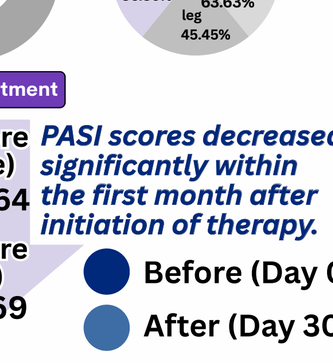
1. Innovation and supporting results

Section 1.1 Predicting the mechanism of action of substances to target molecule (TNF-α) with molecular docking (*in silico* study)



Compounds	Binding energy (kcal/mol)	% Member in cluster	H-bond
A. THC	-10.41	64	Chain B, TYR151 HO---OH
B. CBD	-8.54	52	-
C. Curcumin	-8.56	74	Chain A, TYR151 OH---OH Chain A, LEU120 C=O---HO Chain C, ILE58 C=O---HO
D. DHA	-8.19	37	Chain A, TYR151 OH---OH
E. EPA	-7.49	39	Chain A, TYR151 OH---OH Chain C, GLY121 NH---OH
F. ALA	-6.85	52	-
G. Omega-6	-6.76	40	Chain A, TYR151 OH---O=C

According to AutoDock 4.2, molecular studies showed that all components of the product bind to the target molecule TNF-α, suggesting an effect comparable to standard treatments for psoriasis.



Thai traditional medicinal formulation, documented in Khunnithes Sukkhakit (Volume 2)

Section 1.2 Comparison of active compound levels across different extraction methods

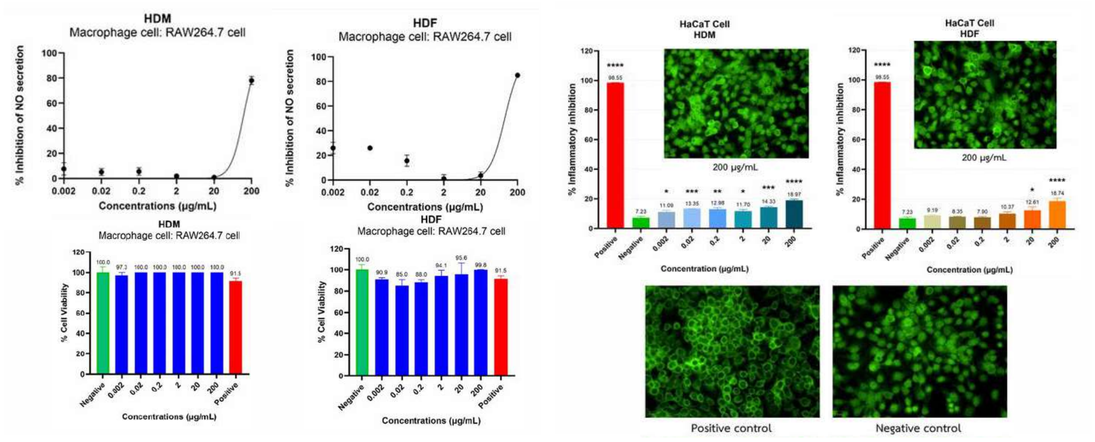
Items	Results: Maceration for 30 minutes	Heat 140°C 30 minutes	Maceration for 3 days	Unit	Methods
Tetrahydrocannabinol	304.30	527.48	596.27	mg/kg	HPLC
Cannabidiol	7,202.70	8,527.91	8,155.57	mg/kg	
Curcumin	4,233.87	1,487.88	5,158.64	mg/kg	Spectrometric
Alpha-linolenic acid (ALA)	50.64	52.67	52.71	g/100g	In-house method
Omega 3 (ALA,EPA,DHA)	50,715.71	52,739.41	52,712.98	mg/100g	TE-CH-208 based on
Omega 6	16,817.13	14,070.07	14,075.16	mg/100g	AOAC (2019) 996.06

Maceration with heat-induced decarboxylation results in high cannabinoid levels, while three-day maceration yields higher curcumin levels.

Section 1.3 The determination of anti-inflammatory

a. anti-immune cell inflammation (NO detection) assay

b. anti-skin cell inflammation (NF-kB detection) assay

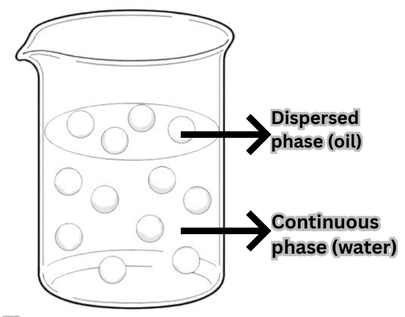


Section 1.4 Development of a non-staining topical nano emulsion with targeted skin action and effective stratum corneum penetration

Section 1.5 The physical, chemical and microbial properties of HemaDerm emulsion

Test items	Results
Physical properties	
Appearence	Yellow cream with specified scent
Chemical properties	
Cannabidiol content	1,342.67 mg/kg
Tetrahydrocannabinol content	4.48 mg/kg
Cannabinol content	3.33 mg/kg
Heavy metal contamination	
Arsenic (As)	ND
Cadmium (Cd)	ND
Lead (Pb)	ND
Mercury (Hg)	ND
Pesticide contamination	
Carbamate group	ND
Organochlorine group	ND
Organophosphate group	ND
Pyrethroid group	ND
Microbial properties	
Total aflatoxin	
Aflatoxin B1	ND
Aflatoxin B2	ND
Aflatoxin G1	ND
Aflatoxin G2	ND
Microbial contamination	
Aerobic plate count (cfu/g)	<10
Yeast and molds (cfu/g)	<10
Staphylococcus aureus (in 1 g)	ND
Salmonella spp. (in 25 g)	ND
Escherichia coli (in 1 g)	ND
Clostridium spp. (in 1 g)	ND

HemaDerm, a non-staining topical formulation engineered for targeted skin delivery using an oil-in-water nano emulsion system.

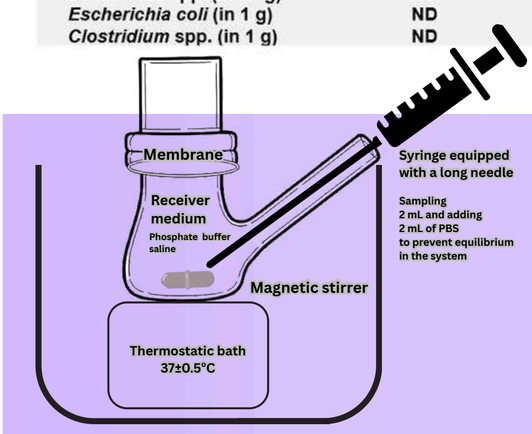


Z-Average diameter 6.00±0.33 nm

Polydispersity Index 0.58±0.02 (Monodisperse)

Zeta potential 0.64±0.16 mV

Percentage of Entrapment efficiency 13.02 %

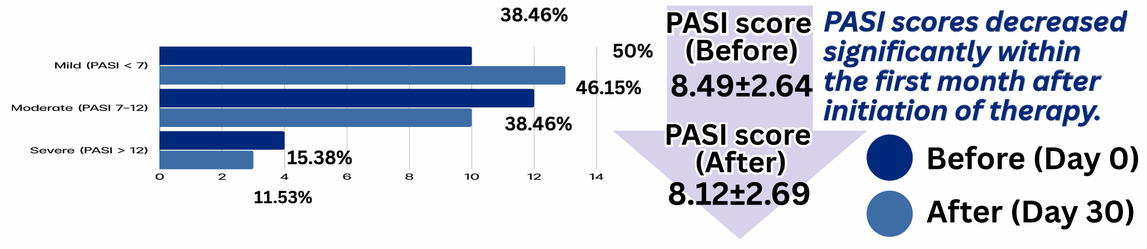


Section 1.6 *In Vitro* skin permeation study using Franz diffusion cells

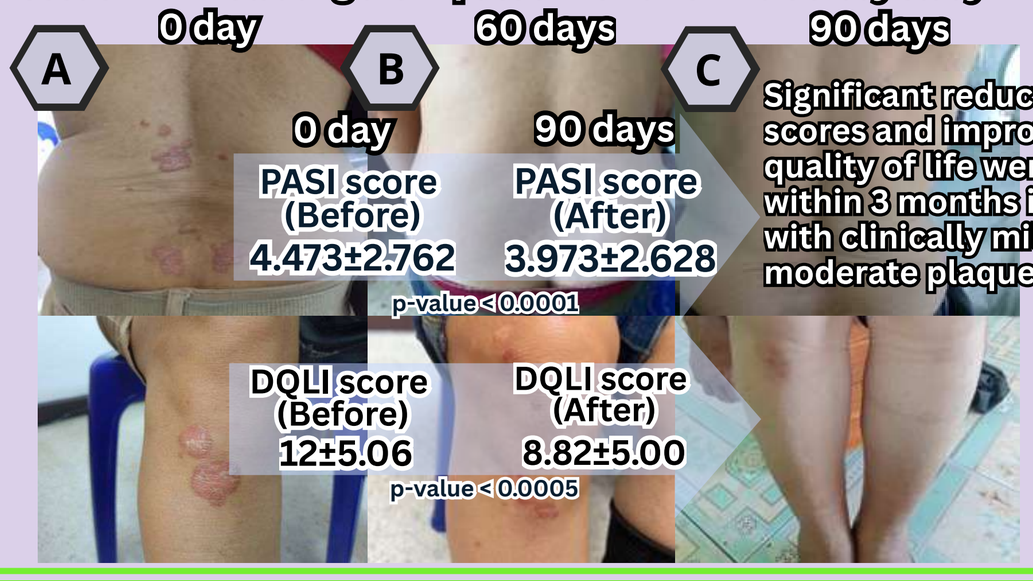
Drug penetration into the stratum corneum reached 250 μg/cm² (28%), exceeding the normal range of 1–10%. indicating localized CBD retention in the stratum corneum

2. Benefit areas of the community and society

Section 2.1 Evaluating the impact of HemaDerm: a 30-day study with 26 patients



Section 2.2 Evaluating the impact of HemaDerm: a 90-day study with 11 patients



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DUALQUIT

Novel approaches in smoking cessation delivering dual action to both brain and lungs with fast-disintegrating tablets

This paper was financially supported by Department of Thai Traditional and Alternative Medicine (DTAM) Fund. PETTY Patent Application: 2503001311

Theerathorn Sungrai(B.Pharm.), Asst. Prof. Maleeruk Utsintong (Ph.D.) and Tewan Thaneerat (M.D.)

กระทรวงสาธารณสุข MINISTRY OF PUBLIC HEALTH
กรมการแพทย์แผนไทยและการแพทย์ทางเลือก Department of Thai Traditional and Alternative Medicine
คณะเภสัชศาสตร์

83% cessation rate within four weeks

SAVE

The first to act on both the brain and lungs

significant reduction in cigarette consumption within the first week

€2,500 million/year

Introduction

Over 1.1 billion people worldwide are smokers with the highest prevalence rates in the European. Tobacco use leads to severe brain, cardiovascular, and respiratory damage, contributing to 13,000 deaths daily and imposing an economic burden exceeding €1.5 trillion annually. Standard treatments such as nicotine gum are commonly used to manage breakthrough cravings. However, these options have significant limitations with costly, unsuitable for cardiovascular disease or dental appliances, GI irritation, and do not support lung function recovery. Most herbal products offer only taste deterrence without clear evidence.

Objectives

The innovators aim to offer a novel solution for smoking cessation with unprecedented efficacy, delivering dual action on both the brain and lungs with fast-integrating tablets, from eco-friendly freeze-dried extraction, achieving up to 83% of cessation rate with in 4 weeks and saving 90% in medical costs.

Discussions/Conclusions

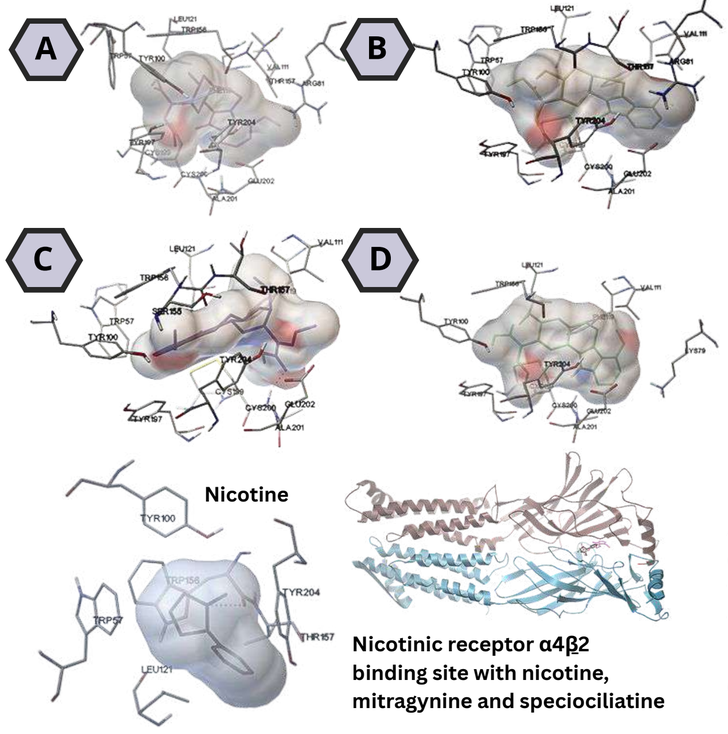
Dual-action quit smoking innovation with oral fast-disintegrating tablets dissolving within 1 minute, no water needed. Targets α4β2 nAChRs in the brain at molecular level with greater efficacy than nicotine. Reduces cigarette use significantly in 1 week, achieving 83% success in 4 weeks. Withdrawal symptoms such as anxiety, irritability, and restlessness were significantly reduced with a statistically significant decrease in the Nicotine Withdrawal Scale score from 5.16 in the first week to 1.31 in the fourth week. No serious adverse effects were reported.

This innovation has the potential to reduce global pharmaceutical expenditure by over €2.5 billion annually and significantly enhance the quality of life. More than 100,000 tablets have been distributed through domestic healthcare services. Finally, we are now seeking global partners to expand into the international smoking cessation market and offer patients and healthcare professionals a new approach to treatment.

Moreover, the product improves lung function in smokers by increasing %PEFR and decreasing CO levels through antioxidant activity, anti-lung cancer cell proliferation, and anti-inflammatory activity, along with inhibiting nitric oxide secretion. It also exhibits neuroprotective effects in human neuronal cells, with no observed toxicity.

1. Innovation and supporting results

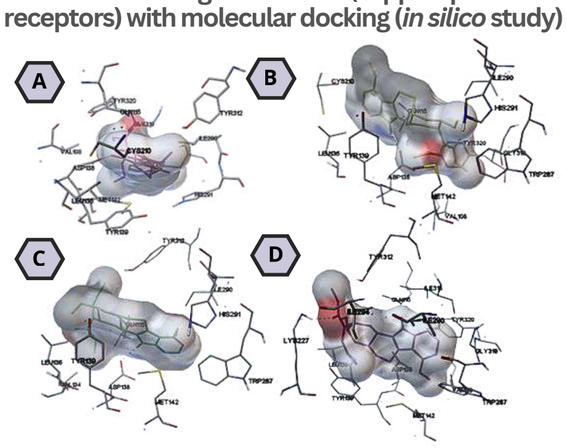
Section 1.1 Predicting the mechanism of action of substances to target molecule (α4β2 nicotinic acetylcholine receptors) with molecular docking (*in silico* study)



Nicotinic receptor α4β2 binding site with nicotine, mitragynine and speciociliatine

Compounds	Binding energy (kcal/mol)	%member in cluster	H-bond
A. Mitragynine	-8.14	100	-
B. Speciociliatine	-8.11	97	-
Nicotine	-6.72	100	Trp156 chain A C=O---N
C. Paynantheine	-1.65	34	Ala201 chain A NH---O=C
D. Speciogynine	-1.04	50	-

Section 1.2 Predicting the mechanism of action of substances to target molecule (kappa-opioid receptors) with molecular docking (*in silico* study)



Compounds	Binding energy (kcal/mol)	%Member in cluster	H-bond
A. Mitragynine	-8.03	50	Asp138 C=O---HN
B. Speciociliatine	-7.99	52	Asp138 C=O---HN
C. Speciogynine	-7.57	33	Asp138 C=O---HN
D. Paynantheine	-7.50	50	Lys227 NH---O=C

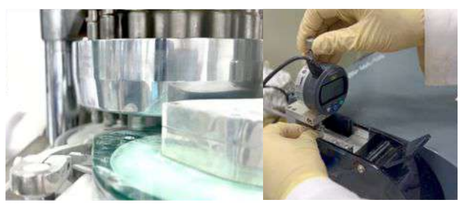
According to the AutoDock 4.2 program, the critical components in these products can act by binding to the target molecule, both KORs and α4β2 nAChRs in the nucleus accumbens, supporting dopamine balance and decreasing withdrawal during smoking cessation.

Mitragynine and speciociliatine show greater efficacy than nicotine at nAChRs, correlating with reduced cigarette use and reported taste alterations in patients. These findings highlight strong potential for this formulation as an effective smoking cessation therapy.

1.3 The physical, chemical and microbial properties complies with international pharmacopoeia.

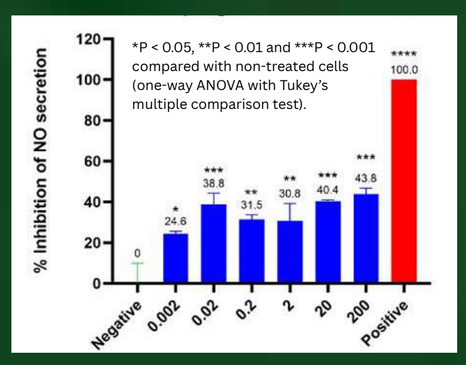
Yaluangkratom in Ya Kret recipe, a traditional medicine used in Thailand for over 170 years consumed as a boiled decoction to alleviate opium addiction.

The liquid extract was converted into a dry powder using freeze-drying at a temperature range of -102°C to -103.8°C for a duration of 12 to 24 hours.

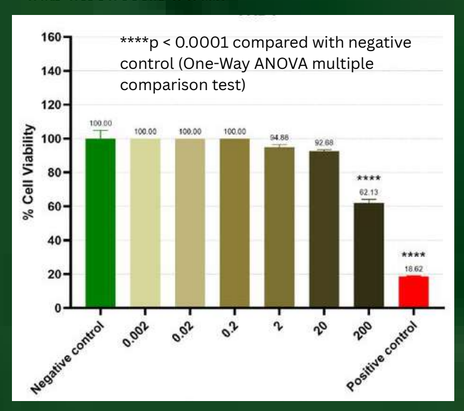


The products demonstrate through drug discovery at the molecular level, green technology in the pharmaceutical industry, cellular studies, and clinical trials.

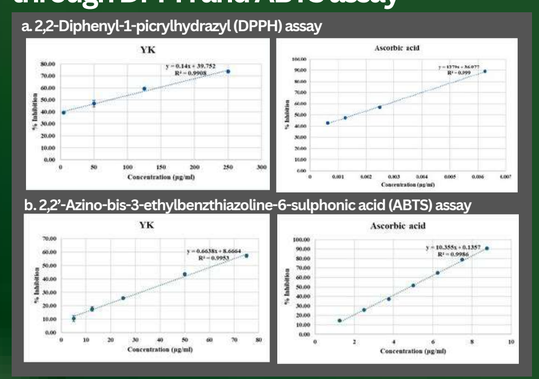
1.4 Determination of YK on anti-inflammatory effects through RAW264.7 macrophage cells



1.5 Determination of YK on anti-proliferative activity in A549 lung carcinoma cells

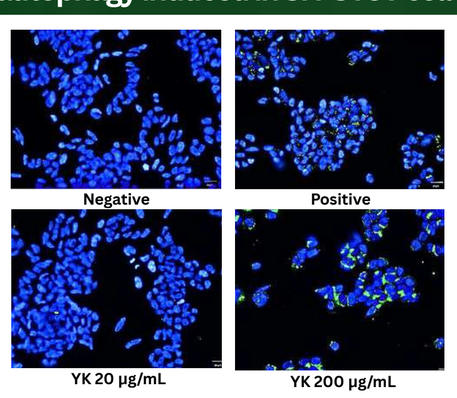


1.6 Determination of antioxidant effects through DPPH and ABTS assay

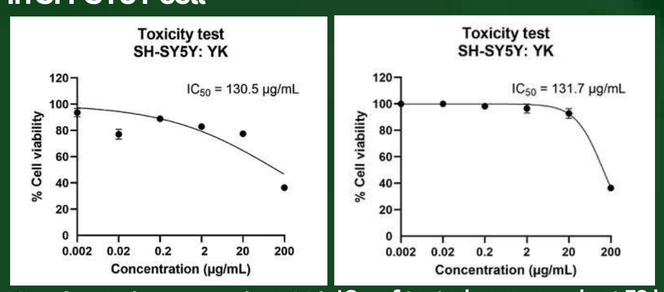


The product exhibits antioxidant activity in both DPPH and ABTS assays, with IC_{50} values of 73.21 and 62.27 µg/mL, respectively.

1.7 Determination of YK on autophagy induced in SH-SY5Y cell



1.8 Determination of YK on the cytotoxic effect in SH-SY5Y cell



IC_{50} of tested compounds at 24 h IC_{50} of tested compounds at 72 h

Furthermore, it demonstrates neuroprotective effects by promoting autophagy in human neuronal cell lines, with no observed toxicity.

The product improves lung function and reduces CO levels by inhibiting inflammatory activity through decreased NO secretion in macrophages.

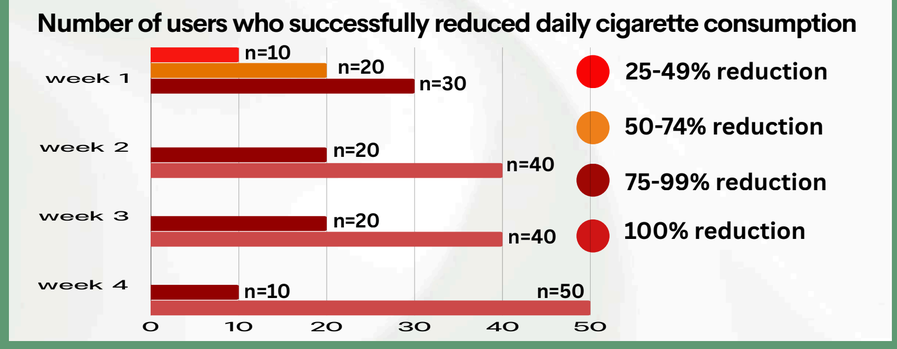
It also exhibits antiproliferative activity in lung carcinoma cells and has an antioxidative effect.

Clinical studies show a significant reduction in cigarette consumption within the first week, achieving an 83% cessation rate within four weeks.

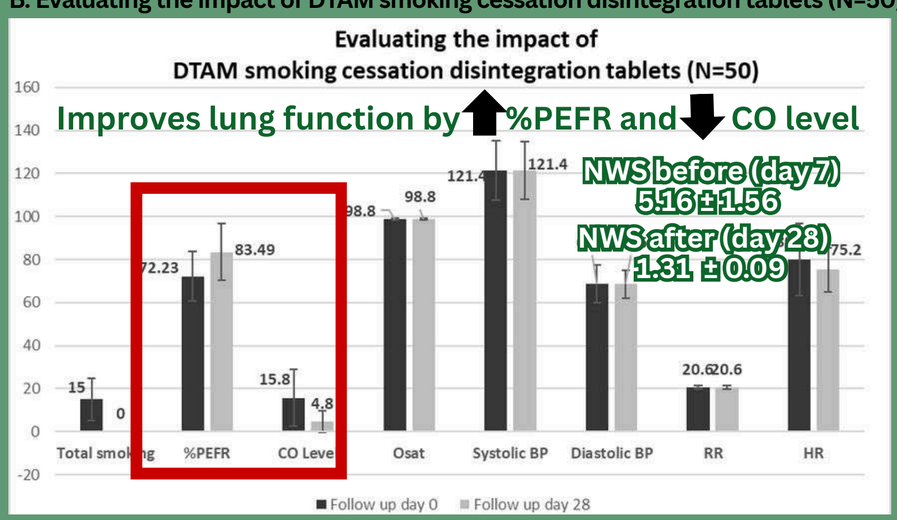
2. Benefit areas of the community and society

Yata B., Phutphat B., Promsen K. (2025)

A. Evaluating the impact of smoking cessation with fast-disintegrating tablets: a 30-day study with 60 patients



B. Evaluating the impact of DTAM smoking cessation disintegration tablets (N=50)



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A Novel Plaque Psoriasis Therapy :

Utilizing an Enhanced-Permeation Cannabidiol Patch for Systemic Delivery

This paper was financially supported by Thailand's Science, Research, and Innovation (SRI) Fund. PETTY Patent Application: 2403002785

Theerathorn Sungrai (B.Pharm.) and Asst. Prof. Maleeruk Utsintong (Ph.D.)

กระทรวงสาธารณสุข MINISTRY OF PUBLIC HEALTH
กรมการแพทย์แผนไทยและการแพทย์ทางเลือก Department of Thai Traditional and Alternative Medicine
คณะเภสัชศาสตร์
สำนักงานคณะกรรมการส่งเสริมวิทยาศาสตร์ วิจัยและนวัตกรรม

SAVE

€1.5 billion/year

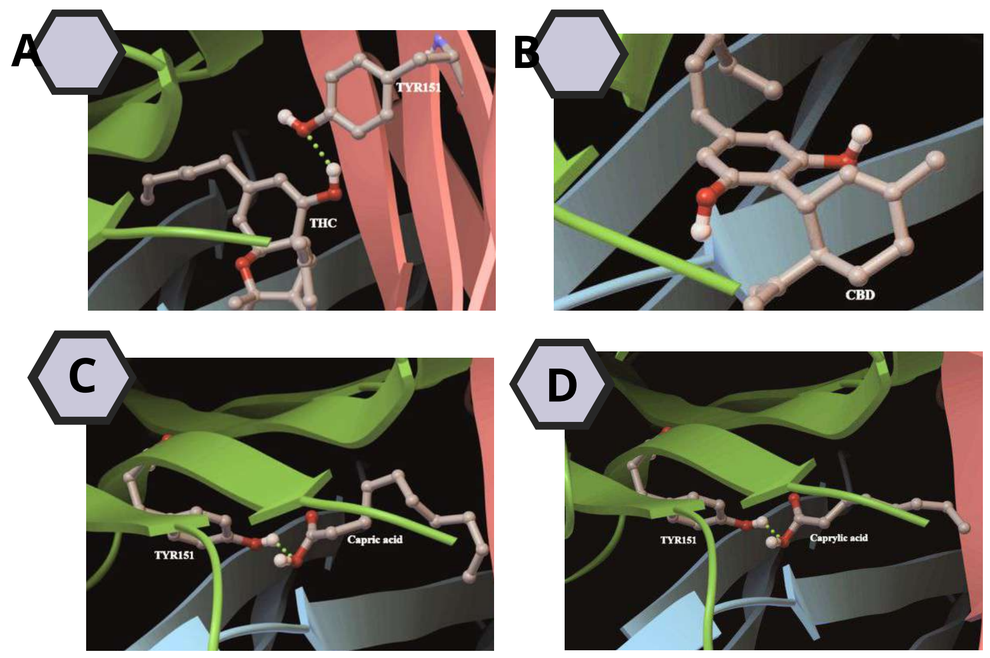
global pharmaceutical expenditures

systemic delivery with non-invasive

This noninvasive CBD transdermal patch offers a safer systemic alternative to steroids for psoriasis by modulating TNF-α via enhanced-permeation polymers, with delivery validated by Franz diffusion, cellular anti-inflammatory effects, and significant PASI improvement within 90 days.

1. Innovation and supporting results

Section 1.1 Predicting the mechanism of action of substances to target molecule (TNF-α) with molecular docking (*in silico* study)



Compounds	Binding energy (kcal/mol)	% Member in cluster	H-bond
A. THC	-10.41	64	Chain B, TYR151 HO---OH
B. CBD	-8.54	52	-
C. Capric acid	-4.62	86	Chain A, TYR151 OH---OH
D. Caprylic acid	-3.83	87	Chain A, TYR151 OH---OH

According to AutoDock 4.2, the molecular study showed that all components in the patches bind to the target molecule TNF-α, suggesting a noninvasive, standard-treatment-like effect for psoriasis.

According to the AutoDock 4.2 program, the critical components in the patches can bind to the target molecule, TNF-α, for treating psoriasis. THC was found to have superior ability compared to CBD, capric acid, and caprylic acid, respectively. The result supports both antioxidative and anti-inflammatory activities, which positively affect psoriasis symptoms.

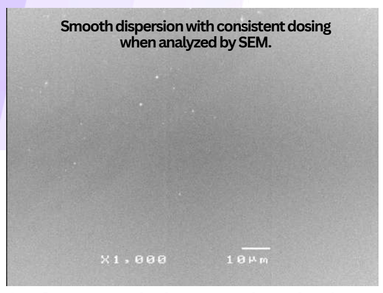
Section 1.2 The physical, chemical and microbial properties

Dissolve the polymer blend of dimethylaminoethyl methacrylate, butyl methacrylate, and methyl methacrylate in acetone, isopropyl alcohol, and ethyl alcohol, respectively. Mix with a homogenizer at 7,000 rpm for at least 120 minutes.

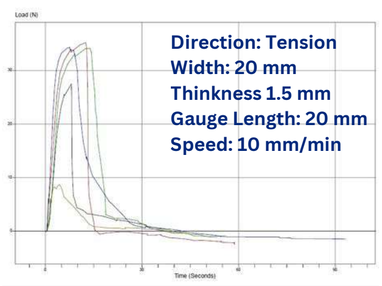
Add cannabidiol extract to the formulation to obtain a patch containing 0.45–0.55 mg of cannabidiol extract per patch, coated with a polymer layer on aluminum foil and packaged in a waterproof plastic pouch.

Test items	Results
Physical properties	
Appearance	Clear yellow film with a specified scent, flexible, and free of air bubbles
Weight/cm²	0.1481±0.3851 g/cm²
Thickness	1.1373±0.0276 mm
Percentage of water uptake	192.2578±16.6362 %
Elasticity properties	34.584± 0.555 N, 1.9394 ± 0.6381 mm
Chemical properties	
CBD content	0.550 mg/patches
THC content	0.019 mg/patches
CBN content	ND (LOD 0.0002)
Dissolution test (USP apparatus 5 Paddle-over-disk)	More than 85 percent at 24 hours
Franz diffusion cell	Flux rate 0.2644 μg x cm² x min⁻¹
Heavy metal contamination	
Arsenic (As)	ND
Cadmium (Cd)	ND
Lead (Pb)	<0.050 mg/kg
Mercury (Hg)	<0.018 mg/kg
Pesticide contamination	
Carbamate group	ND
Organochlorine group	ND
Organophosphate group	ND
Pyrethroid group	ND
Microbial properties	
Total aflatoxin	ND
Aflatoxin B_1	ND
Aflatoxin B_2	ND
Aflatoxin B_3	ND
Aflatoxin B_4	ND
Microbial contamination	
Aerobic plate count (cfu/g)	<10
Yeast and molds (cfu/g)	<10
Staphylococcus aureus (in 1 g)	ND
Salmonella spp. (in 25 g)	ND
Clostridium spp. (in 1 g)	ND
Escherichia coli (in 1 g)	ND

Acting through the bloodstream has passed the skin penetration test using Franz diffusion cells.

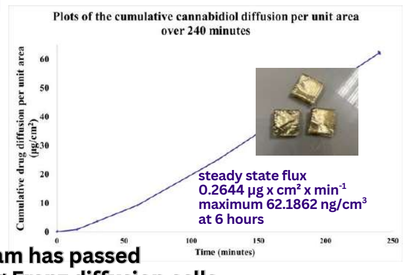


Surface morphology, analyzed using a Scanning Electron Microscope (JSM-5410LV, Japan) and ion sputtering,



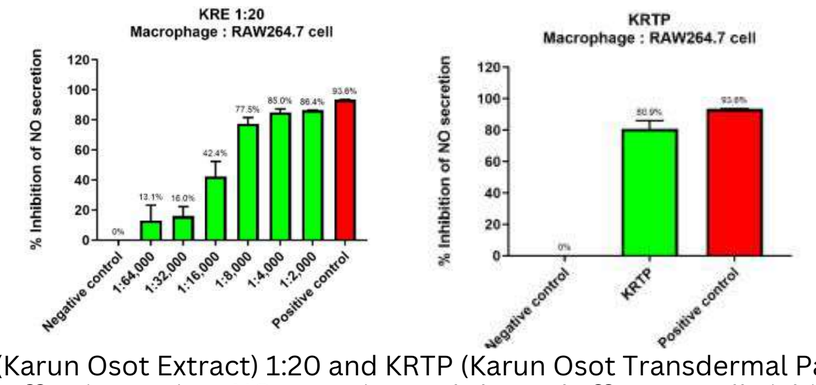
Load at Maximum Load	Machine Extension at Maximum Load
34.584± 0.555 N	1.9394 ± 0.6381 mm

Polymers and permeation enhancers were used in the patches, plus a plasticizer and cohesion promoter to boost elasticity in the affected area.



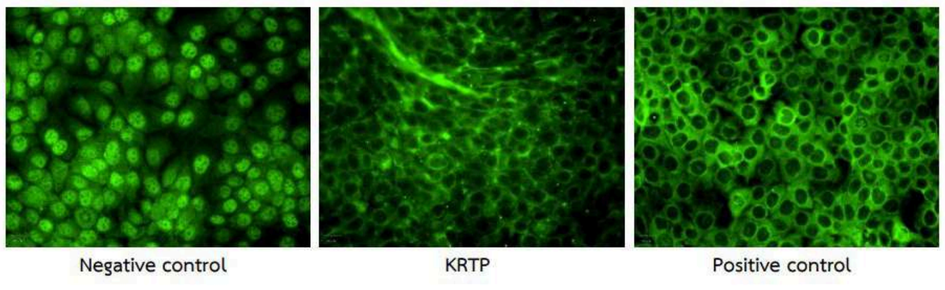
Section 2.1 The determination of anti-inflammatory

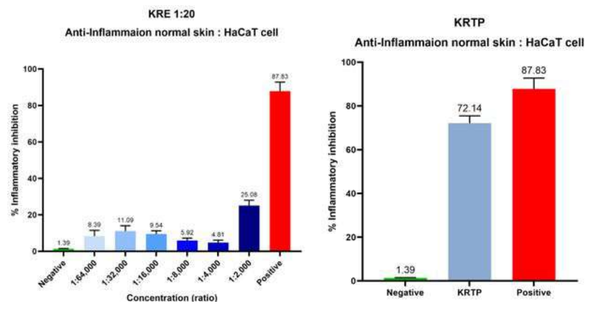
a. anti-immune cell inflammation (NO detection) assay



KRE (Karun Osot Extract) 1:20 and KRTP (Karun Osot Transdermal Patches) were effective against NO secretion and showed effect on cell viability. KRE 1:8,000 clearly reduced NO production without cytotoxic effect.

b. anti-skin cell inflammation (NF-kB detection) assay





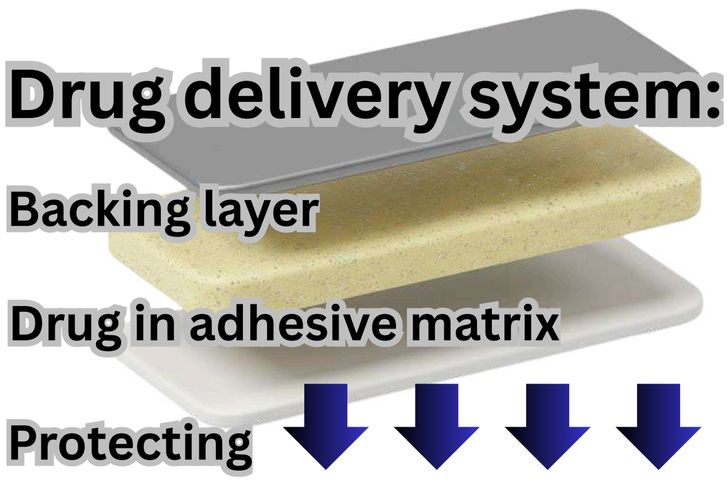
The negative control shown 1.39% of inhibitory effect and the positive control shown 87.83% of inhibitory effect. Which KRE 1:20 shown the highest inhibitory effect (25.08%) at a concentration of 1:2,000 and KRTP shown 72.14% of inhibitory effect.

Section 2.2 The determination of antioxidant activity

Compounds	IC_{50}	
	DPPH	ABTS
Ascorbic acid	7.22±0.32 mcg/ml	32.60±0.36 mcM
Trolox	Not tested	0.02±0.00 mM
Karun Osot (2.1%w/v)	6.47±0.05 mg/ml	0.1088±0.00 mg/ml
Transdermal patches (2.5 %w/v)	5.37±0.09 mg/ml	0.53±0.01 mg/ml

The product exhibits antioxidant activity in both DPPH and ABTS assays, with IC_{50} values of 5.37 and 0.53 mg/mL, respectively.

2. Benefit areas of the community and society



Observations for allergic reactions were conducted after applying the test patch on days 5, 10, 15, and 30.

Based on this molecular evidence, we developed a novel enhanced permeation transdermal patch for plaque psoriasis. The patch integrates polymers, permeation enhancers, plasticizers, and cohesion promoters to achieve high elasticity and skin conformity

Clinical studies demonstrated significant improvement in PASI components including erythema, induration, and desquamation, with scores reduced from 4 to 3, without adverse effects.

No redness, swelling, skin atrophy, abnormal capillary dilation, hypopigmented spots, itching, or pain were observed.

Not only the patches will increase the value of the medical industry, but they will also improve the quality of life and reduce the adverse reactions associated with current treatments. **A total of 20,000 patches have been distributed to the Faculty of Medicine at Chulalongkorn University to study efficiency and safety*, and provided in healthcare services through the Department of Thai Traditional and Alternative Medicine.**

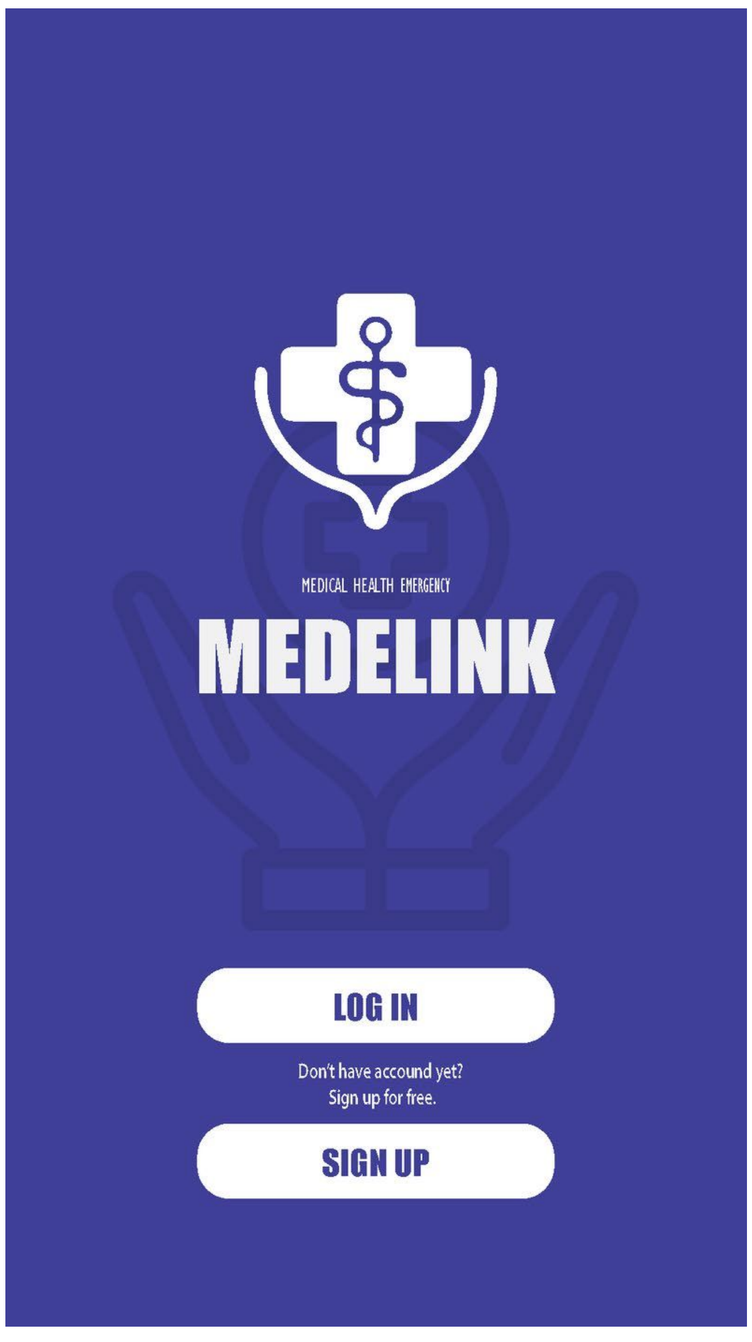
Contact: tdc.standard@gmail.com/+66 618946914

SCAN ME:

Medelink

Authors: **Koch Meng Keang, Thy Sokchan, Kong Sokleang Mok Chan Sophary, Youn Tangyi**

Medelink is a mobile healthcare application that connects patients with qualified doctors for fast, reliable, and convenient medical support . The platform is designed to improve access to healthcare services, especially for people living in rural and remote areas. With a simple and user-friendly interface, Medelink allows patients to consult doctors, receive medical advice, and schedule appointments easily through their smartphones, helping reduce travel time and improve overall healthcare accessibility .



Contact: wagers.samantha@actgts.edu.kh +855 17 487 083

RoboMED

Author/s: Association for Community Development Vladimir

F

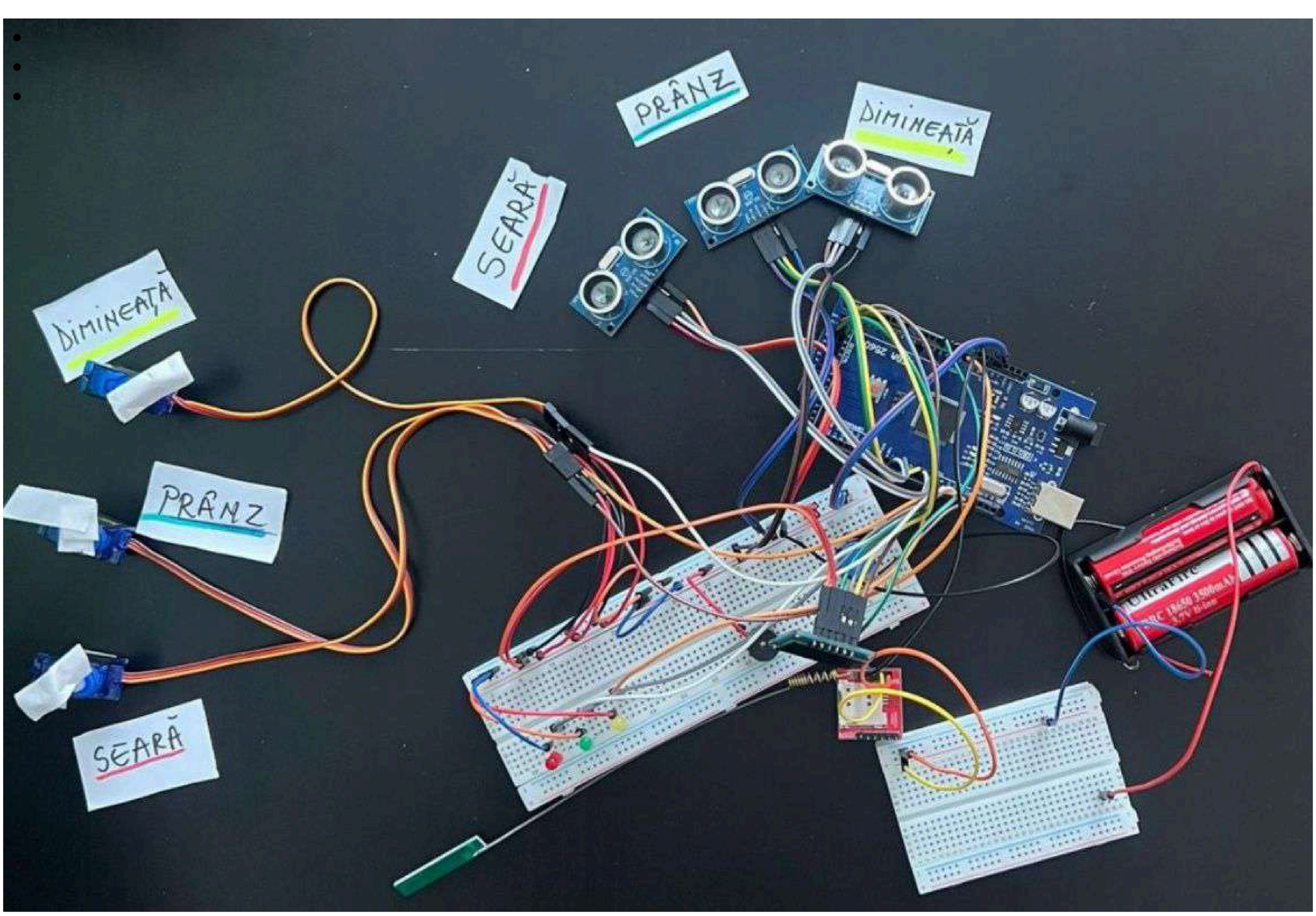
The RoboMED project proposes the development of an automated device for managing medication administration, intended for people who must follow a regular treatment and may forget or confuse their doses. The system is built around the ESP32 microcontroller, chosen for its high performance and integrated Wi-Fi and Bluetooth connectivity.

The device includes a rotation mechanism using a stepper motor or a servo motor, which positions the compartment corresponding to the scheduled dose. A secondary servo motor controls a safety door that remains locked until the time of administration, preventing accidental access or contamination of the medication.

Time synchronization is achieved either through an RTC module such as the DS3231, or via the internet using the NTP protocol, ensuring accurate time even after power interruptions. Information about the current time and the next dose is displayed on an LCD or OLED screen.

When the scheduled time is reached, the system:

- **rotates the corresponding compartment,**
- **automatically opens the access door,**
- **activates a buzzer and LEDs for notification.**



Contact: Anișoara Bocai - +40784094842 bocaiani@gmail.com

Opportunity
CORNELIUGROUP Research-Innovation Association
Creation INVENTCOR Realization
Power of Creative Mind
Deva ROMANIA

FoodSafe is designed to reliably detect allergens even after cooking.

FOODSAFE

Real-Time Multiplex Allergen Detection

<60 seconds

- Detects 8 major allergens
- Results in under 60 seconds
- Replaceable multiplex probe system

Step 1 Extract

Step 2 Insert

Step 3
Instant Results

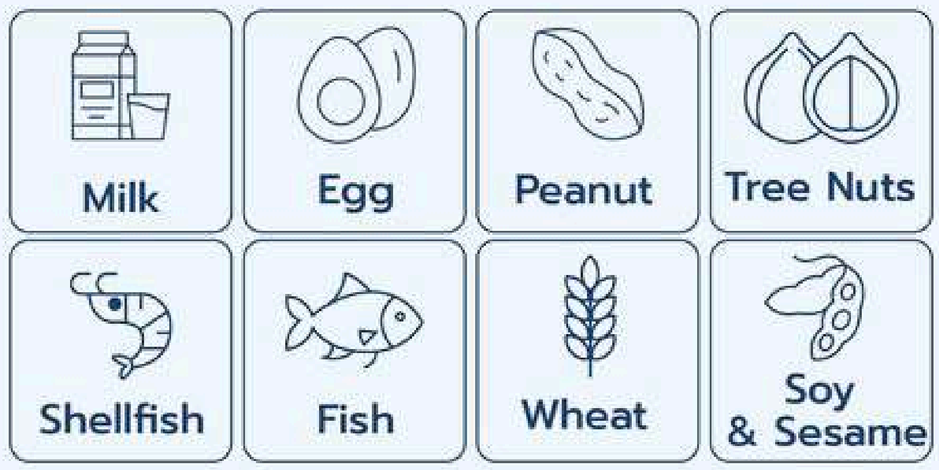
Patent Pending – Application No. 2603000255

Engineered Allergen-Specific Bioreceptors

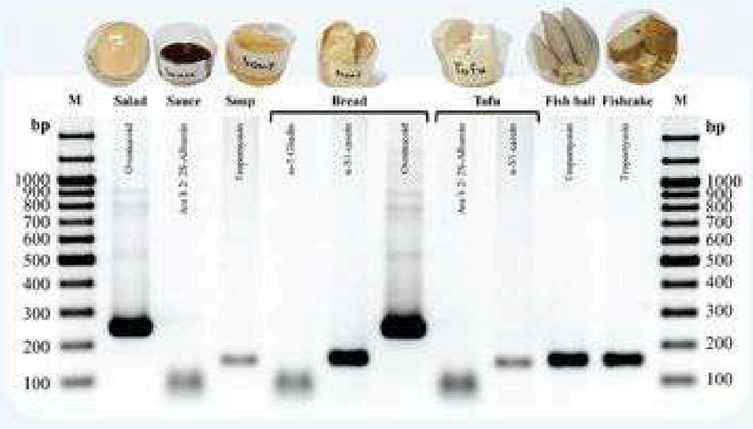
Design ⇒ Engineer ⇒ Detect

Our biosensors detect allergenic proteins even after food has been cooked.

Target Allergens



Laboratory-Validated Target-Specific Detection



- Validated in real food matrices
- No cross-reactivity
- Developed under academic supervision
- Expandable to detect additional allergens

Applications

- Households
- Schools
- Airlines
- Food Service

University Collaboration

Developed and validated under academic supervision in collaboration with Chulabhorn International College of Medicine

Haritchanan Thongarunyik
Founder, Biosensor Engineering

StrokeStep :Smart Biofeedback Insole

Author/s: Master Waranyu Kittithawornkul
Chulalongkorn University Demonstration Secondary School

F

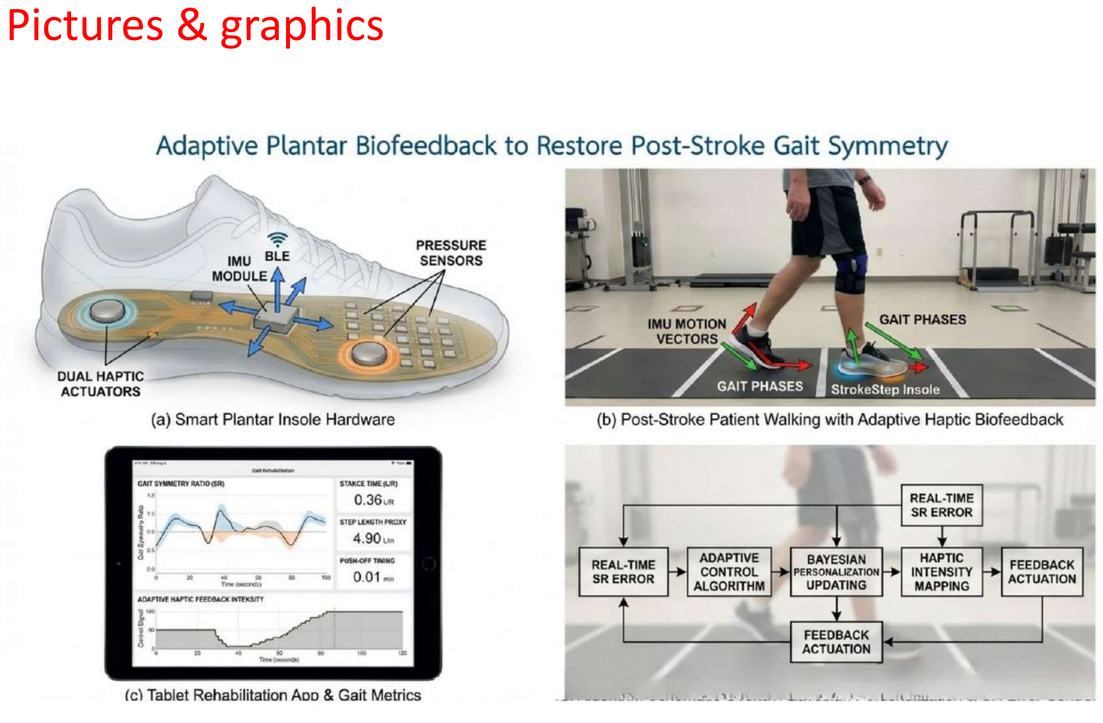
Description :

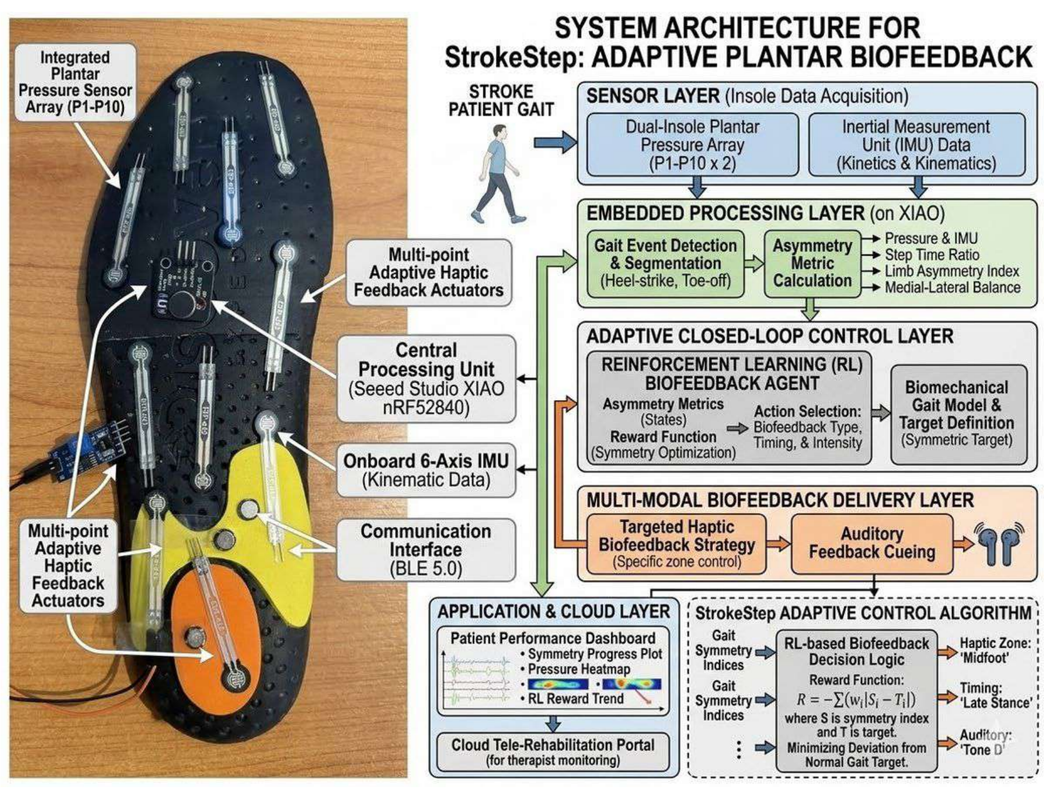
Stroke is a leading cause of long-term disability worldwide. One of the most common stroke-associated conditions is **hemiplegia**, which affects about 88% of post-stroke patients. Hemiplegia often leads to motor impairments, particularly gait dysfunction, which affects nearly 80% of stroke survivors. As a result, many patients develop **gait asymmetry**, where one leg bears more weight than the other due to muscle weakness and impaired motor control. This imbalance can lead to unstable walking, increased energy expenditure, and a higher risk of falls. Traditional rehabilitation typically relies on therapist observation and guided training, but Stroke Patients may not always recognize when their walking pattern is uneven during everyday activities.

StrokeStep : Adaptive Plantar Biofeedback to Restore Post-Stroke Gait Symmetry presents a wearable rehabilitation system designed to improve walking symmetry in Stroke Patients. The system uses pressure sensors embedded in shoe insoles to measure plantar pressure and weight distribution while walking. These sensors collect real-time data to analyze the force applied by each foot and evaluate gait balance.

When uneven weight distribution is detected, the device provides immediate biofeedback, such as vibration, to alert the patients. This feedback helps patients adjust their walking pattern and gradually develop a more balanced gait. By combining wearable sensors with adaptive biofeedback, **StrokeStep** supports more effective rehabilitation and may help stroke survivors regain safer, more stable walking ability.

Pictures & graphics





Contact: waranyu.arty@gmail.com

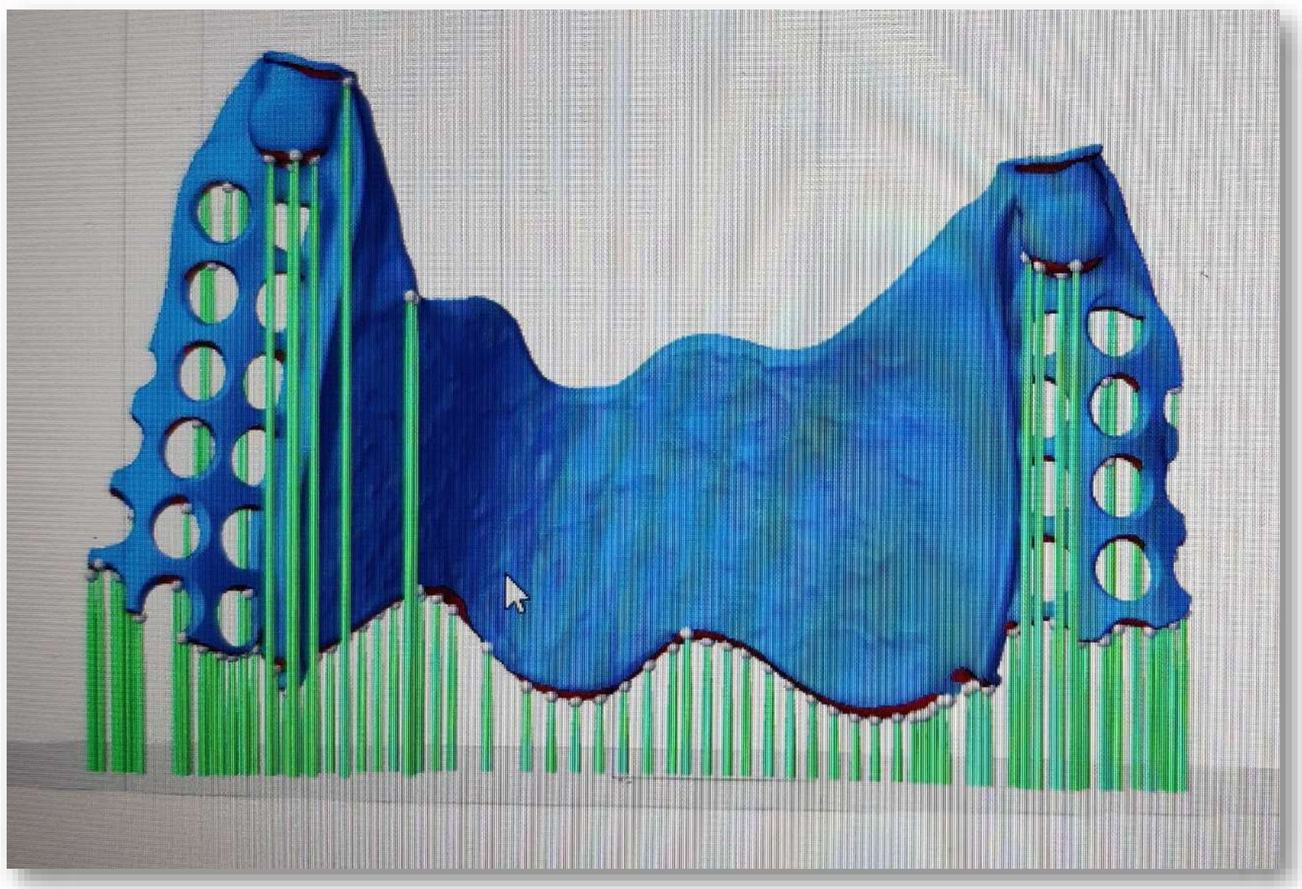
SINTER LASER MELTING

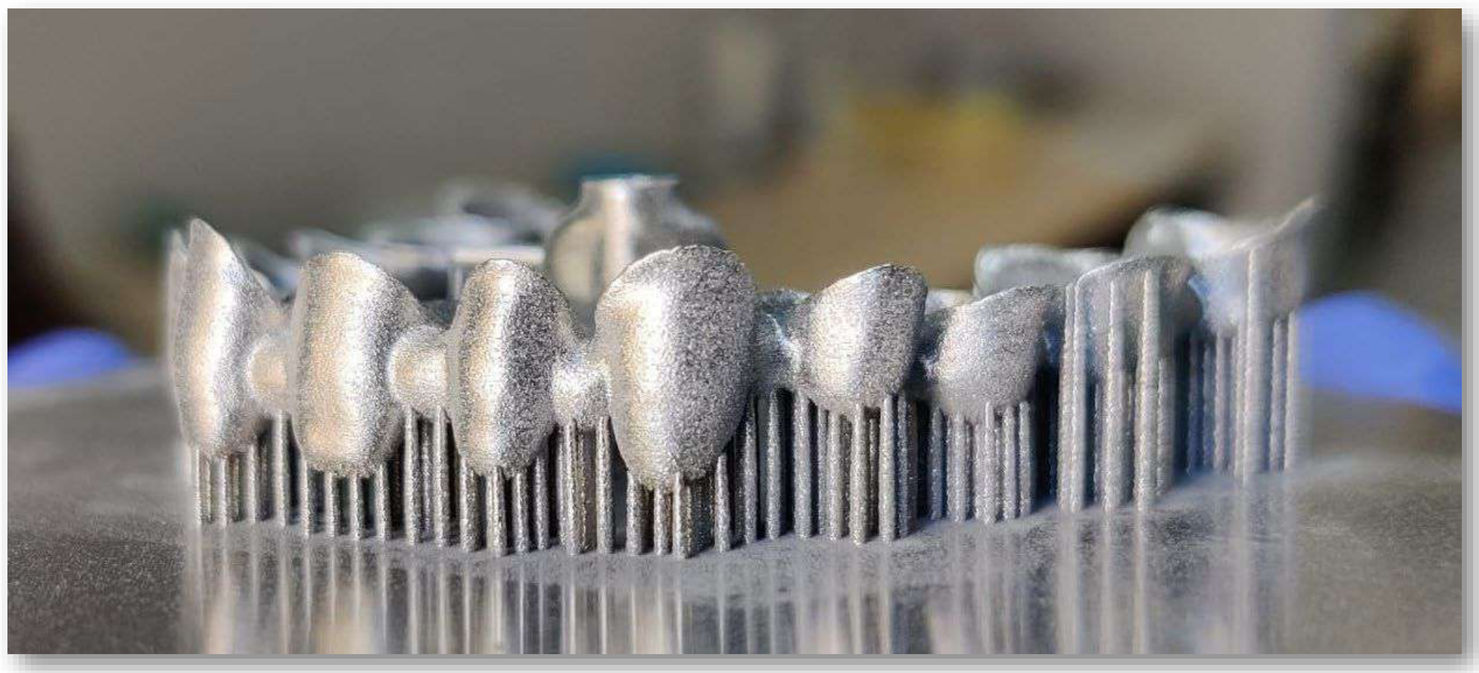
Dental medicine project

Author: Manolin Mita

F

Being in the field related to dental medicine with vast experience and because there was no center specialized in laser printing using Sinter Laser Melting technology in Hunedoara county, I ecided to take this step. 3D printing or additive manufacturing is a manufacturing process of solid objects tri-dimensionally adding layer after layer. Physical objects are produced using data a digital model, a 3D model or others sources such as an AMF* file. By using 3D printing they can be created products of almost any shape. Selective laser melting (SLM) is the leading metal 3D printing technology revolutionizing the additive manufacturing of metal parts. This digitized technology gives dental laboratories the opportunity to benefit from creating work of an exceptional quality, far beyond what humans can achieve with classic melting and casting technologies.





SCAN ME

Contact: ***laserprintdeva@gmail.com***

ILZSU Hair Repair Serum

Product

Author/s: Varga Péterné

ILZSU®

HAIR REPAIR SERUM

Have wonderful tonsure! Stop the hair loss!

As we know the weak immune system has an effect on our body and firstly it can be seen on our look.

As soon as we realize any damages on the hair or on the scalp, such as alopecia areata, hair loss or baldness, it is important to start the treatment immediately.

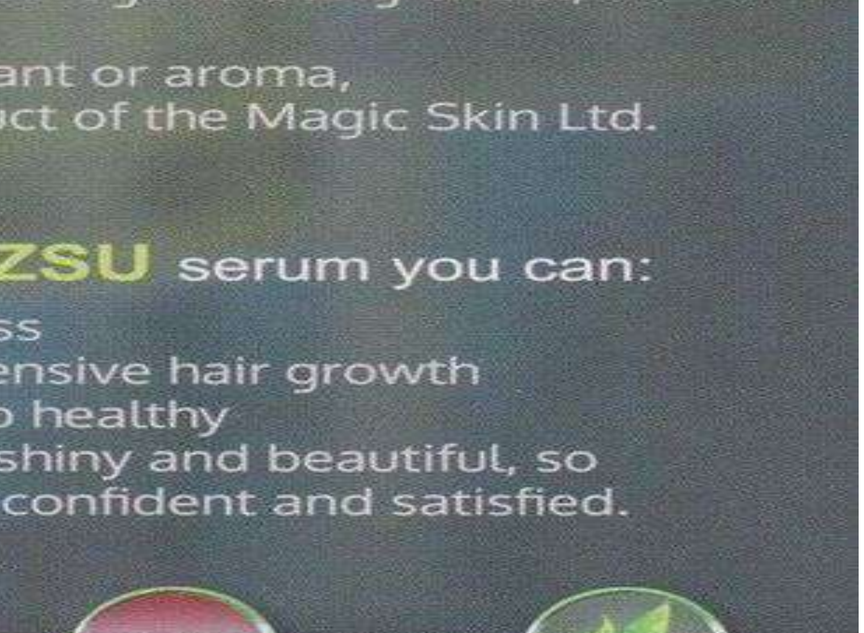
There are several proofs of the good effects of the ILZSU hair repair serum cure in many cases.

How does it work?

The scalp can be stimulated by using the serum, the blood supply can be increased, so the hair loss can be reduced and the hair will start growing.

Naturally, we cannot grow a tonsure on the part of the scalp, where the hair roots are dead but where roots are still alive the regeneration can be started again.

"The power of nature for a healthy hair."



Start using it on time! It is worth using the serum in case of a slight hair loss or for prevention as well in order to

ILZSU HAIR REPAIR SERUM

- It consists of 10 special herbs and their powerful regenerating effect,
- It has 100% natural ingredients,
- It is produced without any preservatives, colorant or aroma,
- It is a Hungarian and original trade mark product of the Magic Skin Ltd.

By using the ILZSU serum you can:

- stop the hair-loss
- promote an intensive hair growth
- make your scalp healthy
- make your hair shiny and beautiful, so you will be self-confident and satisfied.

HUN

100%

Skin-Magic

Cosmetic Manufacturing and Trading Ltd.

+36-70-276-4586 www.ilzsu.hu info@ilzsu.hu

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Title

PRoHep-LCT- PARALLEL ROBOT FOR LAPAROSCOPIC TREATMENT OF HEPATIC TUMORS

Inventor/s - Contact

Plitea Nicolae, Pîslă Doina Liana, Vaida Liviu Călin, Gherman Bogdan George,
Tucan Paul George Mihai
E-mail: Doina.Pisla@mep.utcluj.ro

Patent/ Application number

Patent OSIM no.: RO134189- B1/30.10.2024

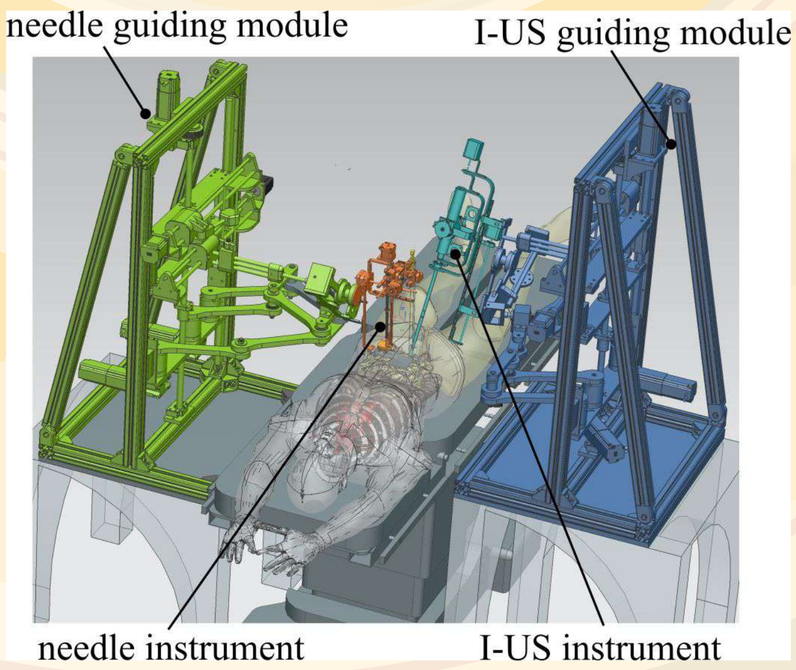
Short presentation

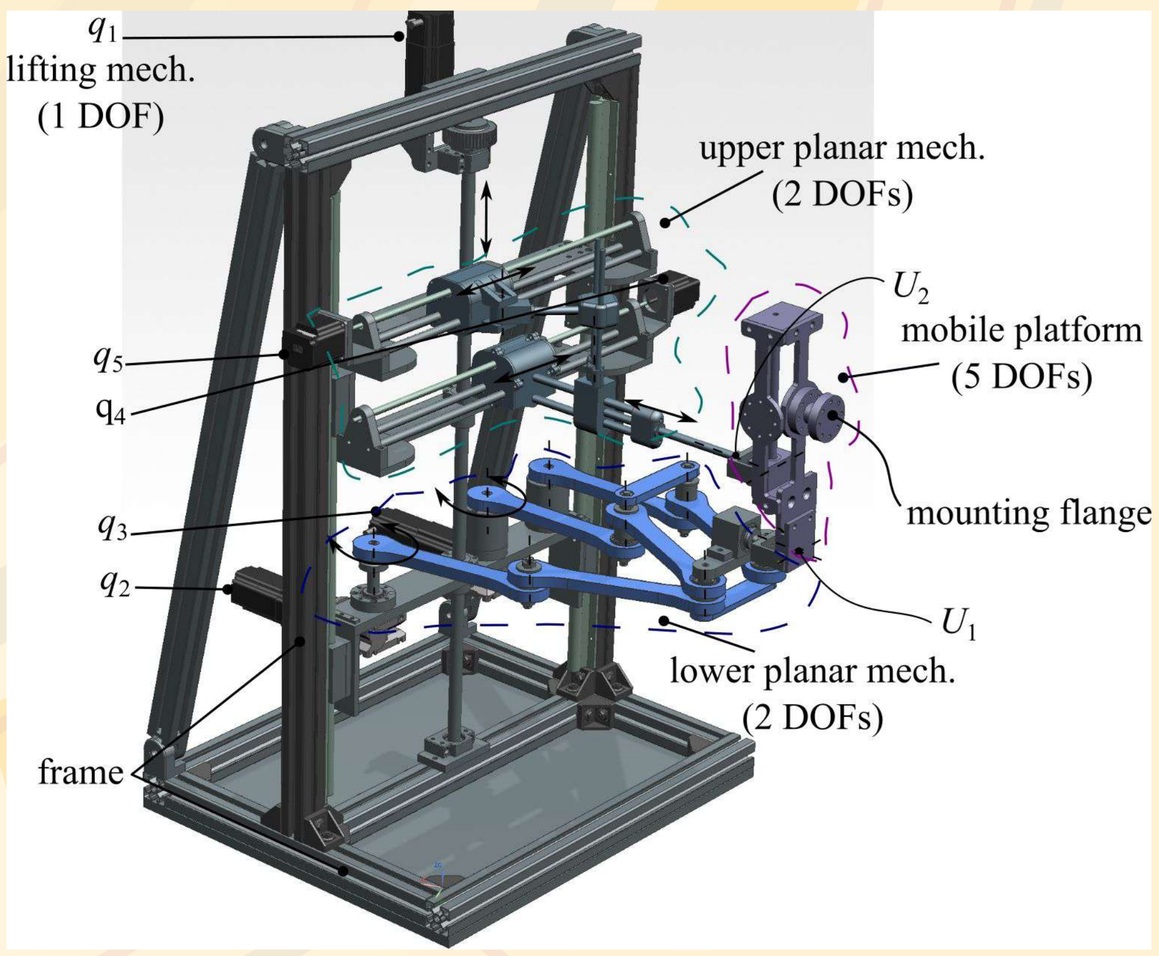
The invention relates to a parallel robot for laparoscopic treatment of unresectable liver tumors. According to the invention, the robot consists of two robotic modules: the intra-operatory ultrasound (I-US) guiding module is designed for guiding a hepatic ultrasound probe in the operating field; the needle guiding module is designed for guiding and inserting brachytherapy needles in hepatic tumors (which are localized using I-US). Each robotic module has five degrees of freedom and are placed on a common frame which is fixed on the patient's bed. Furthermore, both parallel robotic modules consist of two parallel mechanisms, one with three degrees of freedom and is used for positioning an automated medical instrument (to manipulate a hepatic ultrasound probe, or for brachytherapy needle insertion), and the second mechanism with two degrees of freedom for the automated instrument orientation. The parallel robotic system for hepatic cancer treatment is controlled by the surgical staff using a master console located in the operating room.

Applicability

Medical robotics, Cancer treatment, Brachytherapy, Intra-tumoral drug release.

Images





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Title

AUTOMATED MEDICAL INSTRUMENT FOR INSERTING MULTIPLE NEEDLES ON LINEAR AND PARALLEL TRAJECTORIES IN INTERSTITIAL BRACHYTHERAPY CANCER TREATMENT

Inventor/s - Contact

Gherman Bogdan, Bîrlescu Iosif, Burz Alin, Pisla Doina
E-mail: Doina.Pisla@mep.utcluj.ro

Patent/ Application number

Patent OSIM no.: RO134941- B1/30.10.2024

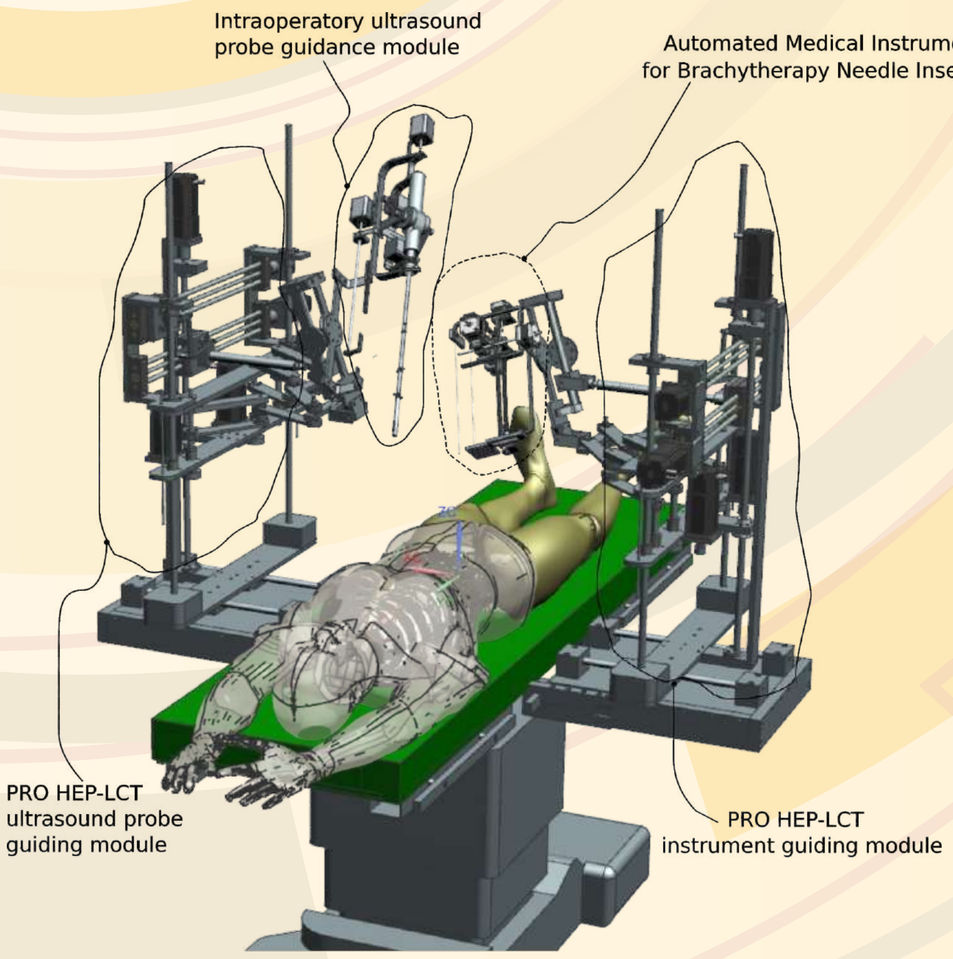
Short presentation

The present innovation is a medical robotic instrument designed to insert percutaneously multiple needles on a straight trajectory in brachytherapy procedures for liver cancer treatment. The instrument has 3 degrees of freedom, having a serial kinematic chain of type PPP and a specially designed gripper. It uses Gantry architecture to position the brachytherapy needle in the XOY plane, using the actuators 1 and 2. The brachytherapy procedure usually requires the precise placement of up to 6 brachytherapy straight needles inside the tumor in a matrix form (which helps avoiding needles collisions), using the actuator 3, at a distance of 10mm from each other (both on OX and OY axes). The size of the treated tumors determines directly the required number of the needles. These are taken from the needles rack, which is attached to the robotic instrument, one by one using the needle gripper, which is designed specifically for this application. The first needle is placed (approximately) in the middle of the tumor, followed by the others, using the pre-planned trajectories. The robotic instrument can also be used for intratumoral drug release.

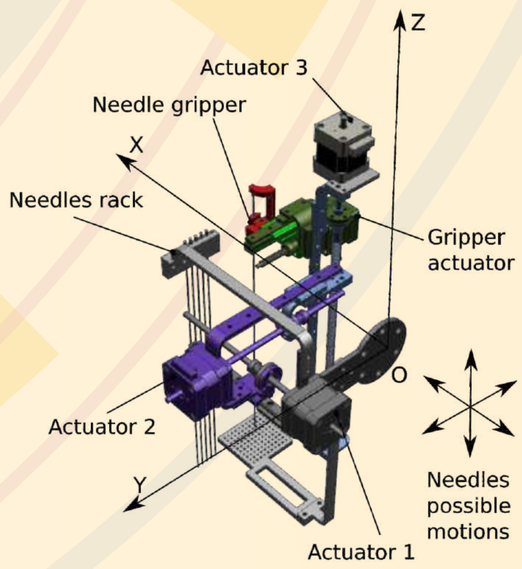
Applicability

Medical robotics, Cancer treatment, Brachytherapy, Intra-tumoral drug release.

Images



Robotic assisted brachytherapy for liver cancer treatment using the automated medical instrument



Automated Medical Instrument for Brachytherapy Needle Insertion

CESTER RESEARCH CENTER FOR INDUSTRIAL ROBOT SIMULATION AND TESTING

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

MEMBER OF EUT+ EUROPEAN UNIVERSITY OF TECHNOLOGY

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Title

PARALLEL ROBOT FOR RECOVERY OF LOWER LIMB JOINTS IN TWO PLANES

Inventor/s - Contact

Pîslă Doina Liana, Bîrlescu Iosif, Vaida Liviu-Călin, Tucan Paul- George-Mihai, Gherman Bogdan George, Machado Jose.
Doina.Pisla@mep.utcluj.ro

Patent/ Application number

Patent application OSIM no.: A/00116/20.03.2024 & Portuguese Institute of Industrial Property (INPI) no.: 20252006789500

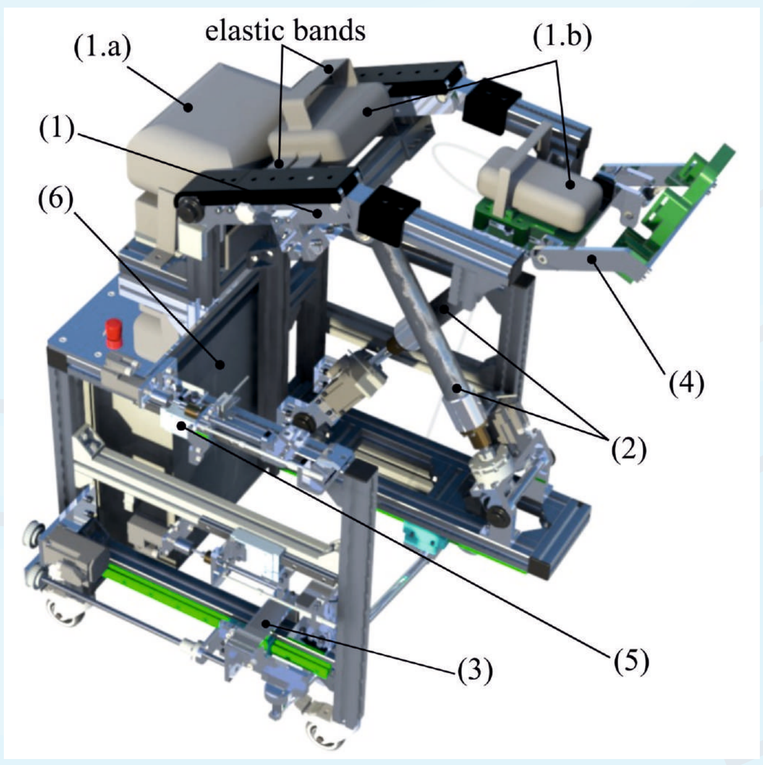
Short presentation

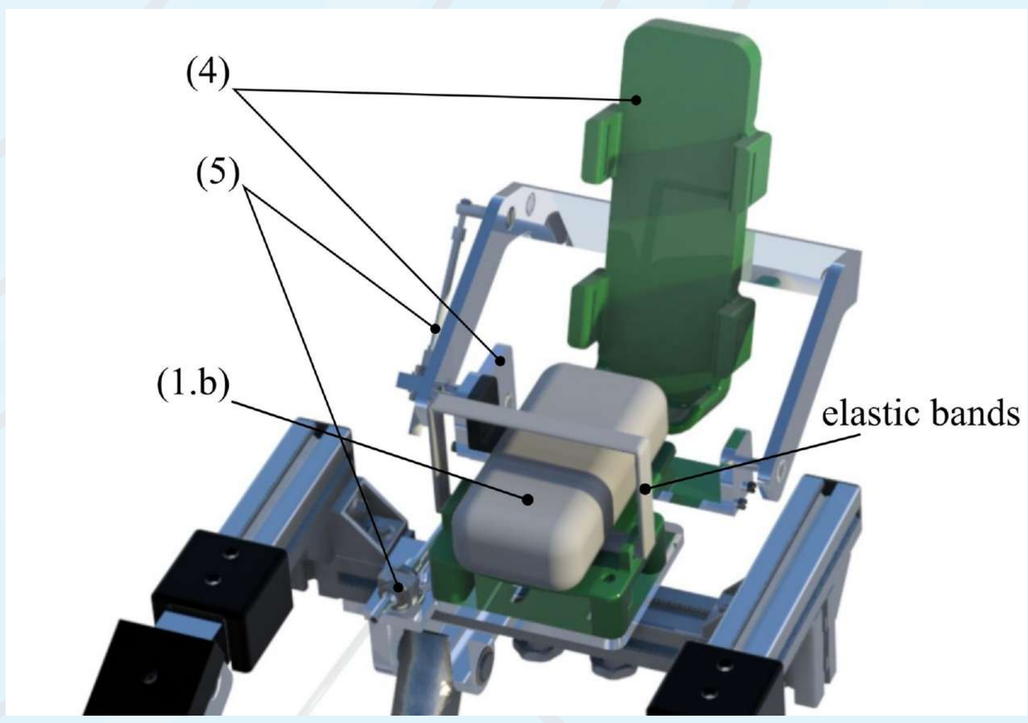
The invention relates to a parallel robot for the medical recovery of patients with neuromotor disorders of the lower limb. The robotic system (the subject of the invention) consists of two parallel, and coupled, robotic modules enabling the neuromotor rehabilitation of the lower limb in two planes. The first module (the hip and knee rehabilitation module HKM) is designed for the hip and knee neuromotor rehabilitation allowing the motions of flexion/extension of the hip and knee joints, and the abduction/adduction of the hip joint. The second module (the ankle rehabilitation module AKM) is designed for the ankle neuromotor rehabilitation allowing the motions of plantar flexion/extension and inversion/eversion. The HKM is composed of: a guiding kinematic chain (1), on which the lower limb is placed on pads (1.a, 1.b) and held using elastic bands; HKM is a serial kinematic chain with three passive revolute joints (RRR), which is guided by three input kinematic chains, two identical revolute-prismatic-revolute (RPR) chains (2), providing the flexion/extension motions for the hip and knee joints, and one prismatic-revolute-revolute-prismatic (PRRP) chain (3), providing the motions of abduction/adduction of the hip joint. The AKM is composed of: a guiding kinematic chain (4), where the foot is placed, which is a serial kinematic chain with two passive revolute joints (RR), and two identical input kinematic chains (5) of type revolute-prismatic-revolute (RPR) which provide the ankle motions.

Applicability

The invention domain of applicability refers to the neuromotor rehabilitation of the lower limb for patience suffering from different neuromotor afflictions such as: stroke, Parkinson disease, sclerosis (different forms), spinal cord injury. The robotic system from the present invention can be adopted in neuromotor rehabilitation centers, together with specialized patient-focused medical protocols, to help the medical personnel in rehabilitating the patients such that the patients can continue a normal life and be able to perform the daily life activities.

Images





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Title

AUTOMATED SURGICAL INSTRUMENT FOR ROBOTIC-ASSISTED MINIMALLY INVASIVE SURGERY

Inventor/s - Contact

Pîslă Doina Liana, Chablat Damien, Bîrlescu Iosif, Vaida Liviu-Călin, Pușcă Alexandru-Vasile, Tucan Paul-George-Mihai, Gherman Bogdan George.
Doina.Pisla@mep.utcluj.ro

Patent/ Application number

Patent application OSIM no.: A/00142/29.03.2024 & French Patent and Trademark Office (INPI-Institut national de la propriété industrielle) no.: FR2414038

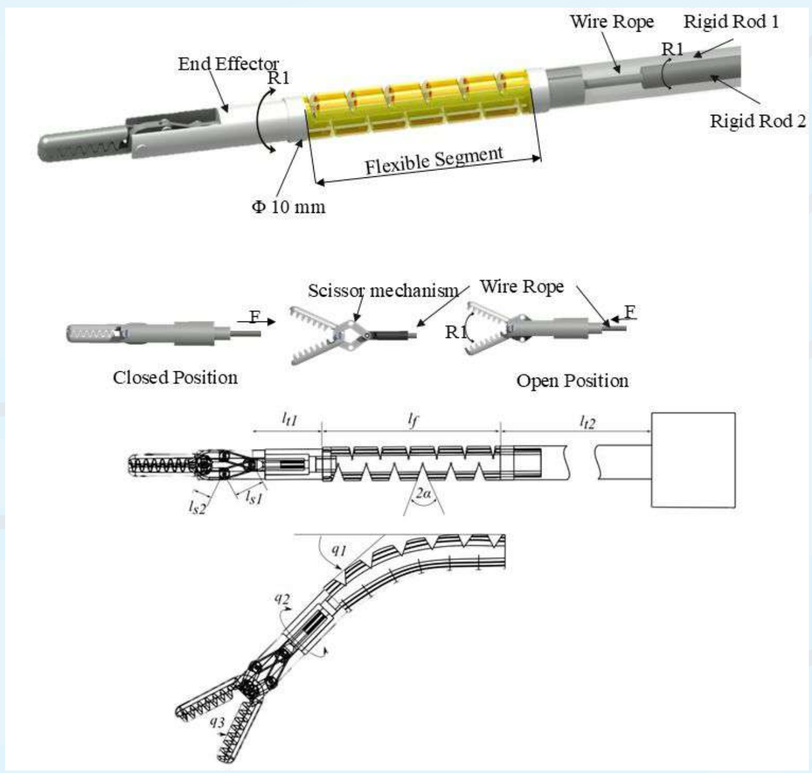
Short presentation

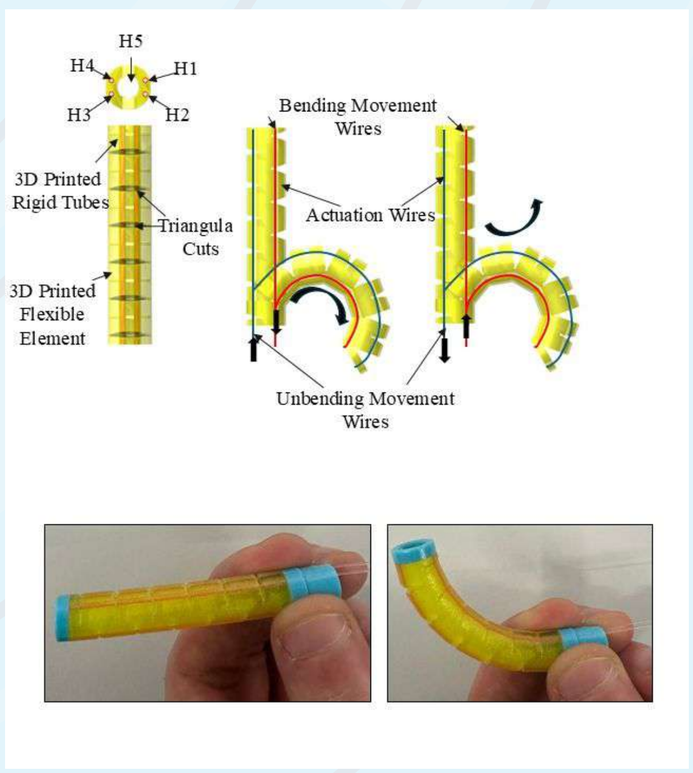
The present invention refers to an automated surgical instrument with high dexterity for minimally invasive robotic assisted surgery. The surgical instrument has 5 Degrees of Freedom (DoFs) for the active head (end-effector) of the surgical instrument (e.g., clips, scissors, dissector, etc.) to ensure high dexterity and easy access in difficult areas of the operating field. High dexterity is ensured by integrating a rotation in the distal area, at the level of the active head and easy access to the operator field is ensured by the controlled curvature of the instrument rod in the distal portion. The flexible segment of the instrument rod is manufactured using 3D printing and elastic materials with special geometry. Moreover, the surgical instrument within the present invention has decoupled motions which leads to increased rigidity, necessary for the manipulation of tissues in the operating field and the conduct of the surgical procedure. The surgical instrument within the present invention is designed to be mounted on serial or parallel robotic surgical systems with 6 degrees of freedom capable of maintaining a fixed point of insertion of the instrument in operator field and containing a module with the motors to actuate the 5 degrees of freedom of the instrument. Consequently, the surgical instrument does not contain sensitive electronic elements and can be sterilized by various techniques (chemical or ionizing radiation), being also more efficient as cost of production and use.

Applicability

The domain of applicability of the present invention refers to the robotic assisted minimally invasive surgery. The automated instrument can be equipped with various surgical tools (e.g., clips, scissors, dissector, etc.) to perform the required surgical task. The present invention is designed to be manipulated by a surgical robotic system to facilitate ergonomics and surgical intervention precision, which in turn improve the outcome of the surgical act.

Images





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Title

PARALLEL ROBOTIC SYSTEM FOR MINIMALLY INVASIVE PANCREATIC SURGERY

Inventor/s - Contact

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Patent/ Application number

Patent application OSIM no.: A/00522/11.09.2024 & French Patent and Trademark Office (INPI-Institut national de la propriété industrielle) no.: FR2414265

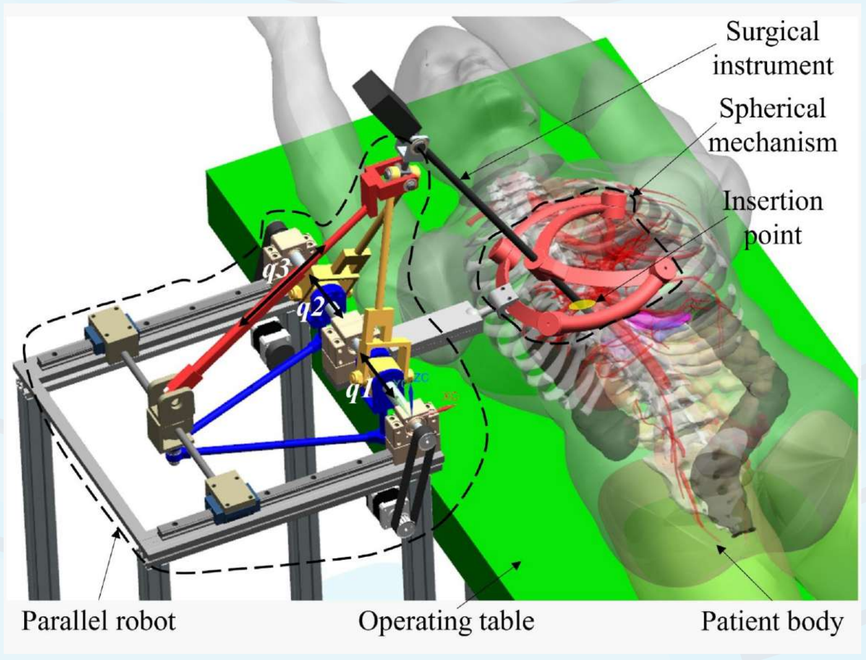
Short presentation

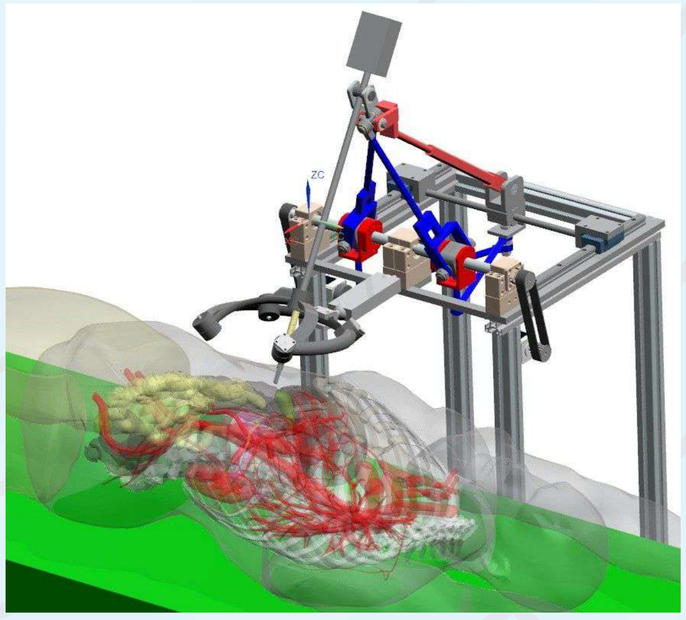
The present invention refers to a parallel and modular robotic system for minimally invasive surgery (MIS) of the pancreas. The robotic system is designed to assist the main surgeon in various MIS tasks and to replace the second surgeon in the operating room. The main surgical tasks of the modular parallel robotic system are manipulating active surgical instruments (staplers, scissors), manipulating the laparoscopic camera, manipulating retractors. The robotic system consists of three modules, namely: (1) an innovative parallel robot with 3 Degrees of Freedom (DOFs) that manipulates a surgical instrument; (2) a spherical parallel mechanism which constraints the surgical instrument in a Remote Center of Motion (RCM) type of motion (where the surgical instrument has three orientations with respect to the insertion point in the surgical field and one translation fir the instrument insertion/retraction); (3) the surgical instrument which is manipulated by the parallel robot (1) and constrained at the insertion point by the spherical mechanism (2) to avoid trauma. The specific advantages of the robotic system proposed for minimally invasive surgery of the pancreas are high accuracy and rigidity (characteristics of parallel robots that increase patient safety during the medical act), modularity, reduced footprint in the operating room and increased ergonomics (features that ease medical intervention for surgeons).

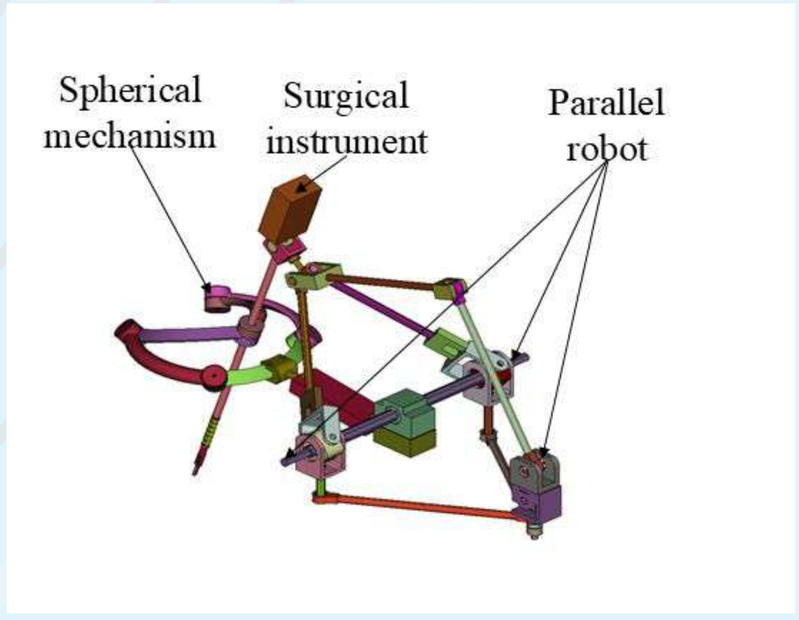
Applicability

The domain of applicability of the present invention refers to the robotic assisted minimally invasive pancreatic surgery and targets the accurate manipulation of various surgical instruments (staplers, scissors, laparoscopic camera, etc.). The present invention aims to replace the second surgeon in the operating room, to facilitate ergonomics and surgical intervention precision, which in turn improve the outcome of the surgical act.

Images







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Title

INTELLIGENT ROBOTIC SYSTEM WITH 3D NAVIGATION SYSTEM FOR ORAL SURGERY

Inventor/s - Contact

Doina-Liana Pîslă(UTCN), Cristian Mihail Dinu (UMFCJ), Paul-George-Mihai Tucan (UTCN), Rareș-Cristian Mocan (UMFCJ), Călin Liviu Vaida (UTCN), Vasile-Nicolae Bulbucan (UTCN), Daria Pîsla (UMFCJ), Mihaela-Carmen Hedesiu (UMFCJ)

Patent/ Application number

Patent application OSIM no.: A/00581/30.09.2024

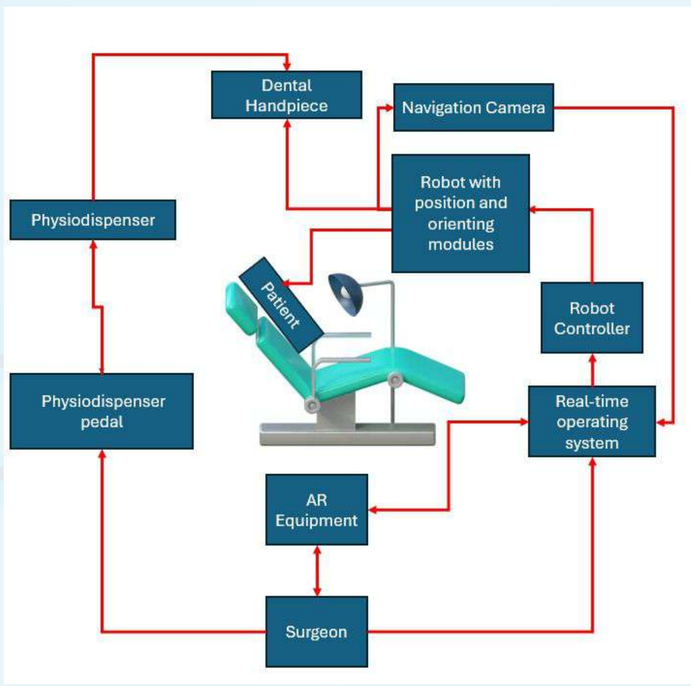
Short presentation

The present invention describes an intelligent robotic system that works together with an advanced 3D navigation system to perform oral surgery with increased precision and efficiency. The invention consists of an intelligent robot having at least six degrees of freedom, responsible for manipulating the dental handpiece during the procedure. This operation is based on commands from the process controller and a real-time operating system. The system also includes a stereo vision camera and 3D navigation system used to provide real-time three-dimensional imaging of the surgical site. These images enable the dynamic generation of trajectories for the robot's end effector that controls the dental handpiece. Additionally, the robot controller transmits the real-time motion parameters from the operating system ensuring continuous updates through the 3D navigation system. The surgeon oversees the entire procedure and can intervene as necessary. Using augmented reality equipment, the surgeon can simulate the surgical process, previewing the handpiece trajectory, receiving patient status updates, making fine trajectory adjustments, recording the procedure, and virtually placing the dynamic surgical guide. All these functions use the preoperative CBCT images and the real-time 3D navigation system, enabling active adjustments during the medical procedure, including compensating for the patient's head movements.

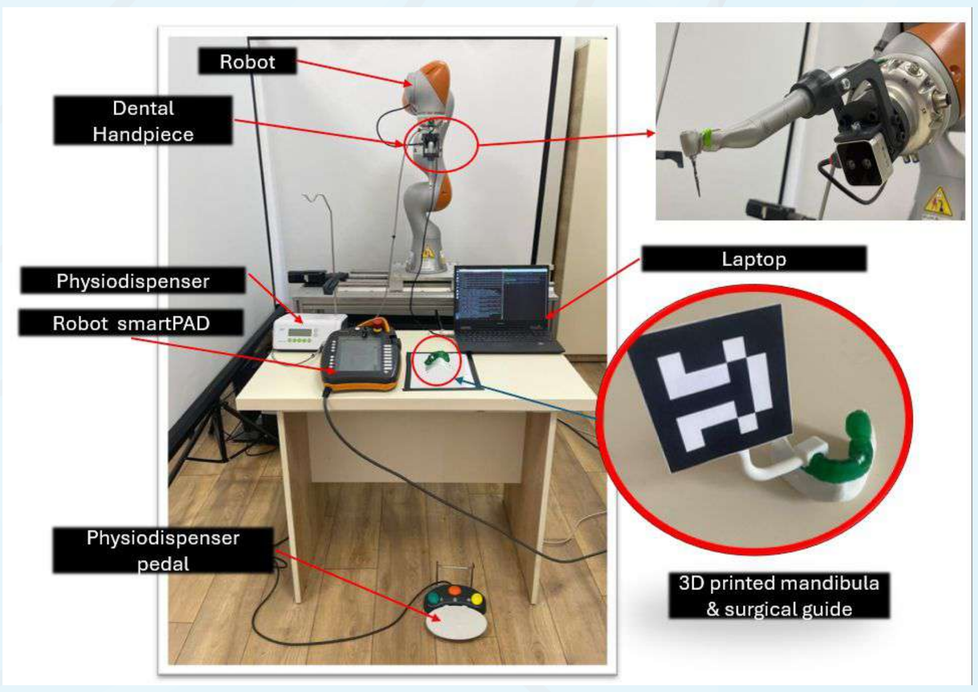
Applicability

The specific applicability of the intelligent robotic system with 3D navigation system for oral surgery from the present invention is robotic-assisted oral surgery, a medical procedure that has proven multiple advantages over classic, manual surgery such as: higher precision, ergonomics, reduced risk of damage to adjacent tissues, reduction of human errors, optimal post-operative evolution and maximization of the implant lifetime. The intelligent robotic system with 3D navigation for oral surgery represents a significant advancement in the field of oral surgery, combining cutting-edge technologies to provide more precise, safe, and effective treatments. This transforms the way oral surgical interventions are performed, bringing benefits for both doctors and patients.

Images



Concept



Prototype

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Title

METHOD FOR MAKING CUSTOMIZED IMPLANTS FROM TITANIUM-GRAPHENE COMPOSITE WITH CONTROLLABLE MECHANICAL CHARACTERISTICS VIA SELECTIVE LASER MELTING PROCESS

Inventor/s - Contact

Cosma Sorin Cosmin, Bâlc Nicolae Octavian, and Berce Petru

Patent/ Application number

Patent application OSIM no.: A/00109/18.03.2024

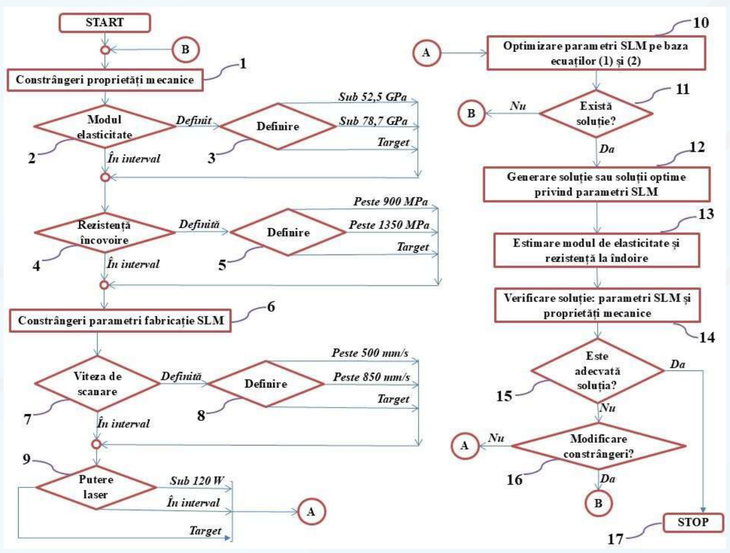
Short presentation

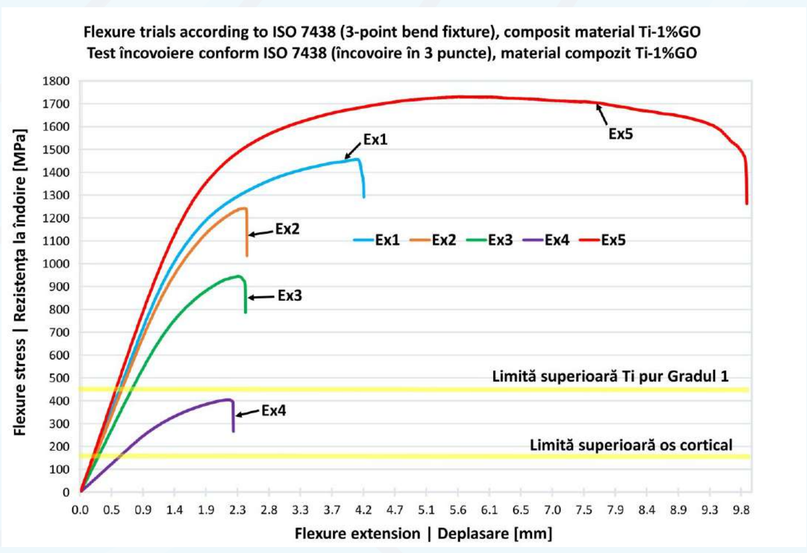
The present invention relates to a direct method of obtaining personalized medical implants used for bone reconstruction made of composite material developed from pure titanium (Ti) and graphene oxide (GO) powder. The implants developed in this manner will have controllable mechanical characteristics, antibacterial and anticancer properties, and they will be fabricated using the selective laser melting (SLM) process. The technology allows modifying the elastic modulus and flexural strength of Ti-1%GO implants according to the patient's needs, following the logic diagram shown in Figure 1. This invention involves defining the mechanical characteristics and constraints of the SLM process parameters, and using the mathematical equations (1) and (2), they will generate the optimal solution for implant manufacturing. Thus, Ti-1%GO implants can be obtained with a specific elastic modulus, 25-50% lower than that obtained from pure Ti and/or an increased flexural strength (over 900 MPa). The method allows the estimation of the mechanical properties that can be obtained depending on SLM parameters and can improve productivity by generating an optimal solution, considering an increased laser scanning speed. The following advantages will be achieved: The elasticity modulus of implants made from this composite can be controlled and reduced, diminishing the stress shielding effect between the implant and host bone;
The mechanical strength of implants can be improved (3 times higher than pure Ti) and the weight of them can be reduced via a design optimization procedure, respecting also the medical requirements; The proposed method does not have a negative impact on the environment.

Applicability

The method is intended for Additive Manufacturing (AM) technologies that use materials in the form of nanometric and micrometric powders and lasers for melting them together. This technology is feasible to produce implants with antibacterial properties by integrating graphene into the composite, which is uniformly distributed across the entire surface of the implant and within its structure, avoiding the typical delamination issue of coatings with graphene. The proposed invention did not have any limit regarding the implant shape complexity, and it can predict the influence of SLM parameters on the elasticity modulus and on the bending strength of implants made from Ti-GO.

Images





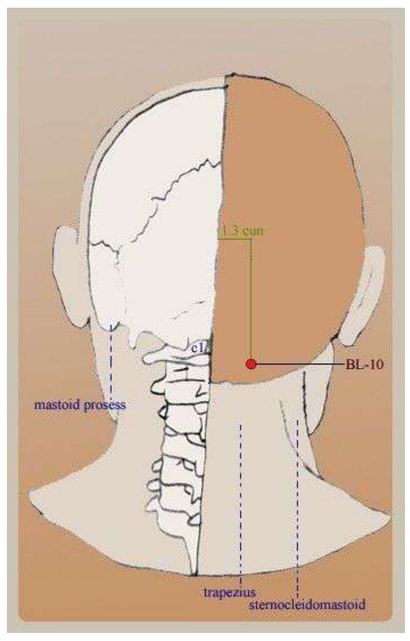
CERVICAL BIORESONANT BELT

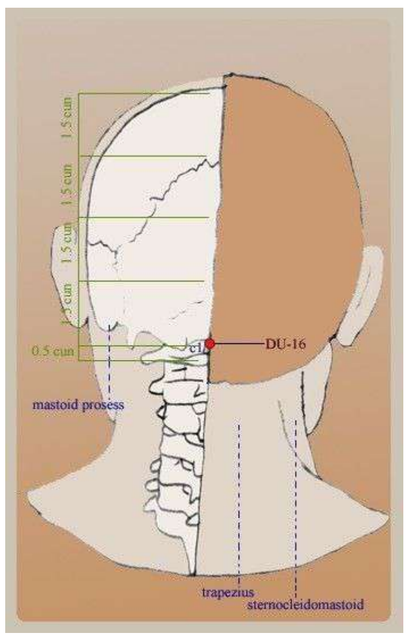
Project

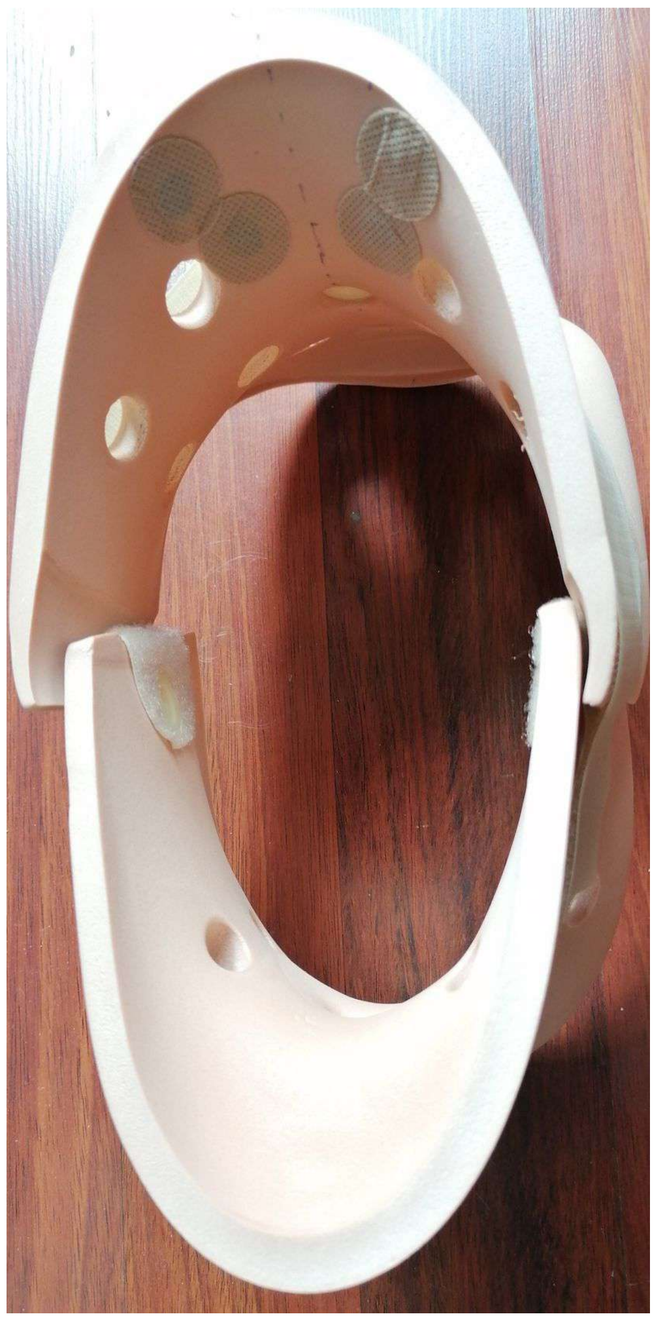
Authors:

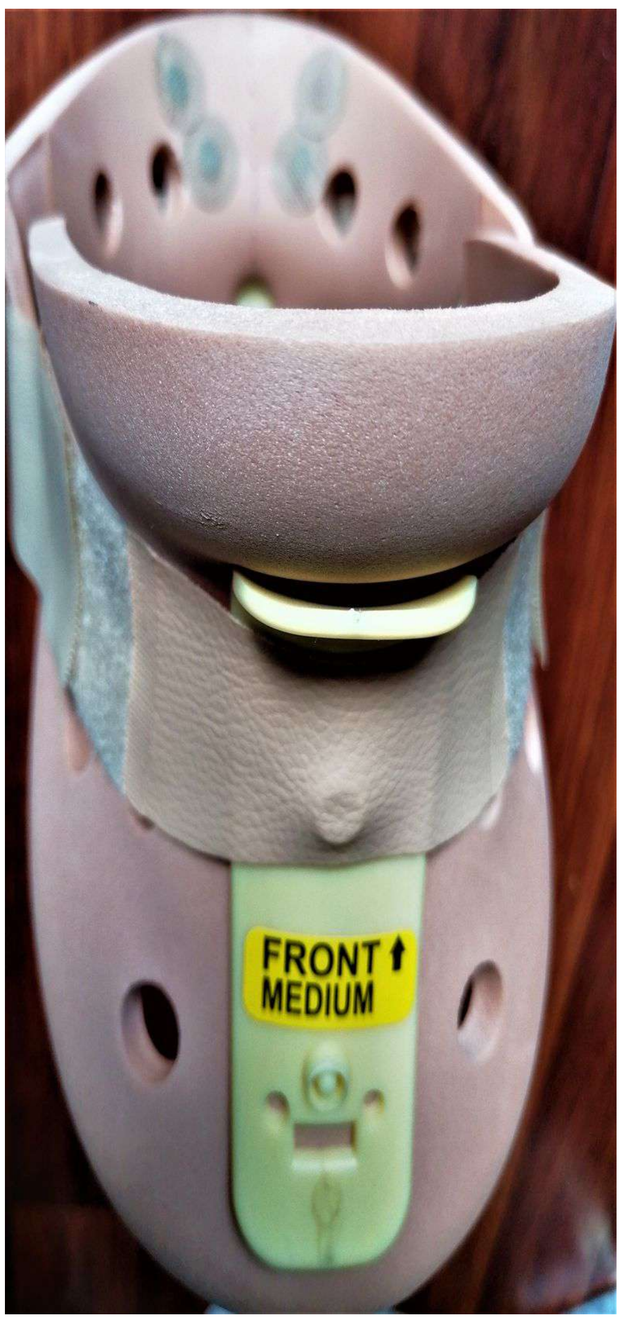
Velcea Marian, Mândrea Lucian, Moldovan Ion Corneliu, Plotog Ioan, Hideg Cătălin, Curta Ioan, Mihăilescu Bogdan, Caracaș Eugen, Chețan Mihai, Ene Ciprian

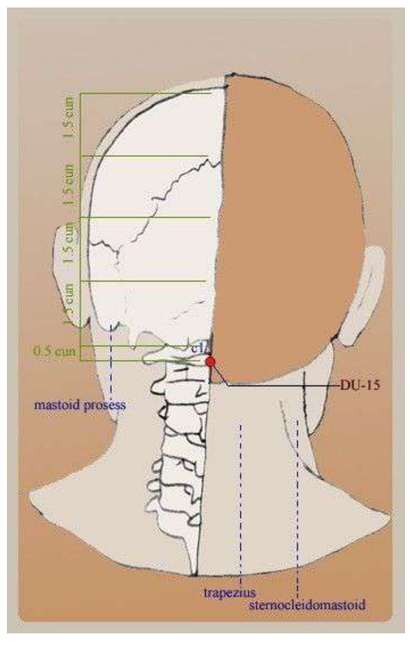
The device consists of a medical support dedicated to the cervical area on which Qi-Polino Doctor Tech passive resonant devices (EMCOPAD) have been assembled in the positions corresponding to the C7 vertebra and acupuncture points BL-10, VB-20, VG-15 and VG-16. These points are activated independently or simultaneously in groups formed by the therapist, depending on the patient's condition and his immediate needs. The interaction at the energy level takes place through the acupuncture points placed in electromagnetic contact with the Qi-Polino device, which transmits impulses with a harmonic frequency of the note LA, located in the radio band. This interaction is only possible during the period when paired acupuncture points are in relative imbalance (one to the other), characterized by the presence of a local electric potential, with an effect on the power supply of the electronic circuit; once the energetic balancing of the corresponding points is achieved, the electronic device cuts off its power supply for the entire balance period, resuming the operating cycle when a new imbalance between the corresponding acupuncture points occurs.

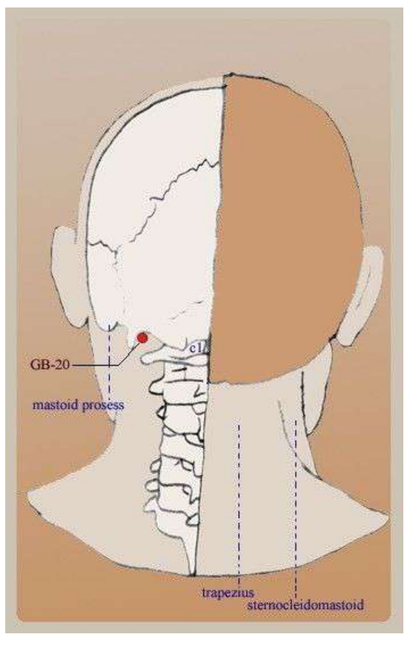












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www.DoctorTech.ro

"Survival Therapy Kit" – Kit for the treatment of ailments, through therapies based on classical acupuncture (TCM – Traditional Chinese Therapy), applied with the help of passive resonant devices "EMCOPAD Doctor Tech"

Authors: VELCEA Marian, MOLDOVAN Ion-Corneliu,
PLOTOG Ioan, MIHĂILESCU Bogdan, HIDEG Cătălin
E-mail: marian.nicolae.velcea@gmail.com

The "Survival Therapy Kit" contains a "Practical Guide" for recommending therapeutic procedures (organized alphabetically for more than 100 common conditions), a set of 200 pieces of EMCOPAD devices (Doctor Tech passive resonant electromagnetic patches) and adhesive rolls for attaching the devices to the body of the treated person.

The devices are applied periodically on the acupuncture points recommended in the therapy of the diagnosed condition. The application period is 21 days and is followed by a 10-day break.

The procedure is repeated, if necessary, twice more.

EMCOPAD Doctor Tech devices are used indefinitely. It is recommended to disinfect them with alcohol before each use.

The advice of a doctor or acupuncturist is recommended.

(TCM is officially approved by the WHO)

EMCOPAD devices
(Doctor Tech passive resonant electromagnetic patches)

MEDICAL EARRINGS FOR ENERGY REBALANCING

Authors: Marian VELCEA, Ion Cornel MOLDOVAN, Ioan PLOTOG, Cătălin Robertino HIDEG, Ioan CURTA, Etelka ANEBTAWI, Benjamin AVIDAN
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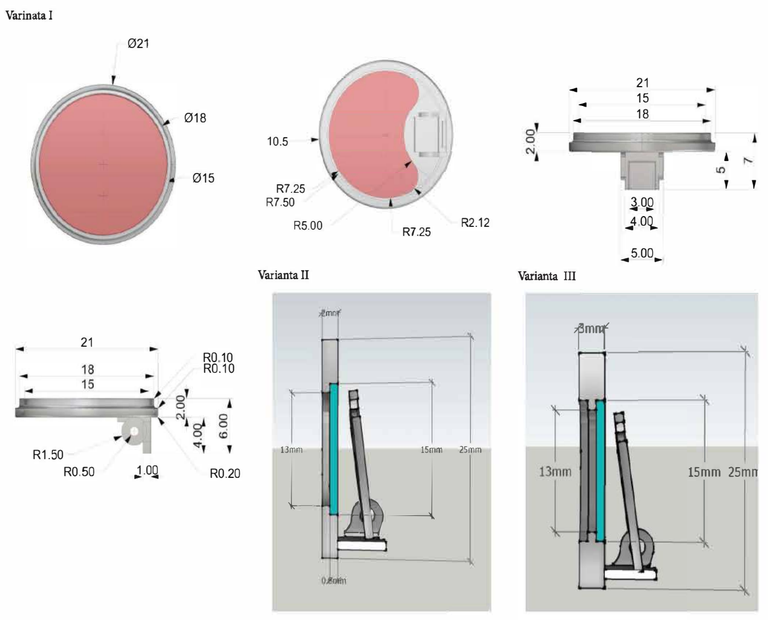
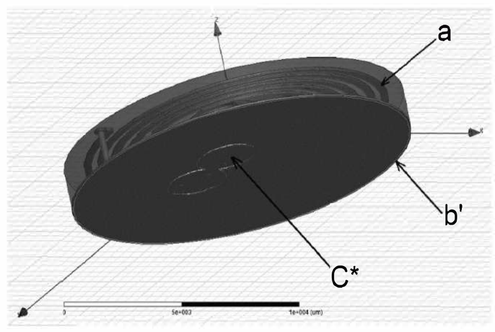
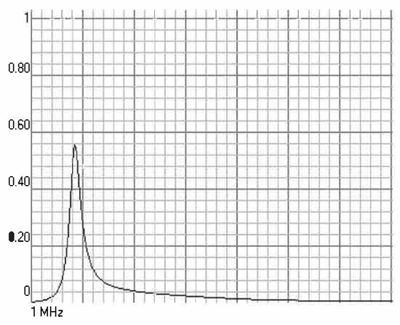
PCT Patent Pending WO 2018-A1

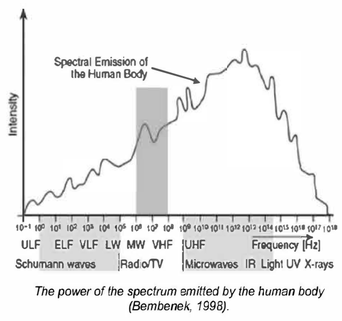
The invention relates to an ear-like medical device built to interact with acupuncture points located on the ear lobe and controlling the health of the eyes.

The device contains electromagnetic patches (PEMs) characterized by specific frequencies that are fixed above the active electrodermal points on the earlobe by means of screws or clips; the device acts as an intelligent acupuncture needle: their activation is ordered by their own biorhythm by the user's body. The device does not require a source of electrical power, being fed from the local electric field.

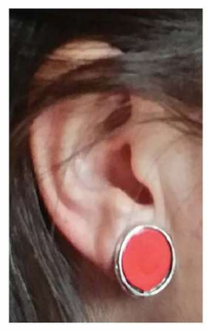


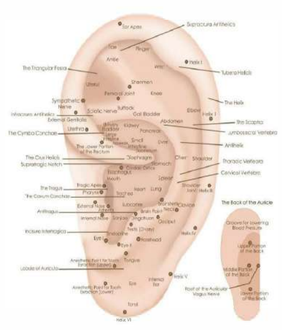


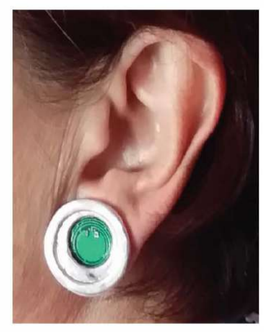


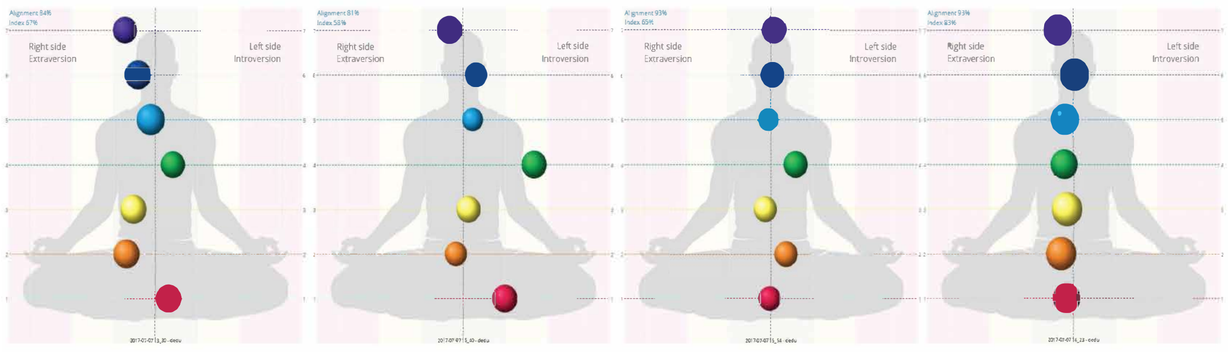


The power of the spectrum emitted by the human body (Bemberaek, 1998).

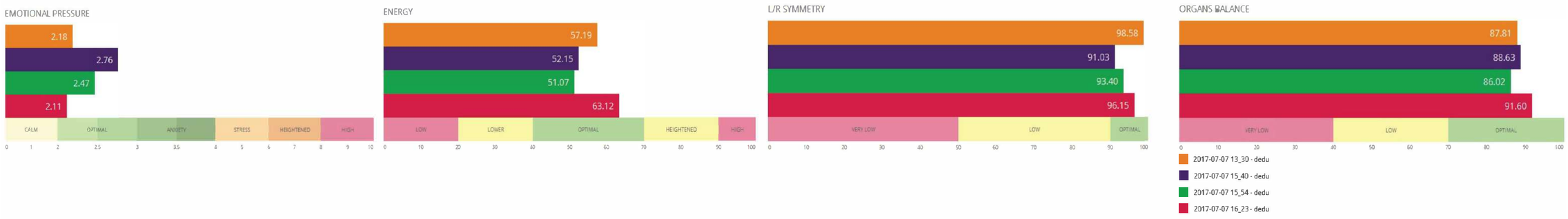








The measurements show the decrease of the stress level, the left-right energetic balancing, the increase of the energy of eyes and the increase of the energy of the internal organs, with the consequence of the improvement of the general immunity.



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Give a better chance to your health!

Bioresonant kneepad for functional recovery

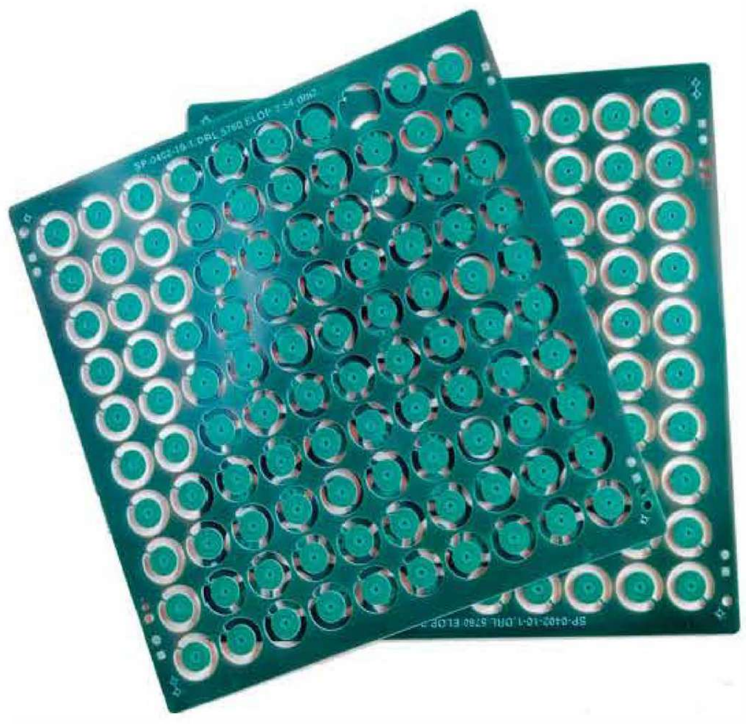
Authors: VELCEA Marian, MOLDOVAN Ion-Corneliu,
CARACAS Eugen, CURTA Ioan, MÂNDREA Lucian
E-mail: marian.nicolae.velcea@gmail.com

The bioresonant kneepad is a device designed for the functional recovery of the knee consisting of an elastic support that surrounds the knee, on which two groups of bioresonant devices EMCOPAD Doctor Tech are assembled.

The first group of four devices is positioned on the inside of the elastic support for front contact with the ball joint - on its contour, both at the intersection with the axis of symmetry (vertical) up/down, and at the intersection with the horizontal drawn through the centre of the ball joint, outside/inside.

The second group of devices is located in the popliteal fossa, also on the axis of symmetry. Regular use of the device in a supervised recovery procedure ensures a faster return to previous performance.

Energy measurements performed with specialized equipment confirm the improvement of the state of the knee after the use of bioresonant knee.



EMCOPAD devices
(Doctor Tech passive resonant electromagnetic patches)

BIORESONANT WRIST BRACE FOR FUNCTIONAL RECOVERY

Project

Authors:

Velcea Marian, Mândrea Lucian, Moldovan Ion Corneliu, Plotog Ioan, Hideg Cătălin, Curta Ioan, Mihăilescu Bogdan, Caracaș Eugen, Chețan Mihai, Ene Ciprian

A medical device designed to protect the radiocarpal joint through an outer shell for functional recovery. It provides the following functions: stabilization and support of the radiocarpal joint, reduction of pain and inflammation; prevention of excessive or sudden movements, protection during physical activities or following an injury.

The bioresonant wrist brace is a flexible model for light physical support, intended for functional recovery of the wrist joint and consists of an elastic support surrounding the radiocarpal joint, on which a group of EMCOPAD Doctor Tech bioresonant devices is linearly assembled. The group of electronic devices consists of ten devices that are positioned inside the elastic support for direct contact with the wrist joint – along its entire contour, exposing it to a harmonic and polarized electromagnetic field. Regular use of the device as part of a supervised recovery procedure ensures a faster return to previous performance. Energy measurements performed with specialized equipment confirm the improvement of the condition of the wrist joint and the patient's general condition, through the use of the bioresonant wrist orthosis.

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www.DoctorTech.ro

TRAVEL PILLOW WITH ENERGY REBALANCING EFFECT

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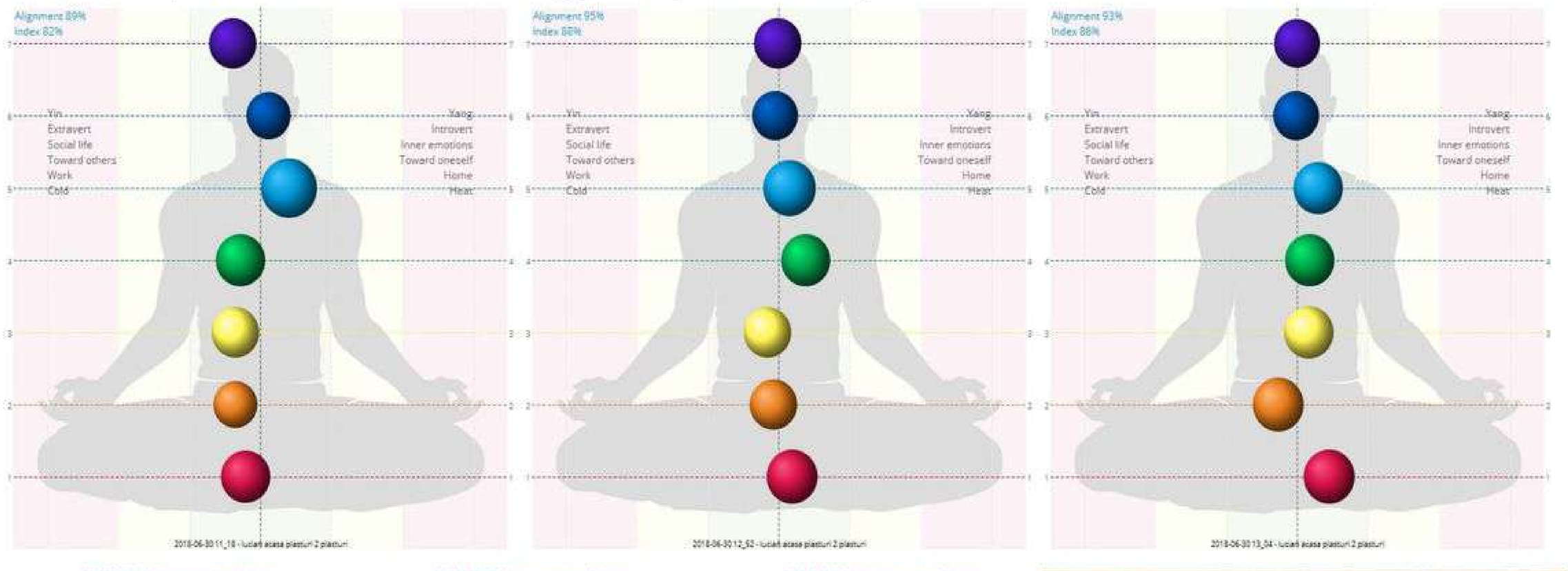
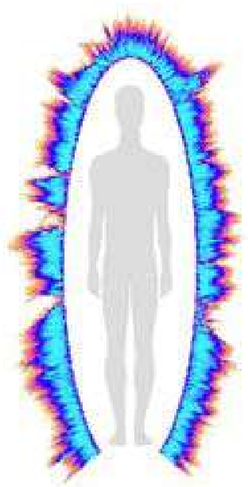
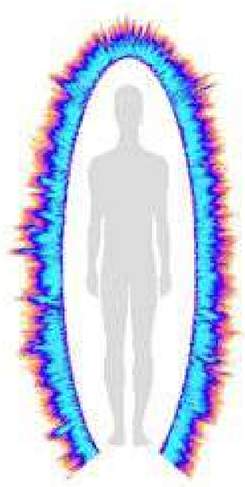
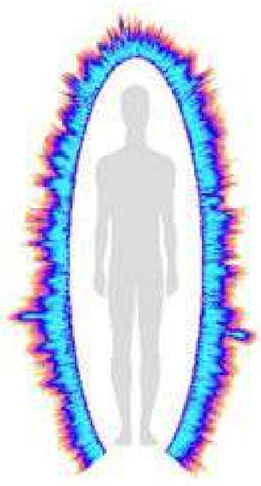
Un set de Bio-cipuri, dispozitive electronice pasive de tip plasture electro-magnetic Doctor Tech este utilizat pentru reechilibrarea energetică atât de necesară în timpul unor călătorii obositoare. Clasica pernă de călătorie care se așează în jurul gâtului este echipată cu dispozitive de tip Bio-cip , amplasate fie pe axa de simetrie, fie simetric față de aceasta. Punctele de acupunctură din zona cervicală ajung în contact cu dispozitivele fixate pe perna de călătorie și produc activarea dipozitivelor electronice. Se produce local o interacțiune similară unui tratament de acupunctură al cărui efect este o reechilibrare energetică și o îmbunătățire a stării generale prin creșterea tonusului și scăderea nivelului de stres. Ciclul de funcționare se reinițiază, periodic, atunci când dispozitivele sesizează un dezechilibru energetic. Astfel, Perna de călătorie Smarty transformă o călătorie obositoare într-o călătorie agreabilă.

A set of Bio-chips, passive electronic electro-magnetic patch devices Doctor Tech is used for energy re-balancing so much needed during tedious journeys. The classic travel cushion that is placed around the neck is equipped with Bio-chip devices placed either on the symmetry axis. The acupuncture points in the cervical area come into contact with the devices attached to the travel cushion and produce activation of the electronic devices. There is a local interaction similar to acupuncture treatment, the effect of which is an energy rebalancing and an improvement of the general state by increasing the tone and decreasing the level of stress. The operating cycle is periodically restarted when devices notice an energy imbalance. This Smarty Travel Pillow turns a tiring journey into a fun trip.









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E-LITE NUTRITIA TONIC RANGE

Natural therapies

F

Author: ***Adriana Vlad***

E-lite Nutriţia, the most recognized manufacturer in the field of apiphytotherapy, offers you unique preparations, with original recipes, created by Prof. Dr. Adriana Vlad – nutritionist, specialist in natural therapies.

The range of nutritional supplements includes tonics in bee honey and herbal extracts for all conditions: Gynecological tonic "E-lite", Glandular tonic "E-lite", Gastro tonic "E-lite", Sedative tonic "Sorina", Renal tonic "E-lite", Antitumor tonic "E-lite", and others, Superforte Ovulin, natural gynecological ovules for the treatment and prevention of gynecological conditions, Superforte Supozin, natural suppositories for the treatment and prevention of conditions of the colon, prostate, urinary tract and genital system.

TONIC POTENTA MAXIMA "E-LITE" | **TONIC GINECOLOGIC "E-LITE"** | **TONIC GASTRO "E-LITE"**

TONIC "E-LITE" 90-60-90 | **TONIC ANTIPARAZITAR "E-LITE"** | **TONIC GLANDULAR "E-LITE"**

SCAN ME

TONIC IMUNITAR "E-LITE" | **TONIC ANTITUM "E-LITE"** | **TONIC HEPATO "E-LITE"**

Contact: ***elite.nutritia@yahoo.com***

SUPERFORTE SUPOZIN & SUPERFORTE APICOPLANT

Natural therapies

F

Author: ***Adriana Vlad***

Superforte Ovulin - Solid Cream *it is a 100% natural product that helps alleviate the manifestations of prostate, colon, and female genital dysfunction. It has a strong anti-inflammatory, cicatrizing, antirheumatic, antiseptic, antitumor, antihemorrhagic action. It prevents and acts beneficially on the early symptoms of colon and prostate damage, has positive effects in cases of tumors in the colon and the female genital area. The product is beneficial in prostate disorders, cystitis, nephritis, urethritis, internal and/or external hemorrhoids, inflammation, wounds, eczema and tumors on the colon, rheumatic diseases, but also in gynecological diseases, administered together with "Superforte Ovulin - Solid Cream". Ingredients: honey, propolis, pollen, royal jelly, mummy, clay, cocoa butter, sea buckthorn oil extract, chamomile, thyme, St. John's wort, marigold, marigold, juniper essential oil, sage, pine, fennel, geranium, lavender.*

SUPERFORTE APICOPLANT *it is a natural product that acts beneficially in conditions of the colon, rectum and intestine. Action: colon detoxifier, decongestant, alkalizing, antimicrobial, regulates digestion (diarrhea, constipation), antitumor, regenerates the digestive mucosa and intestine, antihemorrhoidal (in combination with Superforte Supozin), intestinal soothing (indigestion, gas, irritable colon, biliary colic etc.), slimming cures. In chronic conditions, a natural and homeopathic treatment is recommended - internally for a period of 3-6 months for greater treatment efficiency. Ingredients: Argilla (clay), Theobroma cacao (cocoa butter), Melem (honey), Cera (wax) Carbo (coal), Argentum colloidal (colloidal silver), Probiotic, Calamus aromaticus (obligean), Mentha essential oils), Feaniculi (fennel), Camelia sinensis (tea tree), Caryophyllis (clove), nipagin, nipasol.*

SCAN ME

Contact: ***elite.nutritia@yahoo.com***

Proportional extrapolation of the data on the smokers number in the study of the radon x smoking interaction as a trigger factor in the onset of bronchopulmonary cancer in the Republic of Moldova

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CORETȘCHI Liuba, OVERCENCO Ala, ABABII Aurelia

The research is supported by the Ministry of Health and the Ministry of Education and Research of the Republic of Moldova in the framework of the sub-project "Monitoring the ionizing radiation exposure to the professionally exposed personnel and the public with the development of radioprotection measures" (2024-2027), no. 13.01.02

According to the WHO, **radon** causes lung cancer in between 3% and 14% of all the cases, depending on the average level of radon concentration in the country and the prevalence of smoking, and the risk of lung cancer for smokers is much higher than for non-smokers.

Radon exposure and **tobacco smoking** are the two leading risk factors for **lung cancer**, which is the second most common cancer in the Republic of Moldova. According to the National Population Study STEPS 2021, **three out of 10 people** were current **tobacco smokers**.

The number of tobacco smokers in the *radon x smoking x lung cancer* study is necessary, but difficult due to the different scale of the initial data and therefore requires the use of a special method of bringing them to values suitable for the study.

The number of tobacco smokers of the **National Population Study STEPS 2021** (4097 interviewees, age 18-69 y.o., both genders, urban/rural residence) and population data of the National Bureau of Statistics were used. Because of the STEPS 2021 data on number of smokers is available only for the whole country in order to fit these data with radon measurement data and the lung cancer morbidity rates a **mathematical tool of proportional extrapolation** of initial data on tobacco smokers has been developed.

The mathematical ratio (proportion) between the total population number in each age group, gender and place of residence with the number of the population in the same categories by regions has been calculated, using the population data of the National Bureau of Statistics during 2021.

Based on these links (rates), the number of smokers by region of the country has also been calculated.

The data obtained by extrapolation by regions allowed us to develop a spatial distribution of tobacco smokers, to asses them by statistical sense as well as to use them in ***radon x smoking x lung cancer*** study.

1. Proportion of population (ratio, %)
(nr of population in every region / nr of total population) * 100
by age, gender, residence, region

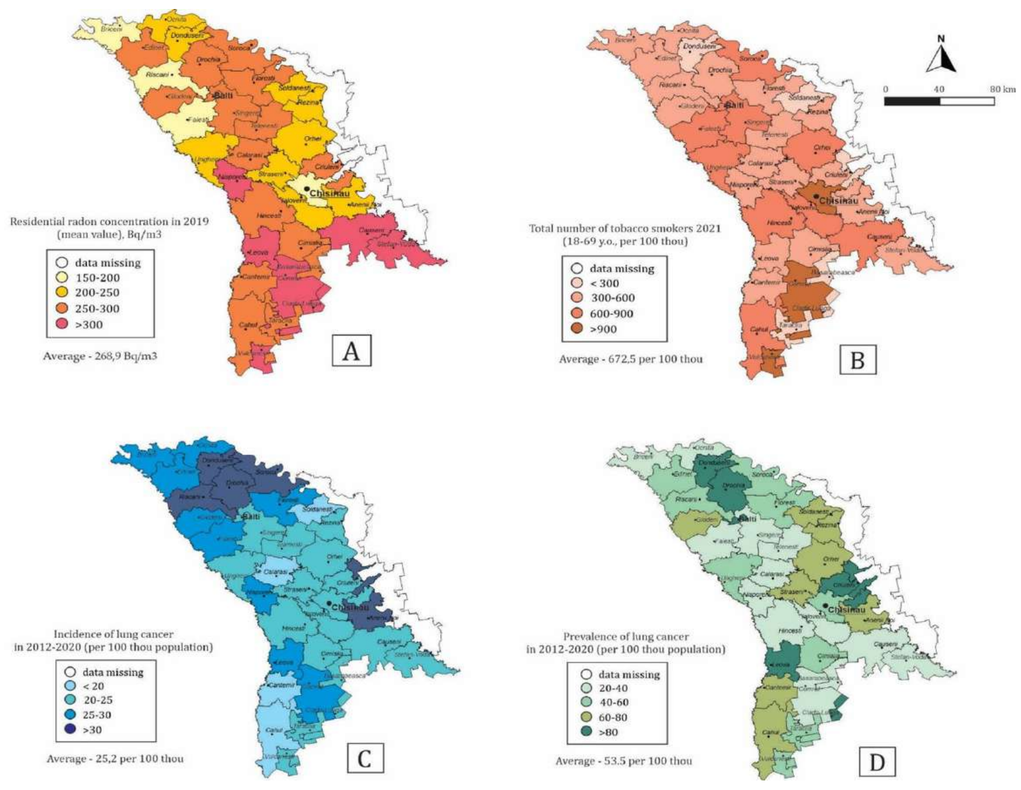
→

2. Nr of smokers
(ratio * nr of smokers from National Household Survey) / 100
by age, gender, residence, region

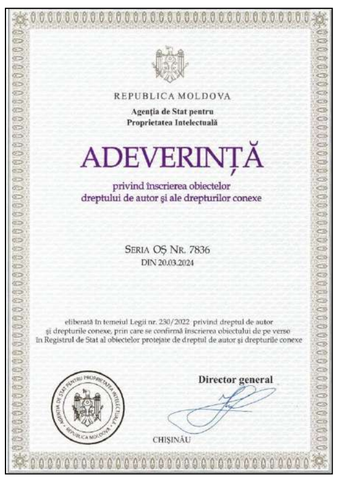
↓

3. Standardized nr of smokers per 100 thou of population
(nr of smokers * 100 000) / nr of total population
by age, gender, residence, region

The elaborated proportional extrapolation algorithm



Cartograms of spatial distribution of radon concentration (A), total tobacco smokers (B), lung cancer incidence (C) and lung cancer prevalence (D) in the Republic of Moldova



REPUBLICA MOLDOVA
Agenția de Stat pentru Proprietatea Intelectuală

ADEVERINȚĂ

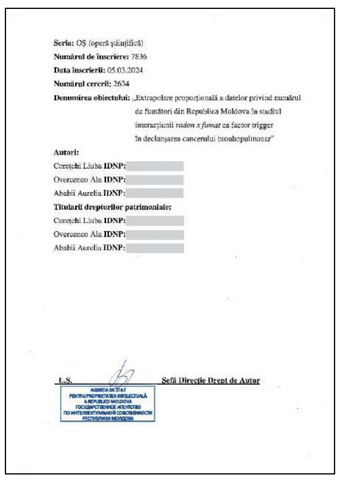
privind înscrierea obiectelor dreptului de autor și ale drepturilor conexe

SERIA OȘ NR. 7836
DIN 20.03.2024

eliberată în temeiul Legii nr. 230/2022 privind dreptul de autor și drepturile conexe, prin care se confirmă înscrierea obiectului de pe verso în Registrul de Stat al obiectelor protejate de dreptul de autor și drepturile conexe

Director general

CHIȘINĂU



Seria: OȘ (operă științifică)
Numărul de înscriere: 7836
Data înscrierii: 05.03.2024
Numărul cererii: 2634
Denumirea obiectului: „Extrapolare proporțională a datelor privind numărul de fumători din Republica Moldova în studiul interacțiunii *radon x fumat* ca factor trigger în declanșarea cancerului bronhopulmonar"

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National Agency for Public Health webpage:
https://ansp.md/control_radon/

FaceBook page:
https://www.facebook.com/profile.php?d=100082203806764

TIMIȘOARA

National Research & Development Institute for Welding and Material Testing - ISIM Timișoara

ULTRASOUND ACTIVATION DEVICE FOR FLOWING OR LIMITED VOLUME LIQUID MEDIA

F

***Patent application* No. A2024 00456 / 01.08.2024**

***Author:* Nicușor-Alin SÎRBU**

Homogenization and dissolution of biological or solid components is used in various techniques for processing liquids in limited volumes or in flow state. It is often necessary to homogenize mixtures of different liquids or to emulsify them. To achieve these processes, mechanical stirring action is used, usually with rotating elements, stirring by vibration, but especially using ultrasound energy for cellular effects due to ultrasonic cavitation, or forcing liquids through the narrow and fragmented spaces of slits arranged in a labyrinth-like manner. In some applications the above procedures are complemented by controlled heating of liquids to accelerate processes due to thermal energy.

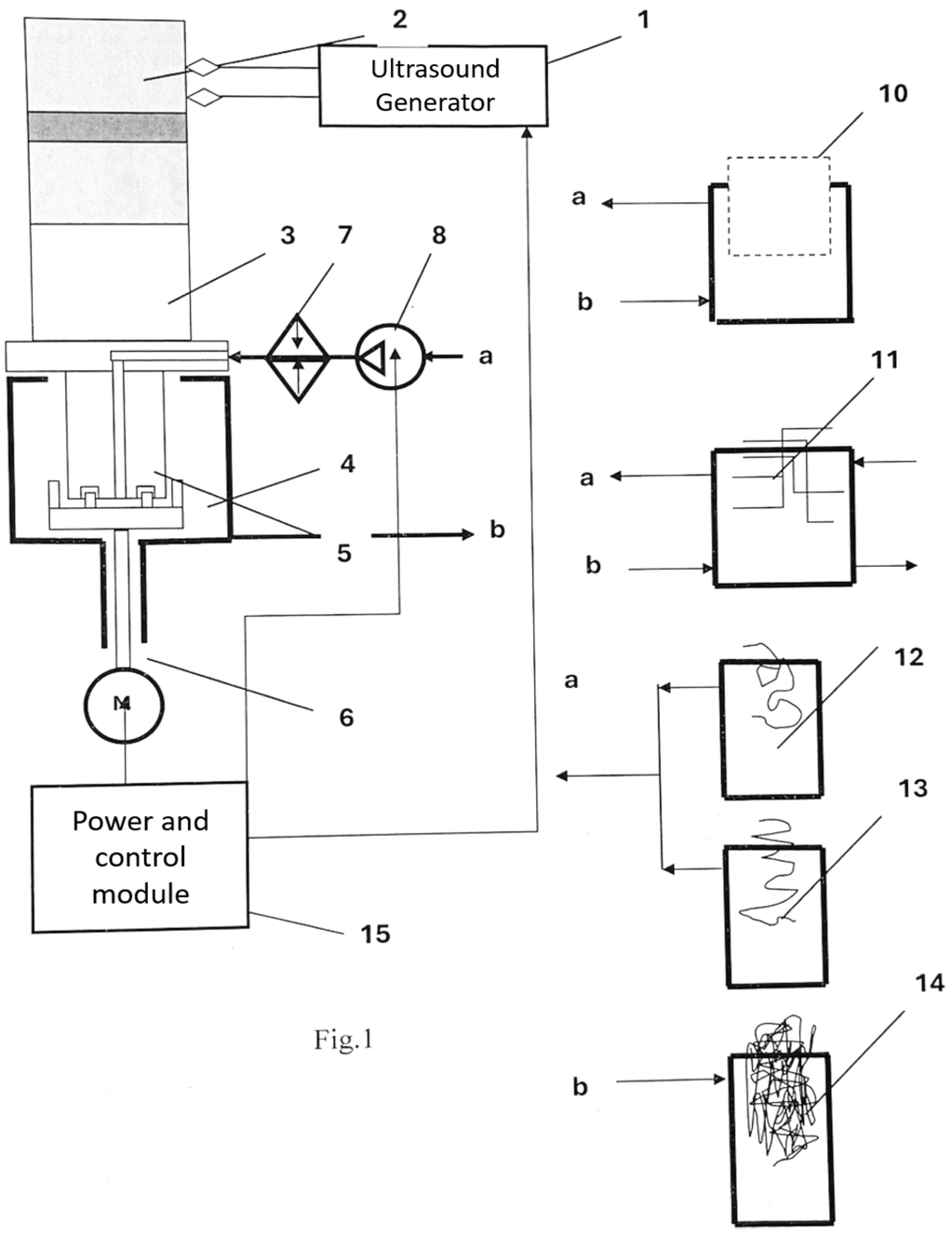

Fig.1

Scheme of the activation device and variants of use

Object of the invention:

The device according to the invention provides an efficient and rapid activation of liquids by the simultaneous superposition of the ultrasonic activation effect, the mechanical activation effect and the heating effect.

The technical problem solved by invention:

The technical problem of the invention is the realization of a device for the homogenizing, emulsifying and dispersing processing of a liquid in a limited volume or in a flowing state in continuous flow by combined ultrasonic, mechanical and thermal action in order to increase efficiency and reduce processing time.

1. Ultrasound generator
2. Ultrasonic transducer
3. Wave adaptor concentrator
4. Activation enclosure
5. Rotating agitator disk
6. Variable speed motor
7. Heater
8. Electric pump
9. Inlet
10. Collection container
11. Continuous-flow installations
12. Supply container
13. Supply container
14. Collection container
15. Power and control module

Advantages:

- Ensures an efficient and fast activation of liquids by superimposing the ultrasonic activation effect, the mechanical activation effect and the heating effect simultaneously;
- Provides the possibility to adjust activation parameters (ultrasonic intensity, rotation speed, heating temperature);
- Is simple in construction and easy to use.

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MangiCare

Patent/project number: 15

Nutvarit Manorotchaturong , Yujun Sung
Napamenee Kornthong PhD

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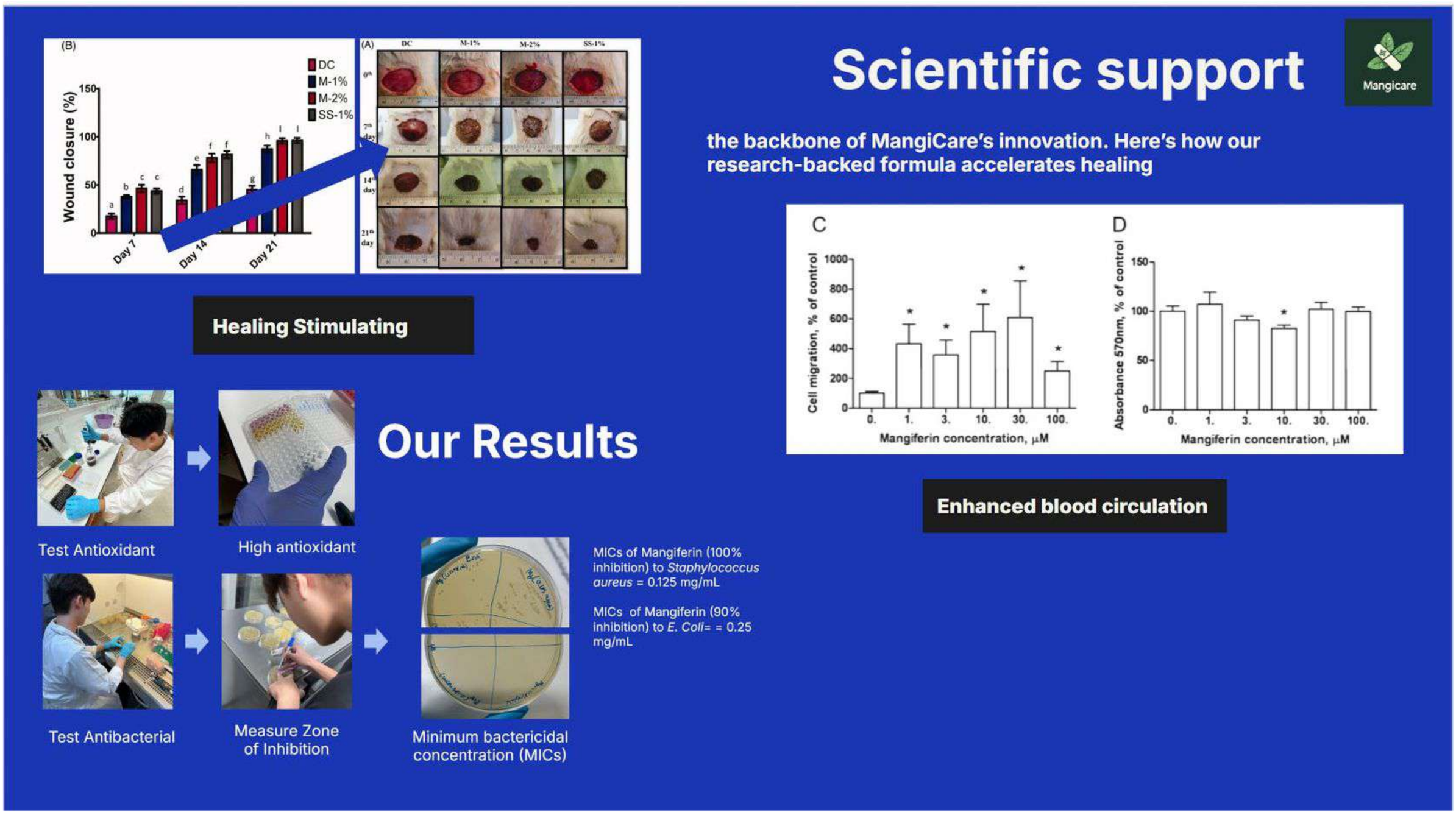
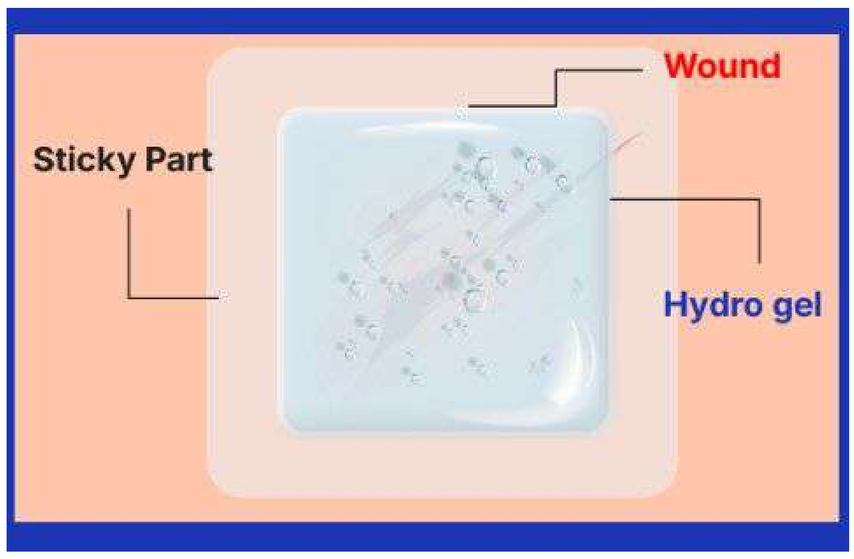
Description MangiCare is a revolutionary hydrogel-based bandage infused with encapsulated mangiferin extracts derived from mango leaves, offering a sustainable and cost-effective solution for diabetic foot ulcer (DFU) treatment. Designed to provide superior wound care, MangiCare's flexible hydrogel adapts to the wound's unique shape, ensuring full coverage and optimal healing conditions. Unlike conventional diabetic wound bandages that rely on burst-release mechanisms, MangiCare utilizes a chitosan-based hydrogel that delivers mangiferin's powerful antioxidant, antibacterial, and anti-inflammatory properties through a sustained-release mechanism. This controlled drug delivery system minimizes the risk of underdosing or overdosing, accelerates healing, reduces infection risk, and eliminates the need for frequent dressing changes, decreasing patient discomfort and healthcare costs. Additionally, MangiCare leverages discarded mango leaves, addressing both a critical medical need and an environmental challenge by reducing agricultural waste and carbon emissions. With its innovative, science-backed approach, MangiCare presents a breakthrough in DFU treatment, making quality wound care accessible to underserved communities while promoting sustainability in healthcare.





Contact:
nutvarit.m@gmail.com

Biocompatible Medical Device and Method of Making Same

US Patent Application 38170047/2019

Ruxandra Vidu, Augustin Semenescu, Ileana Mariana Mates, Cristian Dragos Vidu

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ABSTRACT:

Abstract. Traumatic brain injury is the leader in the ranking of mortality and invalidity. The surgical repair of a defect of the skull by cranioplasty has been practiced since ancient times, when materials of non-biological origin were used for this purpose. New materials and processes are sought to improve osseintegration of implants. Like any surgical procedure, cranioplasty involves complications that may be related to the surgical technique and/or to the patient's tolerance to the material used. This patent describes a biocompatible medical device that include two supported meshes for providing mechanical strength and osseointegration properties of the implant, and a multiplayer porous material in between them that is loaded with the required bioactive antibacterial compound to promote a controlled and sustained release of the pharmaceutical agents at the site of surgical intervention. To increase osseointegration, meshes are designed with an open structure and coated with biocompatible materials such as hydroxyapatite.

The composition gradient in the multilayer porous material is attained by loading successive layers of porous material with different amounts of bioactive materials and then stacking them to create a gradient of composition across the porous material.

The present invention describes method(s) to place, fix and fasten the medical device to the bone structure. More particularly, the present invention relates to a method for accelerating the transport of the incorporated drug from the inner layers to the outer edge of the outer layer. The present invention describes a clamping system that provides a fast attachment of the biocompatible medical device to the bone structure and a rapid placement of the three layers of material with different properties: i.e. the two meshes that promote osseo-integration of the implant and one multilayer porous material loaded with bioactive compounds having a gradient composition to control the release of the drugs incorporated in the porous material.

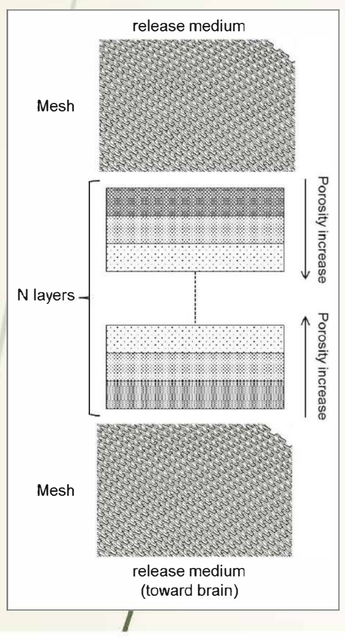


FIG. 1

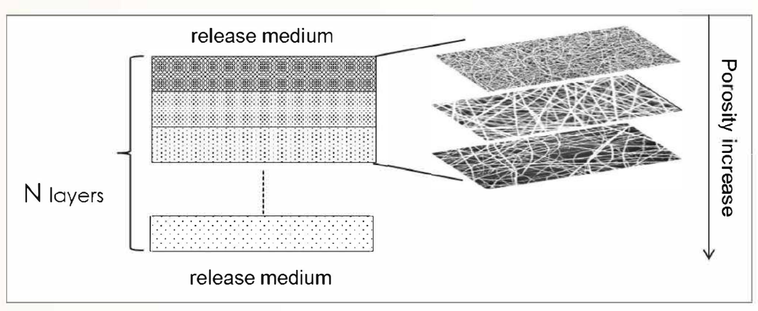
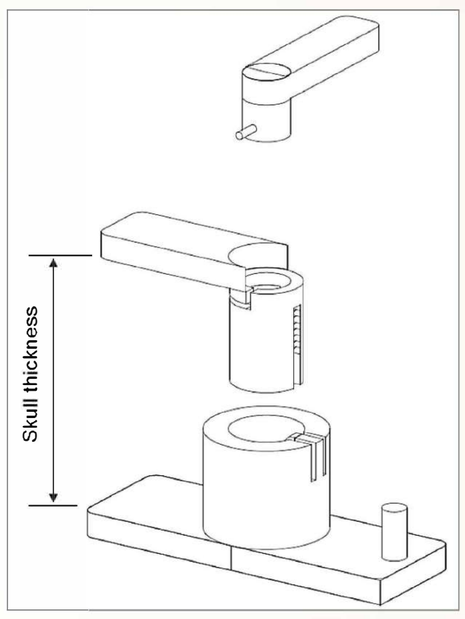


FIG. 2



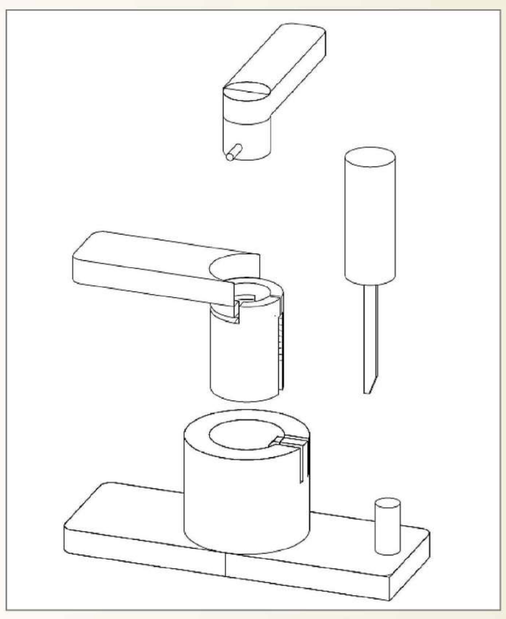


FIG. 3

BRIEF PRESENTATION OF THE INVENTION

This patent describes a biocompatible medical device (Figs. 1-2) and a clamping device (Fig.3) that sets and attach the implant to the bone. The medical device include two supported meshes for providing mechanical strength and osseointegration properties of the implant, and a multiplayer porous material in between them that is loaded with the required bioactive antibacterial compound to promote a controlled and sustained release of the pharmaceutical agents at the site of surgical intervention.

This invention presents a clamping device that allows fixing the biocompatible medical device to the defect (FIG.3). The clamps further allows fixation such that the biocompatible medical device is placed and remains in position when the holding force between the fastener and the implant is reduced. The biocompatible device may not be custom made pre-operatively; instead the meshes and the multilayered porous material may be cut on the spot to fit the anatomic shape of the defect. The clamp-like mounting piece is pre-assembled at the extended position in a fast and secure way to the bone, while the actual assemble of the successive layers is hold in place by the fastening mechanism. The main function of this system is to fix the medical device to the bone structure, and to support and connect the meshes used in the implant for remodeling and restoring bone tissue such as cranial implants. Mashes may have a flat or a convex/concave surface to fit the original shape of the skull. As illustrated in FIG 3, the clamping system consists of three pieces: the lower piece, the upper piece and the middle piece.

- **the lower piece** has a cylindrical part that sits on a support. The cylindrical part has a notch that corresponds to the exterior groove cut into the cylindrical part of the middle piece. The support of the middle piece has a knock on which the first mesh is placed.
- **the middle piece** helps adjust the height of the clamp to fit the thickness of the skull and supports the upper mesh. The middle piece has an external groove on the cylinder that helps adjust the height of the clamp. The bar that has the role to fasten the clamp to the bone structure.
- **the upper piece** fastens together the clamp to the bone structure and to the biocompatible medical device. The upper part has a lever and a knob that fix in place the clamp system. The upper lever comes over the upper mesh when the level is rotated to a closed position.

Assembling the device:

The attachment of the implant to the skull includes attaching the clamping system to the edge of the cranial orifice at different points, creating a base for attaching the lower mesh. First, the lower and the middle pieces are pre-assembled at the maximum extension length, and then mounted at the edge of the skull and then tightened up until it is secured at the edge of the skull. This is possible because both part have a gear rack-like system that allows the two parts to be tightened up but do not allow them to move so that the assembly remains fixedly attached to the edge of the skull orifice. Then the first mesh is placed and hooked to the knock. The lower piece has a hook on the side of the support that is oriented away from the skull, which has dual roles, i.e. to fasten the clamp to the skull and to attach the first mesh. After the lower mesh is placed, the multilayered porous material can be placed on the first mesh. This layer has anti-microbial properties with slow release of the drug. Then the top mesh is placed and the upper piece is inserted and rotated to the ideal position for gripping and immobilizing the mesh. n some embodiments, the attachment of the implant is reversible such that the implant may be removed if complications, such as bleeding, occur.

Advantages:

- it decreases the surgical craniotomy time by simply pressing the clips and insert the plates
- the two meshes doesn't have to be costumed made
- the surgical procedure is more efficient due to the easiness of mounting operations including attaching the clips, laying the bottom mesh, laying the intermediate material, laying the upper mesh and fixing the upper mesh
- the clamping system has a minimum height profile that helps to reduce the protrusions
- the clamping system does not involve any invasive procedure for clamping the implant, such as drilling and screw clamps
- easy placement of the gradient loaded multilayered porous material in between the meshes
- a good contact interface of the upper mesh at the surface of the skull.

"Method of making the treatment of oncological diseases more efficient using the latest generation modern technologies"

Authors:

Ștefan TITU, Lucian MOCAN, Teodora MOCAN, Alexandru IRIMIE

Innovative research project with patent perspectives

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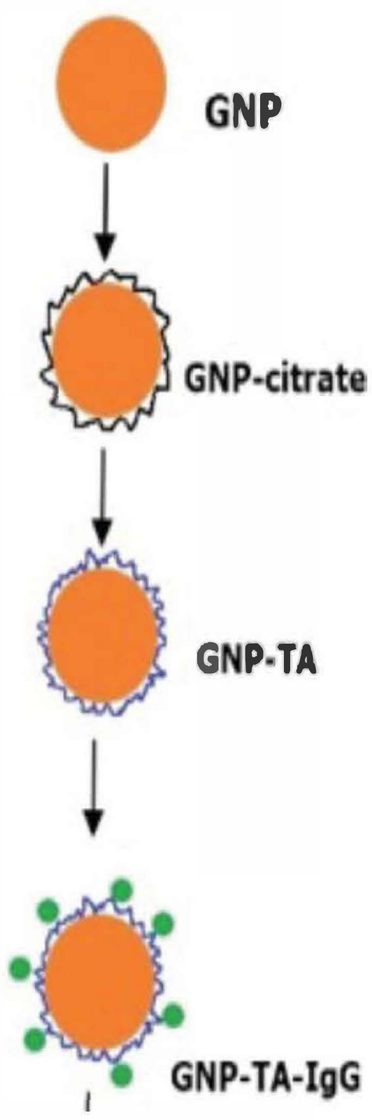
Matrix metalloproteinase-1 has been demonstrated to interfere with cell migration, invasivenes and colagen distruction in cancer patients. In particular, the hemopexin domain of MMP-1 regulates cell behaviour and the concentration upregulation has been known to increase rate of tumor local and metastatic growth. Also, gold nanoparticles represent FDA-approved solutions for cancer imaging and treatment, due to their high level of biocompatibility. We hereby propose an experimental model that starts with the synthesis of gold nanoparticles (modified Turkewich method). The next step of our concept is represented by binding of the anti-MMP1 hemopexin domain antibody onto the surface of nanoparticles. The newly designed construct has a signifficant potential for targeting applications (photothermal treatment, tumor imaging) in cancer field.

Gold nanoparticles stabilized with citrate (GNP-cit.) are synthesized in aqueous medium, as follows: 29mg HAuCl4*3H2O are dissolved in 50mL H2O dist. under continuous stirring and the solution heated to 1000C. Add 5 mL of sodium citrate (20mg/mL) and the reaction is allowed to continue at 1000C under continuous stirring for 2h. In the next step, the citrate ions on the GNP surface are replaced with thioctic acid, as follows: the pH of a 9 mL volume of soil is adjusted. GNP-cit. 9.8nM at pH=11 with the help of a 0.1M NaOH solution. add 90µL of soil. ethanol TA 10mM and 40µL NaCl 2M under continuous stirring, and the reaction is completed for 90 minutes. The obtained GNP-TA solution is then subjected to a 15000RPM/10min centrifugation stage. followed by re-dispersion of the sediment in H2O dist. For the covalent coupling of immunoglobulin G (IgG): adjust the pH of a 3mL GNP 9.8nM solution to pH=8.5, using a 0.1M Na3PO4 solution, add 900 µL EDC (30mg/mL) and 900 µL NHS (30mg/mL), and then, after a 10-minute fermentation, add 4mL of soil. GNP-TA under continuous stirring. The bio-nanostructure obtained GNP-TA-IgG is subjected to an additional step of centrifugation (14000RPM/20min.) and re-dispersion in H2O dist. in order to remove secondary reaction products.



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E-mail stefan.titu@ymail.com

UNIVERSITATEA DE MEDICINĂ, FARMACIE, ȘTIINȚE ȘI TEHNOLOGIE „GEORGE EMIL PALADE" DIN TÂRGU MUREȘ

ADJUVANT FOOD IN PREVENTION/ TREATMENT NON – ALCOHOLIC HEPATIC STEATOSIS

Patent/project number: a 2024 00412;

Author/s: Irina Matran, Rodica Talmaci, Claudia Bănescu

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• **Complementary research with an emphasis on interdisciplinarity:** market research, food technology and control, food safety and nutrivigilance/pharmacovigilance (adverse reactions, drug interactions and contraindications), physiology, histopathology, food biochemistry, medical biochemistry, laboratory medicine, experimental research, legislation and IP.

• **Innovative food – Ingredients:** *Grifola frondosa* (Maitake), *Cordicep sinensis*, inulin, psyllium, spices (parsley leaves, oregano powder), iodized salt, stevia.

• **Status and level of technology:** → **TRL 5:** laboratory samples, physico-chemical analyses, preclinical efficacy evaluation

• Opinion of the Scientific Research Ethics Commission, UMFST "G.E.Palade", no. 2711/ 27.12.2023

• Project authorization issued by the Official Animal Health and Welfare Control Service, within the Sanitary-Veterinary Directorate of Targu Mures, no. 70/ 17.01.2024

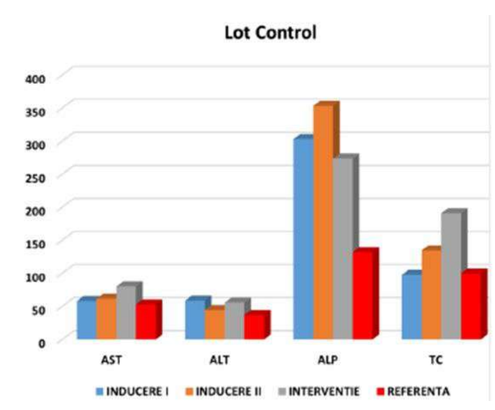
• Directive 2010/63/EU of the European Parliament and of the Council on the protection of animals used for scientific purposes

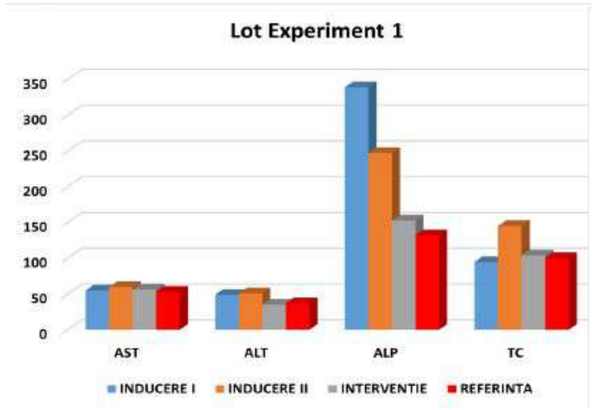
• Biobase Department belonging to the Experimental Research Center of the University of Medicine, Pharmacy, Sciences and Technology "George Emil Palade" from Targu Mures

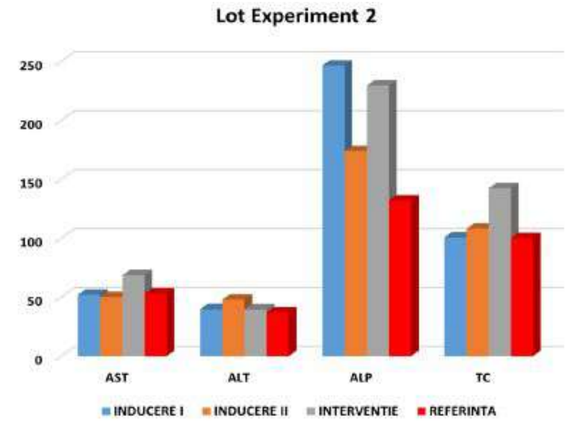
• 32 rat from the Sprague-Dawley line, females and males, aged 6 months, housed in individual cages (8 cpt/ lot, females : males = 1 : 1).

Batches	Induction I	Induction II	Nutritional intervention
Witness	Standard food	Standard food	Standard food
Control	Hyperlipidic 29%	Hyperlipidic 60%	Hyperlipidic 60%
Experiment 1	Hyperlipidic 29%	Hyperlipidic 60%	SP 0.1%
Experiment 2	50% Hyperlipidic 29% + 50% Innovative food 0.1%	50% Hyperlipidic 60% + 50% Innovative food 0.1%	50% Hyperlipidic 60% + 50% Innovative food 0.1%

Monitored parameters - at the end of each period: Body weight, Urinary parameters (URO, GLU, BIL, KET, SG, BLD, pH, PRO, NIT, LEU), Glucemia, Liver parameters (ALB, ALP, ALT, AST, CHOL, GGT, TBA, TBIL, TP, GLOBA/G), Histopathological analyzes – in the Histopathology Laboratory of UMFST «GeorgeEmilPalade». **Monitored parameters – weekly:** water and food consumption.







In group E1 (innovative special food) the values of liver parameters (AST, ALT, ALP, TC) decreased significantly with values close to normal.

• **Categories of economic agents that can manufacture and sell this food:**
  - **1086** – Manufacture of homogenized food preparations and dietetic foods/ Foods for special nutritional conditions
  - **1089** – Manufacture of other food products/ "ordinary" food

• **Effect and marketability:**

• **Complications of NAFLD ↓:** obesity, type 2 diabetes, hypertension, triglycerides ↓

• **Economic complications:** Health system costs ↓, Quality of life of patients and families ↑, Gini index↓, Gross Domestic Product (GDP) per capita ↑, Purchasing Power Parity (PPP) per capita ↑

• **Future prospective potentials:** Licensing or Assignment

Contact: irina.matran@umfst.ro, prorectorat.stiintific@umfst.ro

A HEALTHIER LIFESTYLE IN 2025

Mental Health

Author: Herdiana Dewi Nurfika

Bliss Education Center, Indonesia

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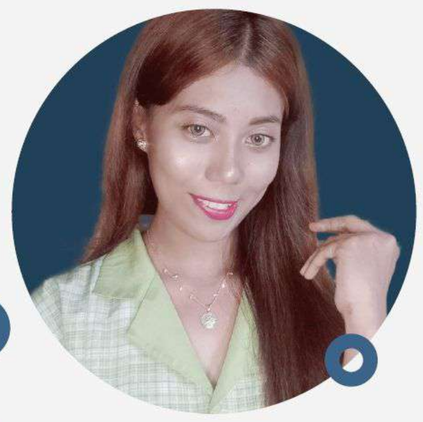
Coach Diana



Herdiana Dewi Nurfika is an Entrepreneur, she is Founder & CEO of Bliss Education Center, Brancy Firm and HDN STUFF. Besides that she is also Certified NLP Master Practitioner, ACT & REBT Therapist, Certified Entrepreneurship & Business Coach, Certified Employee Performance Coach, Certified Professional Workshop Facilitator, Emotional Intelligence Trainer, , Certified Group Life Coach, Mental Health Advocate.

As mental health advocate she become the best mental health advocate in 2023 by MHI Network and got media coverage over a hundred news in UK & US. I also had a community called "Pull Empower" that she provides on social media to empower well-being.

OUTLINE :

- Why Focus on Health in 2025?
- Key Components of a Healthy Lifestyle
- Applying SWOT Analysis to Your Lifestyle
- Setting SMART Goals for a Healthy Lifestyle
- Real-Life Example: Diana's Journey
- Steps to Start Today

by Coach Herdiana Dewi Nurfika

Why Focus on Health in 2025?

by Coach Herdiana Dewi Nurfika

Increased Life Expectancy: Living longer, aiming for quality years.

Chronic Diseases on the Rise: Prevention through nutrition & lifestyle

Work-Life Balance Challenges: Finding sustainable ways to manage stress and stay healthy.

Global Trends: A shift towards plant-based diets, mindfulness, and personalized health plans.

Setting SMART Goals for a Healthy Lifestyle

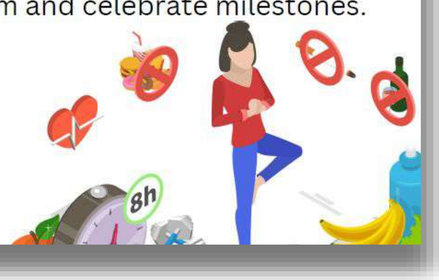
by Coach Herdiana Dewi Nurfika

SMART goals provide a framework to set objectives that are Specific, Measurable, Achievable, Relevant, and Time-bound. By using this approach, you can create clear, actionable plans that are realistic and trackable.

Conclusion

by Coach Herdiana Dewi Nurfika

- **Your Health in 2025:** Starts with small, consistent actions today.
- **Take Ownership:** Use tools like SWOT analysis and SMART goals to personalize your journey.
- **Stay Committed:** Build a support system and celebrate milestones.



by Coach Herdiana Dewi Nurfika

Steps to Start Today

- **Health Audit:**Evaluate your current diet, exercise, and mental well-being.
- **Set Realistic Goals:** Start small, like drinking an extra glass of water daily.
- **Build Habits:** Use apps or reminders for accountability.
- **Involve Others:** Join a group or partner with friends for motivation.
- **Monitor Progress:** Reflect weekly and adjust strategies as needed.

Practical Tips for Better Food Choices

- **In the Grocery Store:** Stick to the outer aisles (produce, dairy, meats).
- **At Restaurants:** Opt for grilled, steamed, or baked dishes instead of fried.
- **At Home:** Batch-cook meals with healthy ingredients on weekends.
- **Snack Ideas:** Nuts, yogurt, fruits, and whole-grain crackers.

Presentation link:

https://www.facebook.com/blisseducationcenter/?locale=ro_RO

SCAN ME

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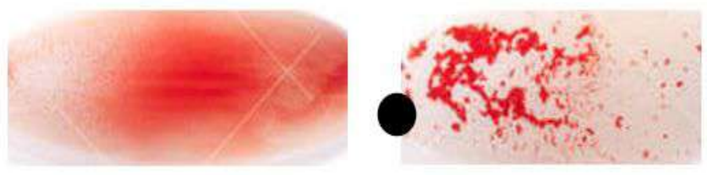
New technique to Conversion of Blood Group(Rh) from Positive to Negative by Immuno-coated Method

Prof.Dr . Ali Abdulhussein Mahdi
Dr.Abdulameer Jasm Mohammed
College of Health and Medical Techniques , Middle Technical University-Iraq

Through this innovation, any Positive blood type is converted into a Negative blood type regardless of the type of blood type (O or A or B or AB) through the encapsulation of Rh (D) antigens on the red blood cell surface, In the blood of people with the positive category of the blood type, the idea is based on the cracking of laboratory-produced antibodies against the Rh antigen (D). The antibody is broken through a site dedicated to cracking, which is usually found on these antibiotics.

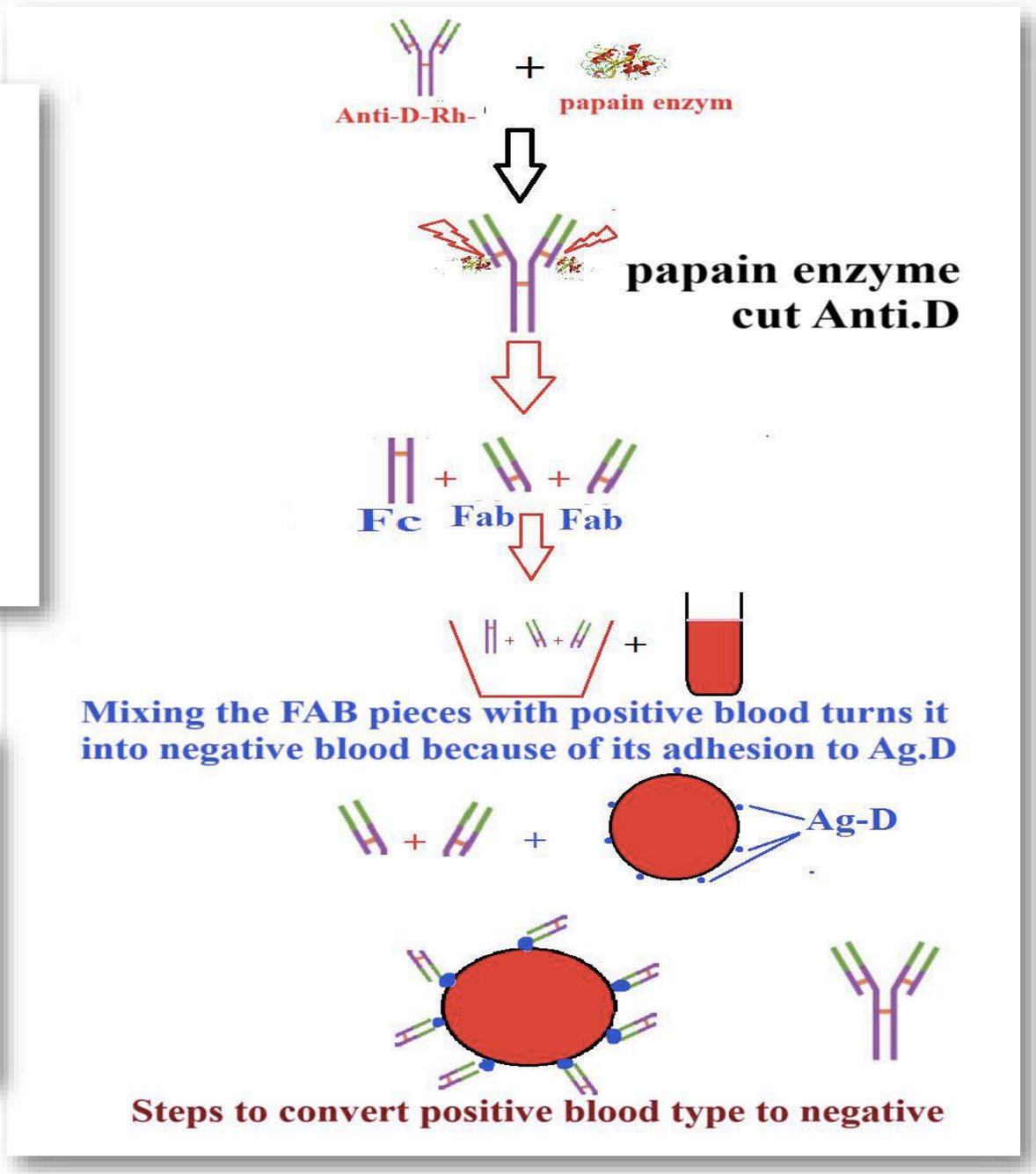
It is universally known as the "papain cleavage site", (papain enzyme) to crack the antibody and uses the fab part of the antigen to encapsulate the surface of the Ag "Rh (D)" and is completely blocked from the immune definition The body, which converts the blood type from Rh (+ ve) to Rh (-ve)

Occurrence of an immune reaction before immunotherapy (A) and no reaction after immunotherapy (B)



(b) (a)

Shows the transformation of the positive blood type in the form of (A) and negative after treatment in the form (B) of the same sample



Steps to convert positive blood type to negative

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Developing a microscope to a three-dimensional microscope

Prof.Dr . Ali Abdulhussein Mahdi*
Dr.HASHIM ABED ABBAS / **
***College of Health and Medical Techniques , Middle Technical University-Iraq**
****University Diyala / college of medicine.**

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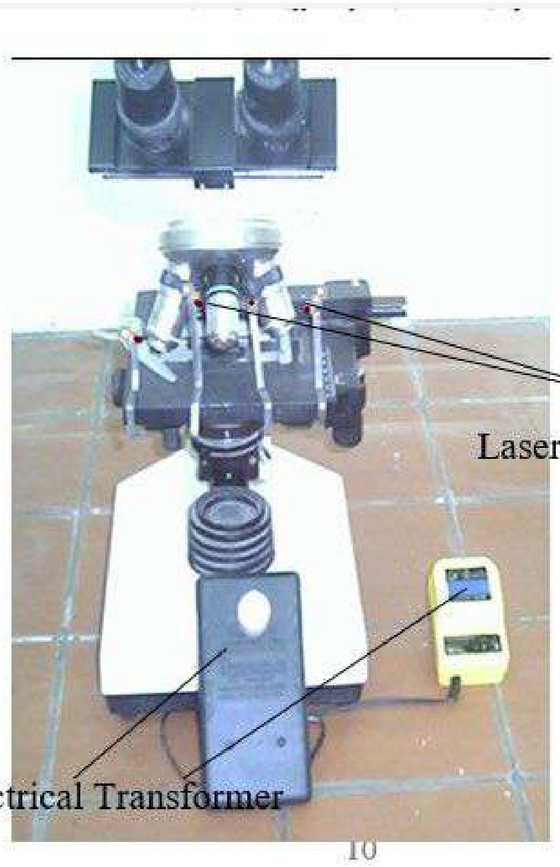
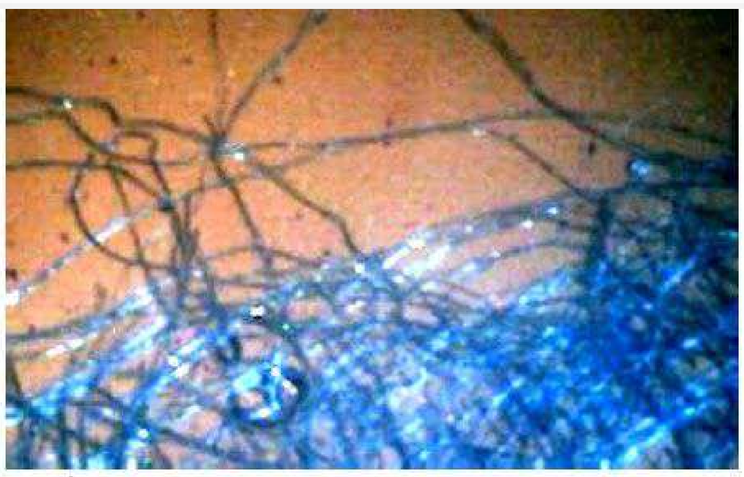
The image that we see in the ordinary light microscope is in fact a false image with dimensions greater than the real size that the model under the microscope looks like because it represents the shadow of the model and not the image of the original model and this image has only two dimensions; and since some laboratory diagnoses depend in their diagnosis on the shape and dimensions of cells, there was a need to manufacture a three-dimensional vision microscope system, which shows us the true image of the model and its three dimensions by placing a laser diodes system that is installed on the ordinary optical microscope simply and easily.

Through this microscope, our concept of the images taken by the ordinary microscope will change from the images taken by the three-dimensional vision microscope.





fungi taken by X40 holographic microscope

fungi taken with X40 ordinary microscope

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A new technique to estimate the phagocytic activity of cells

F

Dr. Omar Sadik Shalal
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This innovative technique involves utilizing bacteria labeled with fluorescent nanoparticles as bait to evaluate the phagocytic activity of cells, including mononuclear and neutrophil cells. The procedure entails mixing labeled bacteria with a drop of blood on a glass slide, incubating the slide at 37°C for three hours, and examining it under a fluorescent microscope. Labeled bacteria appear as fluorescent entities inside or outside the cells.

The phagocytic activity rate is calculated by counting the number of cells containing fluorescent bacteria, dividing it by the total cell count, and multiplying the result by 100%. This method boasts a low error margin (less than 0%), as it relies on fluorescence-based detection rather than traditional staining methods, overcoming issues of dye crystallization and incomplete bacterial staining.

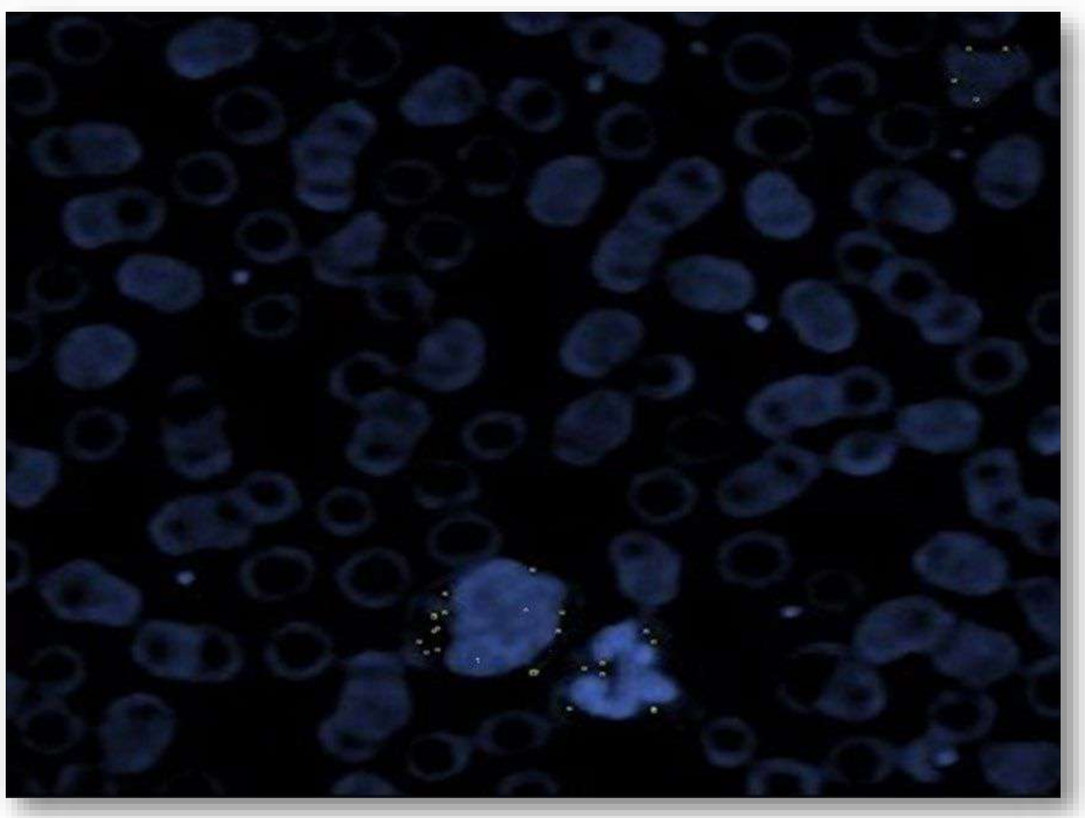

Figure 1: Demonstrates phagocytosis of fluorescent-labelled bacteria observed under a fluorescent microscope.

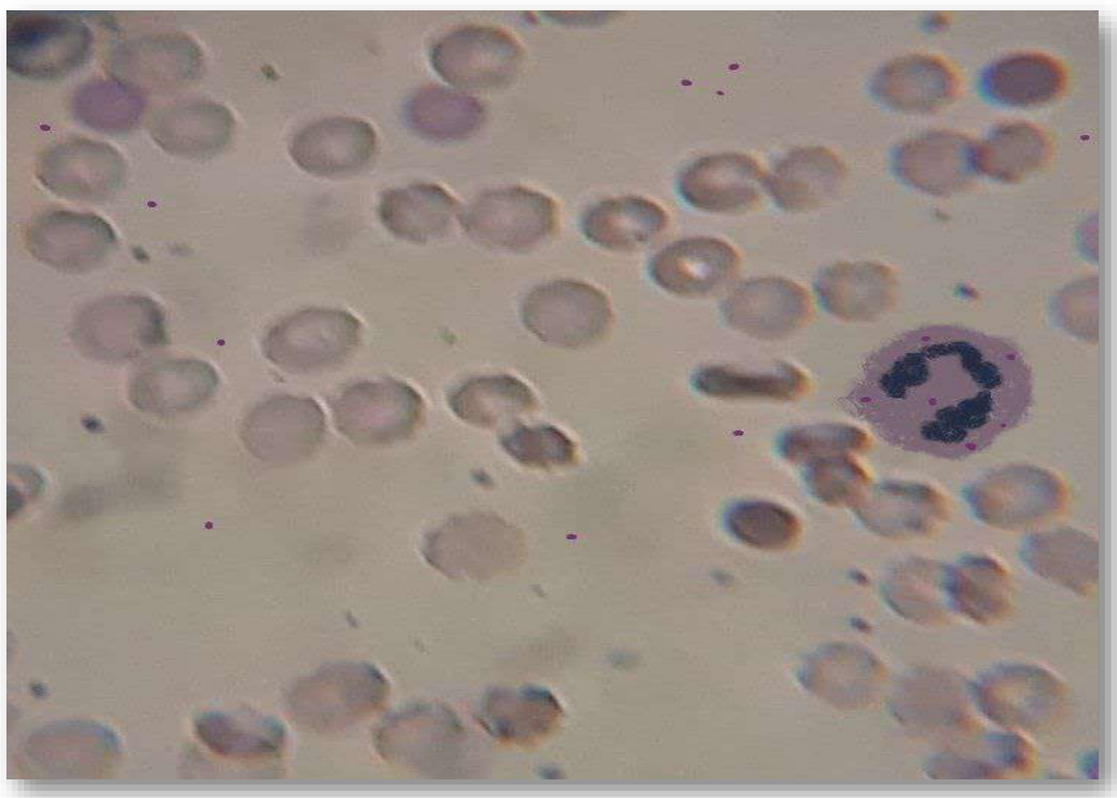

Figure 2: Illustrates traditional staining methods and their limitations, such as misidentification of dye crystals as bacteria.

Advantages:

Ease of Use: Simple and cost-effective.

High Accuracy: Overcomes limitations of traditional staining methods.

User-Friendly: Easily interpretable by researchers without extensive experience due to clear bacterial fluorescence.

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Purification of black carrot dye and its use as a color reagent

Dr. Rabab Mohammed Abood
Azhar Mousa Mohammed

A paper industry was reached that reveals acidic, basic and neutral solutions through the color change occurring in it, where the acid has a red color and when the neutral is purple and when the base is green, and the color guide used in this experiment is extracted from the carrot plant Daucus carota after the extraction process on it.

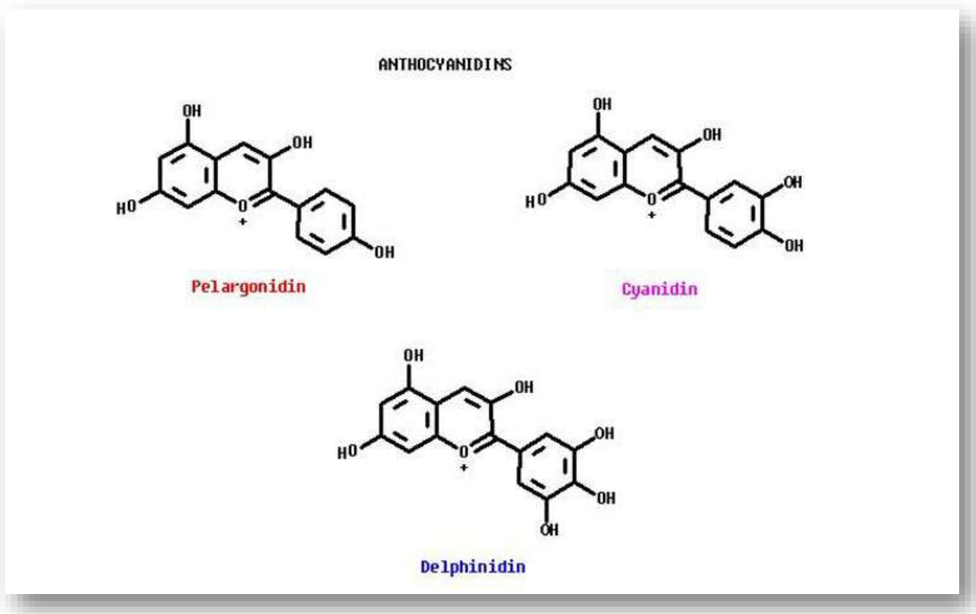
This method is distinguished from the method of sunflower paper by the following:

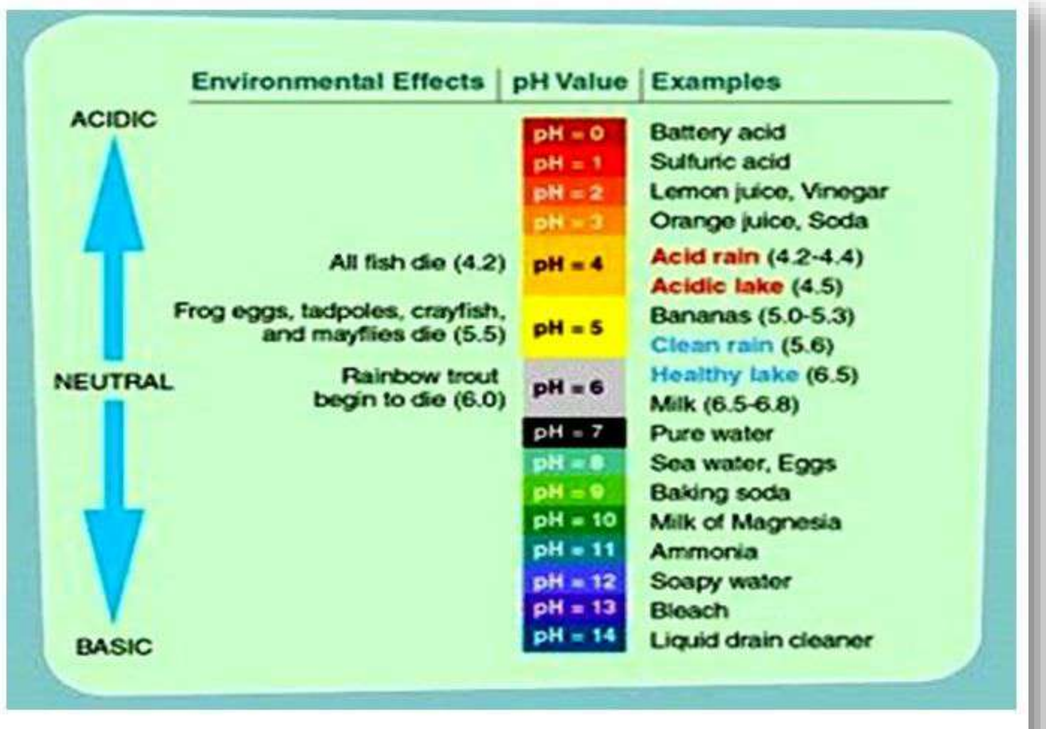
1- It's made of non-toxic natural materials while sunflower paper is made of toxic chemicals.

2- Made of materials available in nature and inexhaustible.

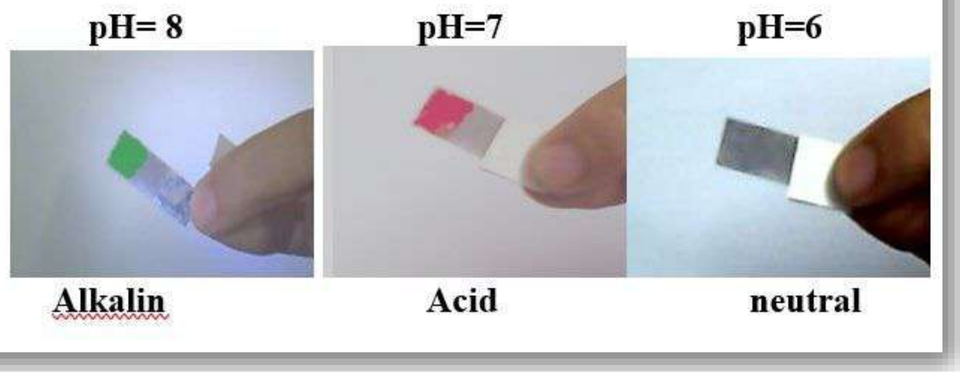
3- It is characterized by the fact that the new method has three points of color change: red, green and purple, while the sunflower leaf has two points of color change, which are red-blue.

4- Color stability chemically, as they do not disintegrate and do not interact with the materials used with them, which gives them color stability.





Represents the color change of xanthinin pigment



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THE BEAUTY ROOM

THE WORLD OF NAILS

The nail is a thin plate that grows on the top of the last phalanx of the fingers and covers the top of the fingertips.

The most important methods to style a nail is **semi-permanent nail polish**, and to give it length you can use the **construction on the template** or the **construction from smart shapes tips.** There is also the old **tips** that are no longer used.

- The construction of the nail can be done with:

Gel

Acryl

Poly-gel

- The construction of gel nails is recommended for people who want a flawless manicure for a long time but it is very effective and for women whose natural nails are not very resistant, they break quickly or exfoliate immediately.

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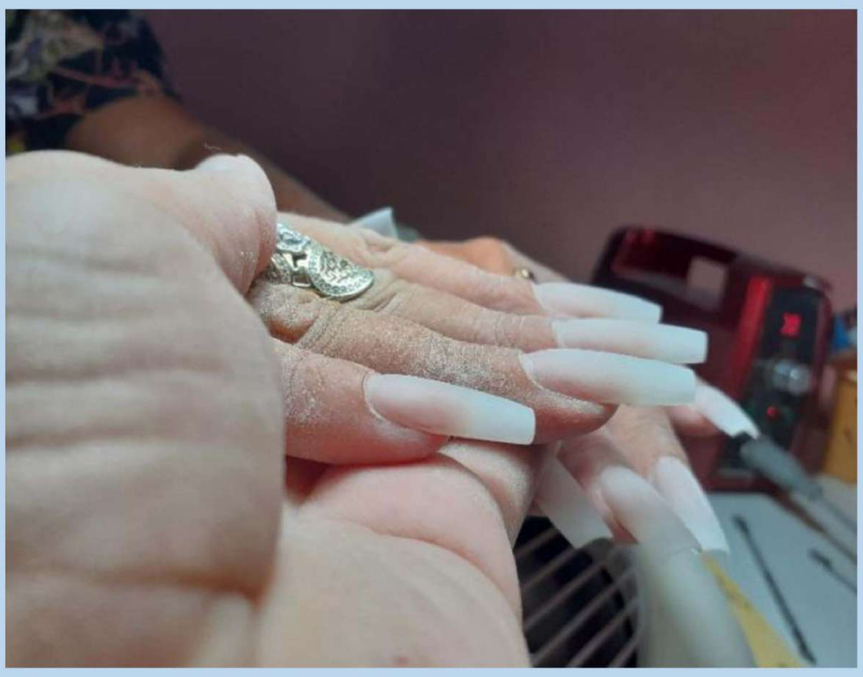

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QVibe frequency generating therapeutic device- used in a psoriasis case

Patent/project number: No 009015340-0001, 06/05/2022

OSIM: 301241/29.12.2023

F

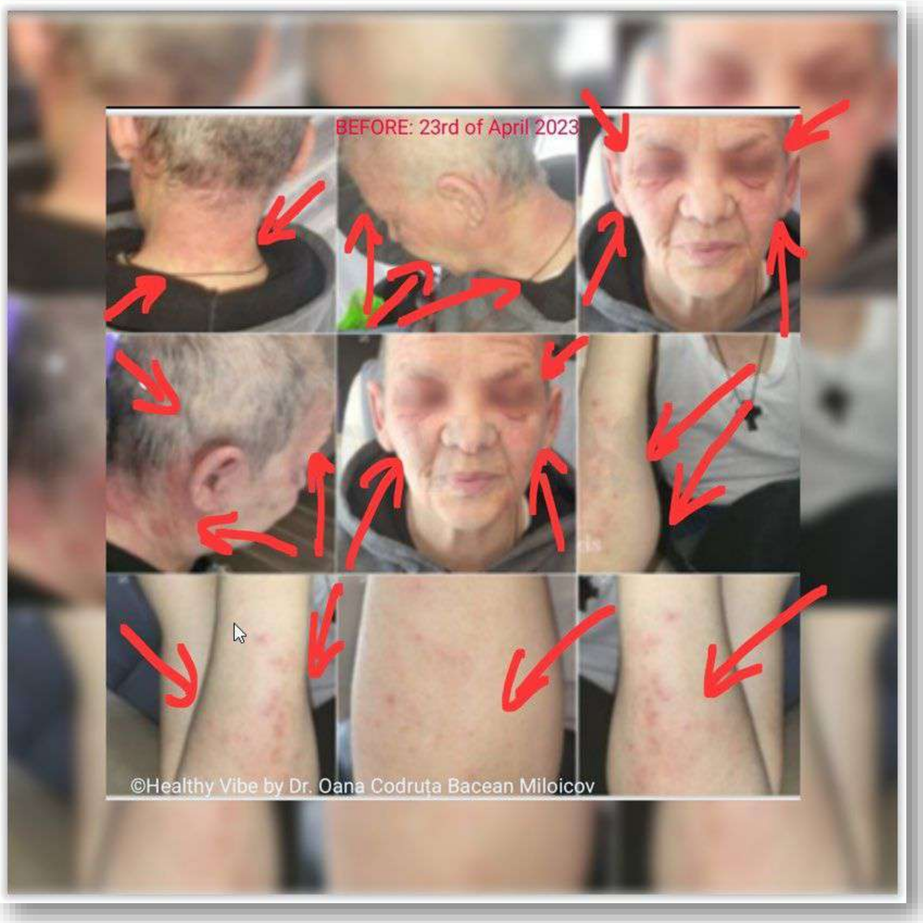
Author/s: Senior Lecturer Dr. Oana Codruta Bacean Miloicov

Institution: SC Holistic Lounge SRL

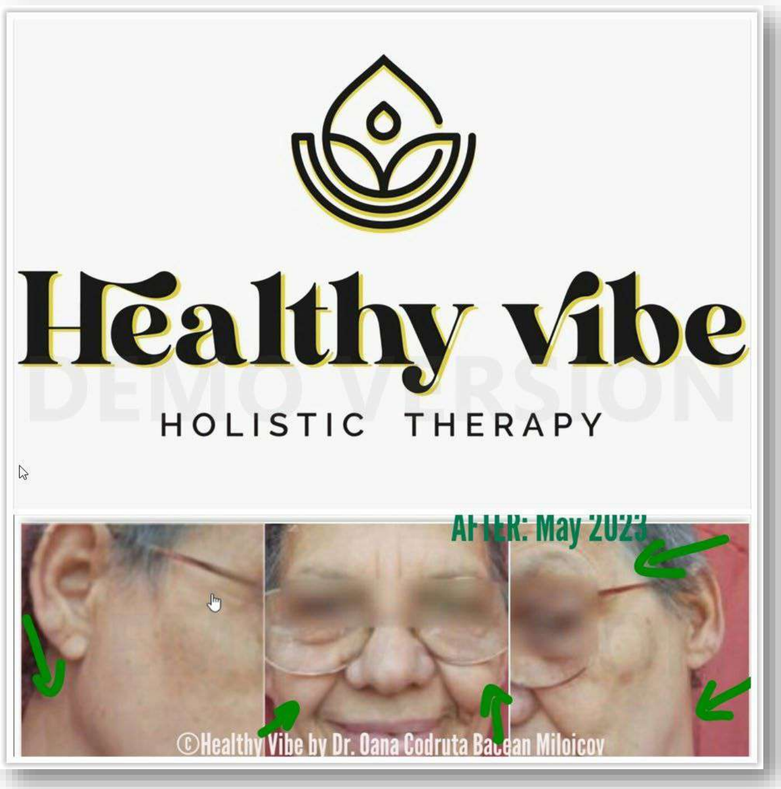
Psoriasis is a chronic autoimmune skin condition characterized by the rapid overproduction of skin cells. This results in the formation of red, scaly patches on the skin's surface. The exact cause of psoriasis is unclear, but it is believed to involve a combination of genetic and environmental factors. Psoriasis can cause discomfort and itchiness, on face, neck, arms, in this case.

Q Vibe is a therapeutic frequency generating device, an inovative concept made out of requencies that are imprinted on it, the final result is a special, unique algorithm, modified according to the pathologies of the patients. We applied the device as a therapy(local external application) for this case. The subject used the QVibe deviece everyday, the frequency recipie is a unique registered algoritm imprinted on the device that generates the frequencies as therapy; we can clearly see the difference in the pictures(BEFORE- on 23rd of april 2023) and the result in the pictures named: (AFTER- on may 2023, followup: 25 IAN 2024).

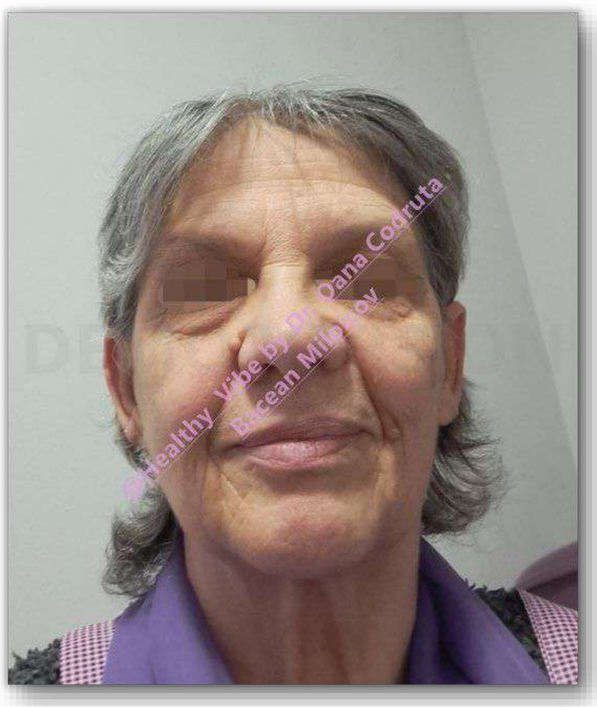
BEFORE- 23rd of april 2023



AFTER- may 2023



25 IAN 2024



It is successfully used in balancing other pathologies as (allergies/digestive problems/renal diseases/melanoma/nervous system lessions/viral or bacteriological infections/parasitic infestations/bone diseases, etc.), it optimises the state of health, according to the improvement of the clinical and paraclinical paramethers.

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SCAN ME

Solutie Virala ”SV”

Viral solution ”SV”

Patent/project number: OSIM 301242/29.12.2023

Author/s: Senior Lecturer Dr. Oana Codruta Bacean Miloicov

Institution: SC Holistic Lounge SRL

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Substance composition - BASE: 5 ml Swedish Bitter, 25 ml ozonated pure water

The product is obtained by energetic imprinting with specific frequencies of known viruses; according to scientific studies, any energetically imprinted liquid generates those frequencies for a duration of approximately one month, after which the liquid no longer retains the energetic imprint. I used this aspect and reprinted another solution after the deadline.

I have used the product in hundreds of cases of viral infections, with spectacular results even from the first days; method of administration: the first two days: 7pic x 5/day, then: 7pic x 3/day, until the bottle is used up.

It is interesting that the base consists of a tincture of plants, natural and without adverse effects, but the therapy is actually made from the energetically imprinted frequencies on the solution. We started from the premise that digestion begins in the oral cavity, where absorption is very good (ex.: Nitroglycerin that is administered sublingually), as a result: statistics, kinesiological tests and the clinical evolution of the cases have shown us that the product is efficient reducing the occurrence of the symptoms, increasing immunity - much improved clinical condition after administration, significant reduction of inflammation and nasal congestion.

The remedy is energetically imprinted with the help of the only device of this type in RO, the recipie concept being registered with copyright.

Other benefits:

- adjuvant in upper respiratory infections (rhinitis, sinusitis, tonsillitis, laryngitis)
- adjuvant in lower respiratory infections
- anti-inflammatory
- antiviral
- can be anywhere administered
- does not require travel to get the solution, it can be send anywhere

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CO-TECH- test, measure, balance

(innovative concept of Automated Software Process for evaluation and therapy through biofeedback)

Patent/project number: OSIM 301240/29.12.2023

Author/s: Senior Lecturer Dr. Oana Codruta Bacean Miloicov

Institution: SC Holistic Lounge SRL

CO-TECH software process automation is an innovative and copyright-protected concept that brings a new perspective to patient evaluation and therapy. By using biofeedback, this system allows for the optimization of evaluation processes, improvement of therapies, and reduction of execution times, resulting in an optimized therapeutic approach with accelerated efficiency.

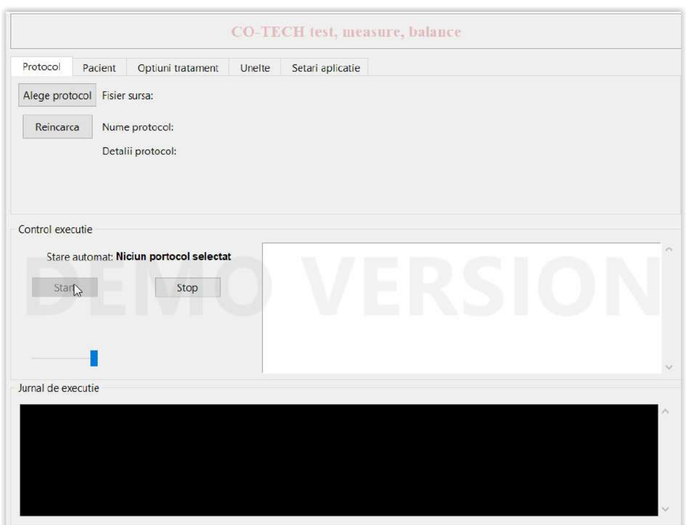
One of the core features of CO-TECH is its ability to obtain precise and detailed data about patients through biofeedback. This process involves measuring and monitoring the physiological responses of the patient in real-time. As a result, therapists can have access to essential information about the patient's health status and can adapt the treatment based on these data.

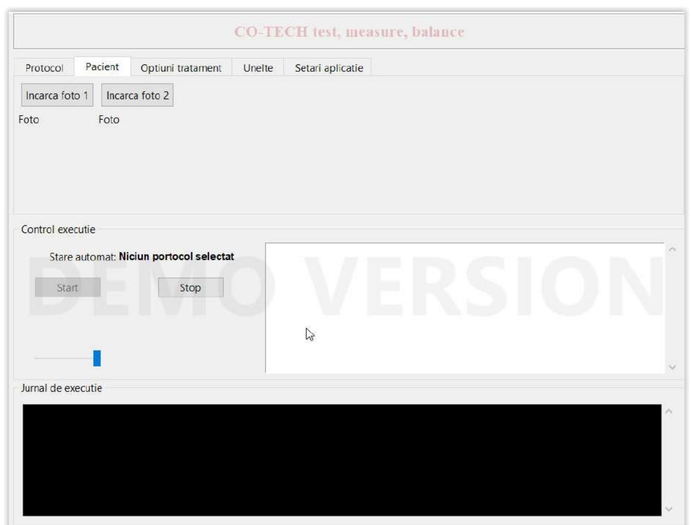
By applying CO-TECH software process automation in therapies, specialists can more accurately evaluate the patient's health condition and rapidly identify problems or difficulties they may face. Additionally, this system enables continuous monitoring of therapeutic progress, facilitating real-time adjustment and optimization of the therapy.

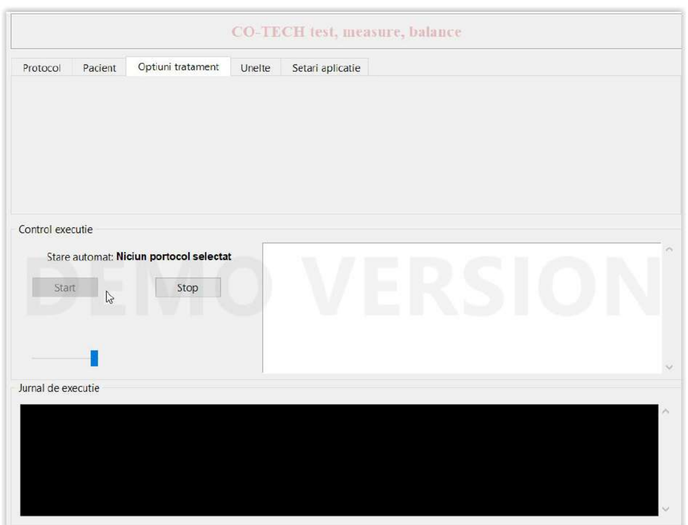
Moreover, CO-TECH software process automation brings a significant change in terms of the time required for therapies. By utilizing this innovation, therapists can considerably reduce the overall duration of therapies as they can quickly identify and eliminate inefficient or unnecessary methods. Consequently, patients will benefit from more time dedicated to other types of therapies without compromising the effectiveness of the main treatment.

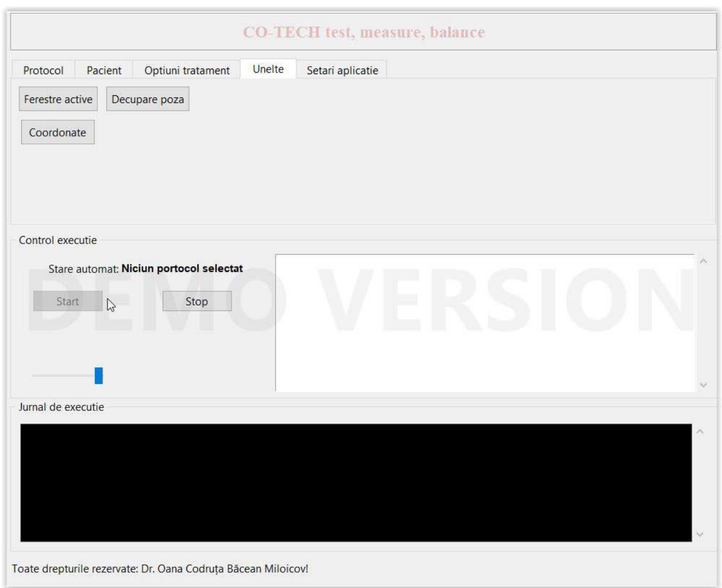
Another significant value brought by CO-TECH is its capacity to provide an optimized, personalized, and tailored therapeutic approach to each patient's needs. Through efficient resource utilization, therapists can develop specific strategies for each patient and track their evolution and health status in real-time. Through the use of CO-TECH software process automation, therapies become more efficient, faster, and personalized. This revolutionary concept offers the possibility to evaluate and treat patients more accurately, reducing therapy periods and maximizing therapeutic outcomes. CO-TECH brings benefits to the field of biofeedback evaluation, therapy improvement, and streamlining of therapeutic approaches, thus transforming the way patients are treated and cared for.

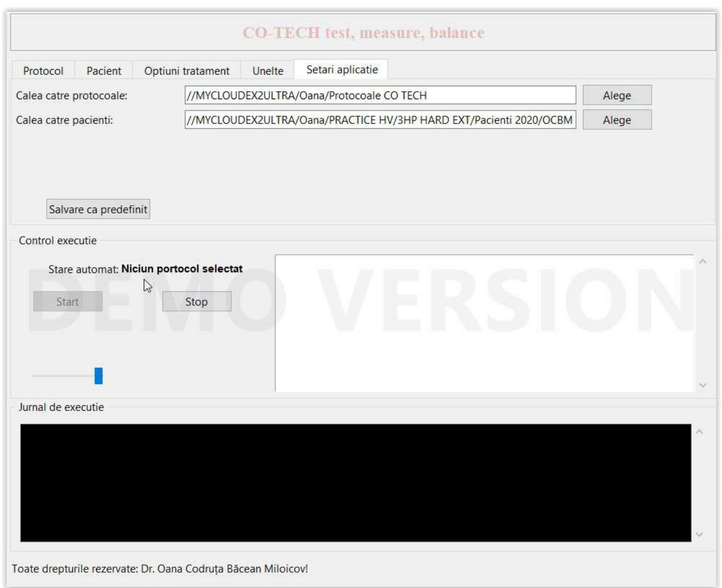
Affections that we have already used the CO-TECH- test, measure, balance concept for: depression, neoplasms, burnout, vitiligo, neurological diseases.











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SCAN ME

QVibe frequency generating therapeutic device-used against parasitic infections

Patent/project number: OSIM 301243/29.12.2023

Author/s: Senior Lecturer Dr. Oana Codruta Bacean Miloicov

Institution: SC Holistic Lounge SRL

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Intestinal parasites in children are organisms that develop and live in their intestinal tract, causing various symptoms and health problems. The causes of parasitic infestation can be varied, including consuming contaminated food or water, contact with infected animals, or lack of proper hygiene.

The effects of intestinal parasites on children's health can be quite severe. These parasites can affect nutrient absorption, causing nutritional deficiencies and delays in growth and development. They can also cause abdominal pain, diarrhea, nausea, weight loss, fatigue, and irritability. Persistent parasite infestation can compromise the child's immune system and lead to the development of other serious conditions.

To combat intestinal parasite infestation in children, an effective and non-invasive device is the Q Vibe - a therapeutic anti-parasitic frequency generator. This device provides a natural and gentle solution, eliminating the need for aggressive or invasive chemical substances in treatment.

Q Vibe works by generating and transmitting specific frequencies that are highly unpleasant and harmful to parasites. These frequencies disrupt and destroy the parasitic organisms, eliminating them from the child's body. The use of the Q Vibe device is easy and convenient, so it can be used at home or in a clinic setting.

Another advantage of using Q Vibe is its immediate effectiveness. After applying the therapeutic frequencies, the child will experience rapid relief of symptoms and an improvement in overall health. Treatment with Q Vibe is completely non-invasive and does not cause any negative side effects.

In short, the Q Vibe device provides a non-invasive, natural, and effective solution for combating intestinal parasite infestation in children. By using therapeutic anti-parasitic frequencies, this technology offers immediate benefits and completely eliminates the harmful effects of chemical substances.

Q Vibe is a therapeutic frequency generating device, an inovative concept made out of frequencies that are imprinted on it, the final result is a special, unique algorithm, modified according to the pathologies of the patients. We applied the device as a therapy(local external application) for these cases on the right hand on the radial arthery, where we can feel the pulse.
It is recomanded to use QVibe deviece everyday, all the time, especially during the night, the frequency recipie is a unique registered algoritm imprinted on the device that generates the frequencies as therapy. In cases of abdominal discomfort caused by colics, inflammation, abdominal bloating, intestinal parasites or imbalance of intestinal flora.

SCAN ME

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ANTISTRESS PROTOCOL used in a vitiligo case

Patent/project number: OSIM 301240/29.12.2023

Author/s: Senior Lecturer Dr. Oana Codruta Bacean Miloicov

Institution: SC Holistic Lounge SRL

F

The results obtained, including physical outcomes, clinical appearance, and psycho-emotional levels, demonstrate the effectiveness of this innovative copyrighted protocol. Its non-invasive nature, combined with optimized clinical parameters, enhances skin appearance and mental equilibrium, as confirmed by the results.

The therapeutic ANTISTRESS PROTOCOL has shown significant benefits in the treatment of vitiligo. Beyond its impact on the physical manifestations of the condition, it also addresses the psycho-emotional aspects that can accompany the disease.

By promoting psycho-emotional balance, this protocol helps individuals cope with the psychological impact of vitiligo. It addresses the underlying traumas stored in the subconscious, aiding in their release and healing.

Furthermore, the therapeutic ANTISTRESS PROTOCOL protocol focuses on CHACKRA balancing, which plays a vital role in overall well-being. Through this process, the energy centers of the body are harmonized, resulting in improved physical and mental health.

The protocol also includes AURA correction, which helps restore the energetic field surrounding the body. By addressing imbalances and blockages within the aura, the therapy promotes healing on multiple levels.

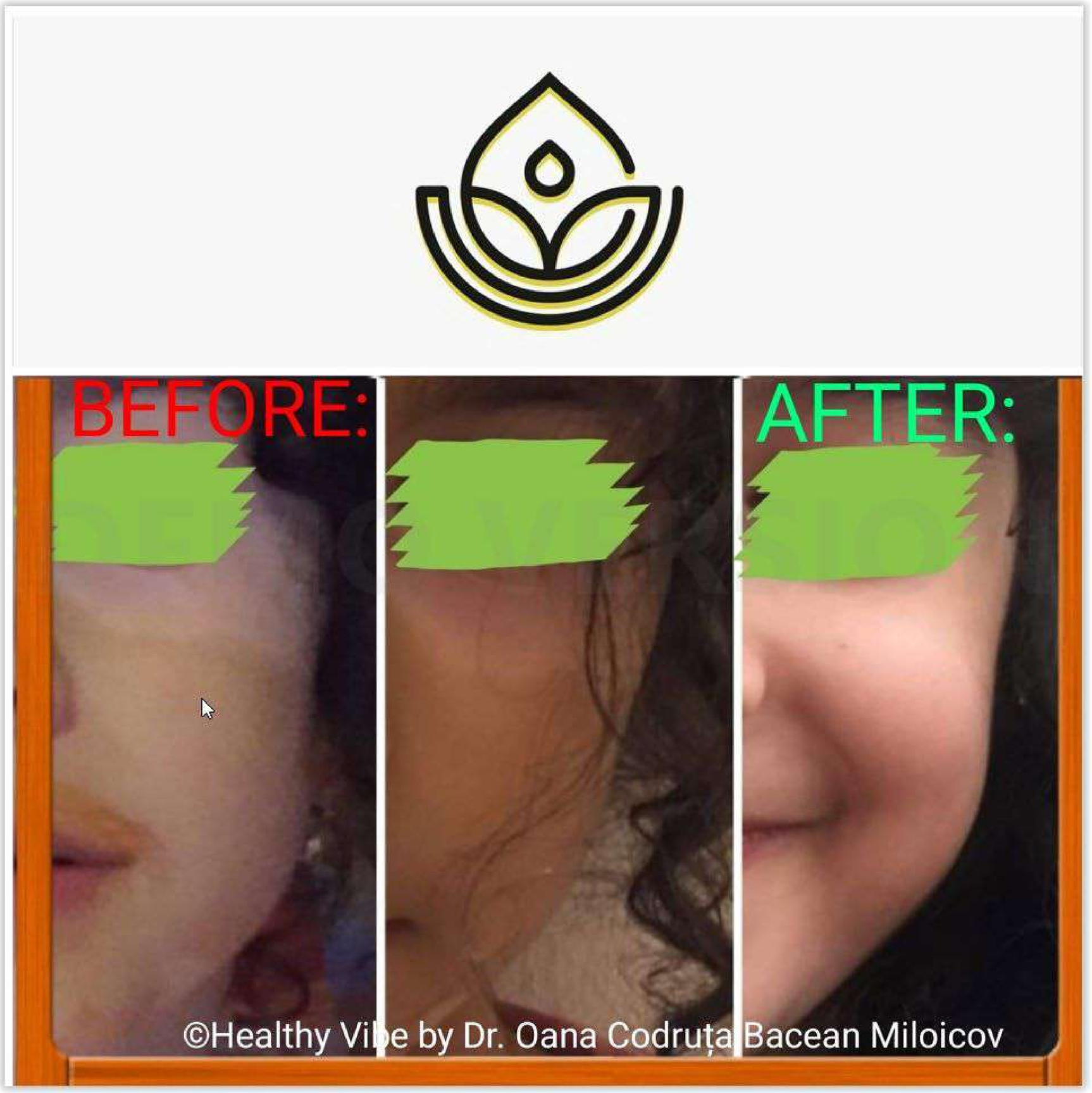
By targeting the imbalances caused by stress factors, this protocol aids in restoring the body's equilibrium. It addresses the impact of external stressors and supports the body's ability to withstand and recover from them.

The use of this innovative ANTISTRESS PROTOCOL has shown remarkable clinical and psycho-emotional improvements. It offers a non-invasive approach to treating vitiligo, enhancing both physical appearance and mental well-being. With the support of copyright protection, this protocol stands as a testament to its effectiveness and results.

The image on the LEFT- **BEFORE** represents the photo taken at the initiation of the therapy.

The image in the middle, intermediate stage.

The image on the right, the RESULT- **AFTER** obtained after three months from the initiation of the therapy.



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QVibe frequency generating therapeutic device - used in fibrillation

Patent/project number: No 009015340-0001, 06/05/2022

Author/s: Senior Lecturer Dr. Oana Codruta Bacean Miloicov

Institution: SC Holistic Lounge SRL

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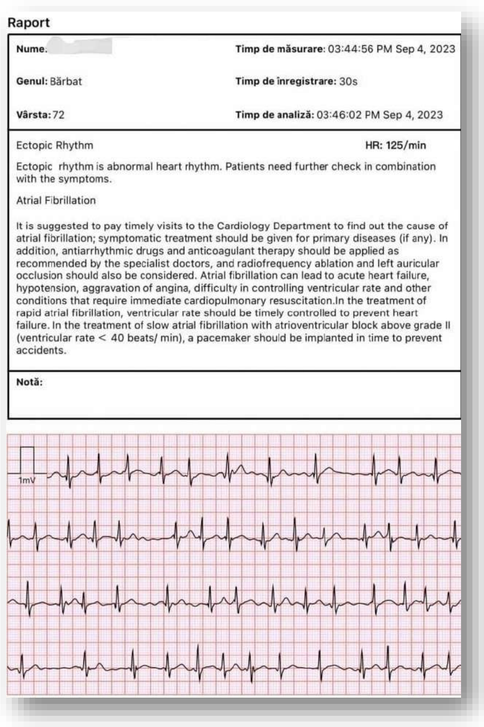
Fibrillation represents a cardiac arrhythmia characterized by rapid, irregular contractions of myocardial fibers, resulting in ineffective cardiac output. This condition poses a significant risk of complications including cerebrovascular accidents, congestive heart failure, and sudden cardiac death.
Traditional therapeutic modalities have primarily involved pharmacological interventions, such as antiarrhythmic agents, aimed at restoring normal sinus rhythm. In refractory cases, interventional approaches such as catheter ablation or implantation of cardiac rhythm management devices may be necessary to achieve rhythm control.
The innovative QVibe device offers a novel approach to fibrillation management, utilizing therapeutic frequencies to modulate myocardial activity. Unlike conventional therapies, QVibe provides a non-invasive and physiologically harmonious intervention.
Mechanism of Action: QVibe operates by emitting targeted frequencies tailored to counteract the pathophysiological mechanisms underlying fibrillation. Its unique formulation integrates anti-inflammatory agents to mitigate myocardial inflammation, optimize coronary perfusion, and enhance myocardial contractility and conduction. Patients can conveniently integrate QVibe into their daily regimen, benefiting from its therapeutic effects irrespective of their location. Fig- Fibrillation episode and Fig.- After using QVibe device, sinusal rhythm- NORMAL
Synergistic Effects of Dual Device Deployment: For enhanced efficacy, simultaneous usage of two QVibe devices is recommended. By wearing one device as a wristband on the right wrist and another as a necklace close to the cardiac region, direct transmission of therapeutic frequencies into the circulation is achieved, augmenting therapeutic outcomes. Fig.3 – After 10 days of using QVibe device, sinusal rhythm- NORMAL AND Fig. 4- – After aprox one MONTHS of using QVibe device, sinusal rhythm- NORMAL
Immediate Symptomatic Relief and Prophylactic Benefits: QVibe offered in this case immediate relief from fibrillation symptoms while also exerting prophylactic effects, reducing the likelihood of recurrent episodes and promoting sustained cardiovascular wellness.
Personalized Therapeutic Approach: QVibe embodies a tailored therapeutic paradigm, customized to accommodate the unique pathophysiological profiles of individual patients. Its innovative algorithmic design ensures precise modulation of frequencies, optimizing therapeutic efficacy for fibrillation management.
In summary, the advent of the QVibe device heralds a transformative era in fibrillation management. By furnishing a gentle, natural, and patient-centric therapeutic modality, QVibe empowers individuals to proactively engage in the preservation of cardiac health and enhance their quality of life.

Fibrillation episode:


Raport

Nume. Timp de măsurare: 03:44:56 PM Sep 4, 2023

Genul: Bărbat Timp de înregistrare: 30s

Vârsta: 72 Timp de analiză: 03:46:02 PM Sep 4, 2023

Ectopic Rhythm HR: 125/min

Ectopic rhythm is abnormal heart rhythm. Patients need further check in combination with the symptoms.

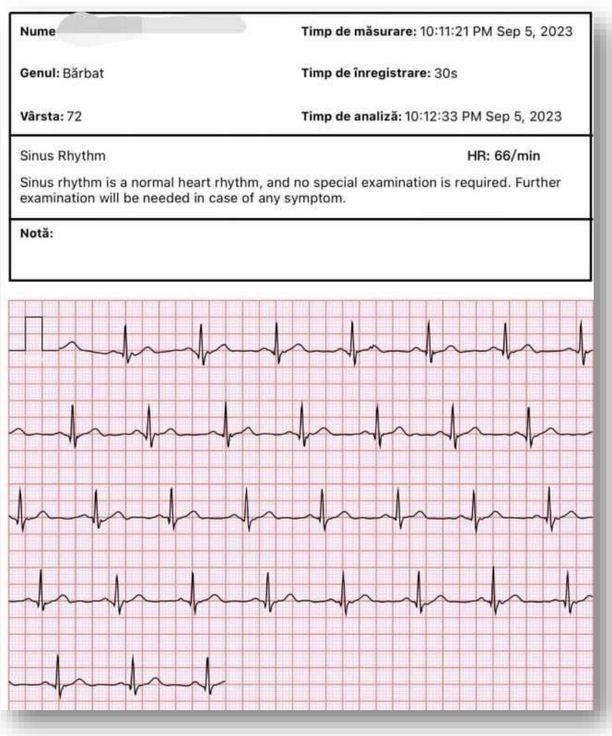
Atrial Fibrillation

It is suggested to pay timely visits to the Cardiology Department to find out the cause of atrial fibrillation; symptomatic treatment should be given for primary diseases (if any). In addition, antiarrhythmic drugs and anticoagulant therapy should be applied as recommended by the specialist doctors, and radiofrequency ablation and left auricular occlusion should also be considered. Atrial fibrillation can lead to acute heart failure, hypotension, aggravation of angina, difficulty in controlling ventricular rate and other conditions that require immediate cardiopulmonary resuscitation.In the treatment of rapid atrial fibrillation, ventricular rate should be timely controlled to prevent heart failure. In the treatment of slow atrial fibrillation with atrioventricular block above grade II (ventricular rate < 40 beats/ min), a pacemaker should be implanted in time to prevent accidents.

Notă:

1mV

After using QVibe device, sinusal rhythm- NORMAL: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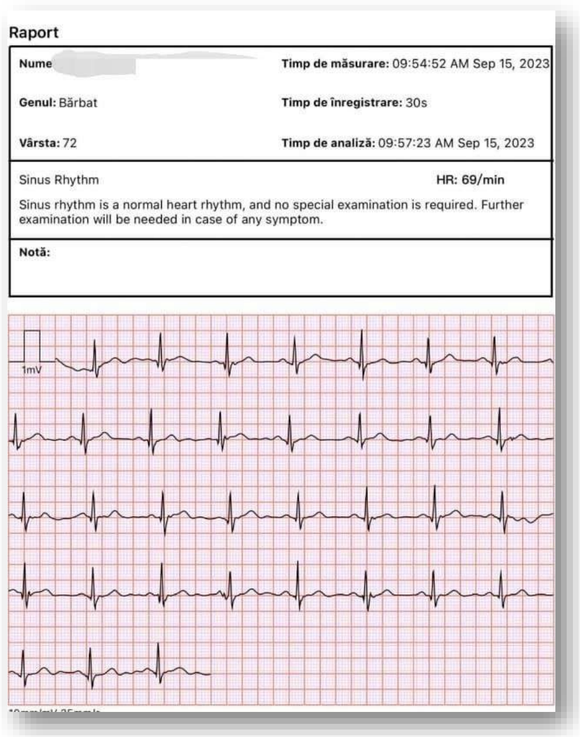
Genul: Bărbat Timp de înregistrare: 30s

Vârsta: 72 Timp de analiză: 10:12:33 PM Sep 5, 2023

Sinus Rhythm HR: 66/min

Sinus rhythm is a normal heart rhythm, and no special examination is required. Further examination will be needed in case of any symptom.

Notă: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Genul: Bărbat Timp de înregistrare: 30s

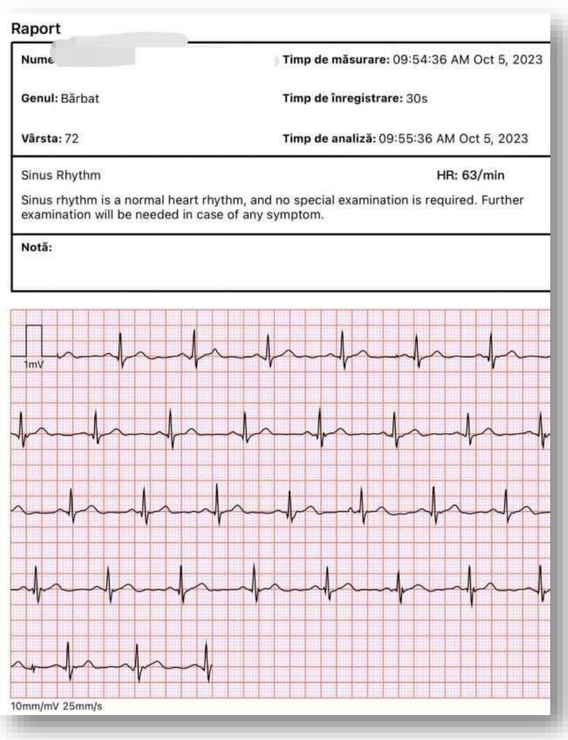
Vârsta: 72 Timp de analiză: 09:57:23 AM Sep 15, 2023

Sinus Rhythm HR: 69/min

Sinus rhythm is a normal heart rhythm, and no special examination is required. Further examination will be needed in case of any symptom.

Notă:

1mV


Raport

Nume Timp de măsurare: 09:54:36 AM Oct 5, 2023

Genul: Bărbat Timp de înregistrare: 30s

Vârsta: 72 Timp de analiză: 09:55:36 AM Oct 5, 2023

Sinus Rhythm HR: 63/min

Sinus rhythm is a normal heart rhythm, and no special examination is required. Further examination will be needed in case of any symptom.

Notă:

1mV

10mm/mV 25mm/s

SCAN ME

Contact: baceano@gmail.com

+40745170879 https://www.healthyvibe.ro/product/incarcare-dispozitiv-q-vibe-medium-circulatie/ www.healthyvibe.ro

CO-TECH- test, measure, balance

(innovative concept of Automated Software Process for evaluation and therapy through biofeedback)

The Importance of Prevention and Personalized Protocol in Complementary Stroke Therapy

Patent/project number: OSIM 301240/29.12.2023

Author/s: Senior Lecturer Dr. Oana Codruta Bacean Miloicov

Institution: SC Holistic Lounge SRL

F

CO-TECH is an innovative and copyright-protected concept that brings a new perspective to patient evaluation and therapy. Using biofeedback, this system optimizes evaluation processes, improves therapies, and reduces execution times, resulting in a more efficient therapeutic approach.

The Role of Prevention in Hypertension and Reducing Major Stroke Risk

Stroke is one of the leading causes of mortality and disability. After the first stroke, the risk of recurrence increases significantly, worsening prognosis.

• A second stroke is frequently associated with severe neurological sequelae, including hemiparesis, aphasia, cognitive impairment, and vascular dementia.

• A third stroke, though theoretically possible, has an extremely low survival rate, with most patients not surviving.

In this context, prevention is crucial in managing hypertension (HTN) and reducing the risk of stroke.

Clinical Case Presentation

📌 Patient: Male, 68 years old, chronic hypertensive, no apparent neurological symptoms before January 2025.

📌 Remote Biofeedback Monitoring:

• Since February 2024, the patient was consistently evaluated for stroke risk using biofeedback remote sessions.

• Significant fluctuations in cardiovascular and cerebral circulation parameters were observed in the biofeedback remote sessions.

• Over 7 months, personalized therapies were conducted to improve cerebral circulation, promote neuronal regeneration, and reduce inflammation.

📌 Acute Event:

• In January 2025, the patient suddenly developed neurological symptoms (acute confusion).

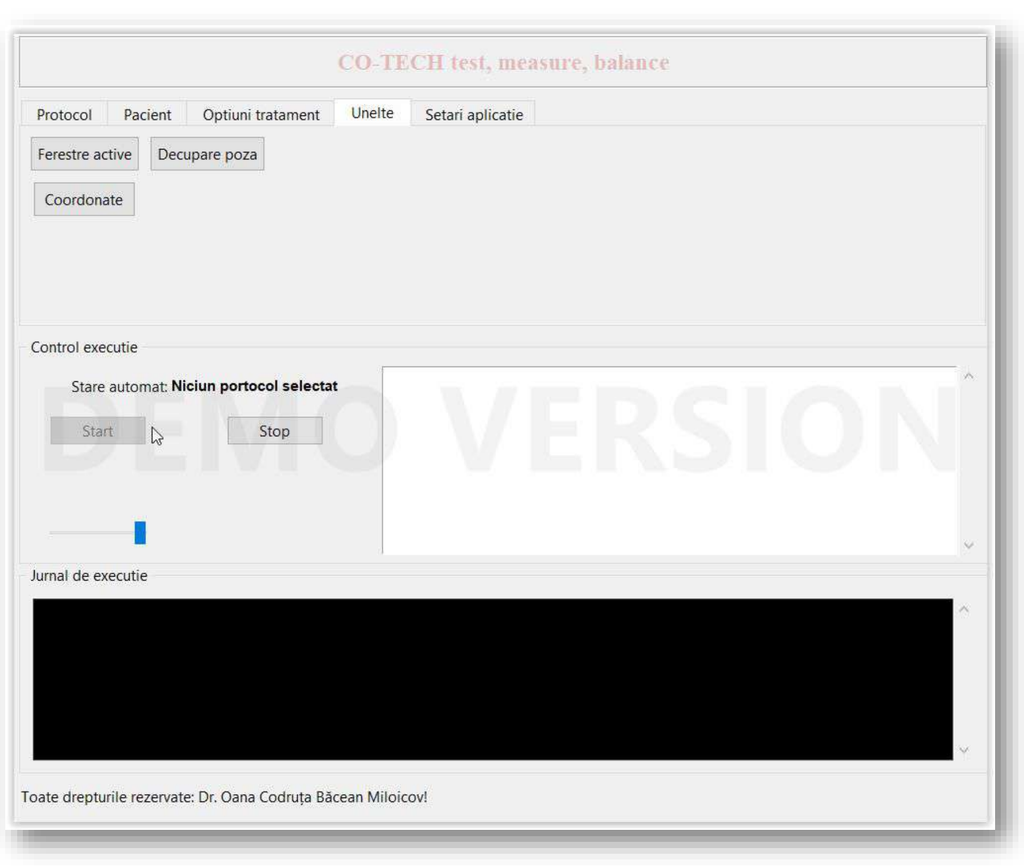
• Emergency department-confirmed diagnosis: Subacute ischemic stroke in the left middle cerebral artery territory.

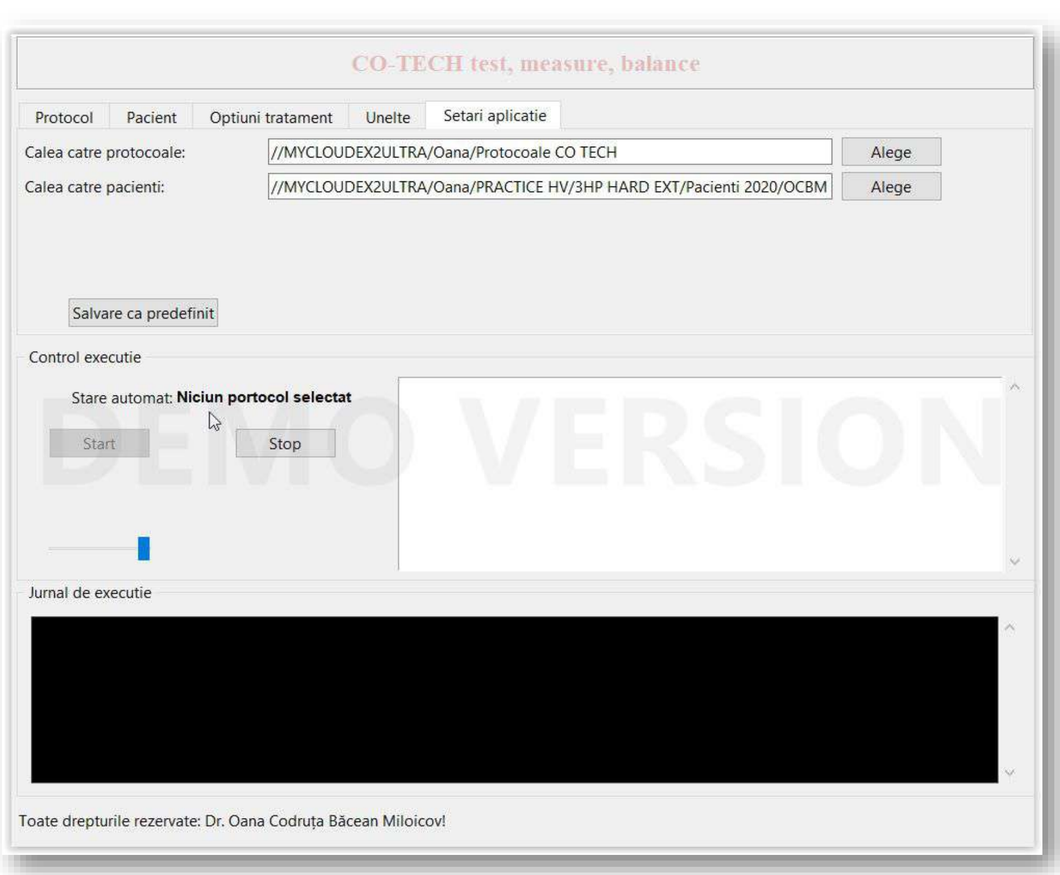
📌 Outcome:

• No neurological sequelae, thanks to prior therapies.

• Significantly shortened recovery time.

• Reduced risk of post-stroke complications.





Conclusions and the Importance of a Personalized, Non-Invasive Protocol

✓ Continuous monitoring through remote biofeedback allows early risk detection.

✓ Preventive intervention optimizes cerebral circulation and reduces the risk of severe strokes.

✓ Hypertensive patients benefit from a complementary approach that may prevent severe disabilities.

Confirmed diagnoses from the hospital discharge note:

✓ Subacute ischemic stroke in the left middle cerebral artery territory (temporal).

✓ Chronic ischemic stroke in the left posterior cerebral artery territory.

✓ Chronic ischemic stroke in the left middle cerebral artery territory (parietal left).

✓ Chronic supratentorial bilateral strokes.

⚠ **Prevention** is the key to longevity! By using a personalized protocol, patients at high cardiovascular risk can avoid severe complications and maintain an optimal quality of life.

Contact: baceano@gmail.com

0745170879

https://www.healthyvibe.ro/transformarea-hipertensiunii-arteriale-prin-terapia-biofeedback-remote/?_gl=1*vhzs0z*_up*MQ..*_ga*MTc3Mzc5MDcxLjE3Mzk0MzgwMjA.*_ga_BZ5RWJGVXF*MTczOTQzODAxOS4xLjEuMTczOTQzODAyNi4wLjAuMA..

www.healthyvibe.ro

QVibe frequency generating therapeutic device

QVibe – Revolutionizing Complementary Therapy for Hashimoto's Thyroiditis and Thyroid Nodules

Patent/project number: OSIM 301243/29.12.2023
Author/s: Senior Lecturer Dr. Oana Codruta Bacean Miloicov
Institution: SC Holistic Lounge SRL

F

Hashimoto's thyroiditis is an autoimmune condition affecting the thyroid gland, leading to fatigue, weight gain, and hormonal imbalances. Thyroid nodules, often associated with this condition, can severely impact thyroid function and overall health.

Innovative Solution – Q-Vibe Device

Q-Vibe is an innovative therapeutic frequency generator providing a natural, non-invasive, and side-effect-free solution for supporting thyroid health.

How Does Q-Vibe Work?

Q-Vibe emits therapeutic frequencies through a unique, registered algorithm tailored to the patient's pathology. The device is applied externally on the radial artery of the right hand, locally or as a necklace.

Recommended Protocol:

Daily use, especially during nighttime, ensures continuous energetic balance.

Case Study – July 17, 2024

Patient: 42-year-old female diagnosed with Hashimoto's thyroiditis and thyroid nodules.

Initial Observation:

- Presence of an imprecisely defined thyroid nodule.
- Significant hormonal imbalances.
- Chronic fatigue and heightened emotional sensitivity.

Intervention: Daily therapy with Q-Vibe for 3 months.

Results Obtained:

- Reduction of nodule volume confirmed via imaging.
- Restoration of hormonal balance, with improved TSH, T3, and T4 levels.
- Increased energy levels and reduced chronic fatigue.
- Improved emotional stability and reduced anxiety.

Advantages of Q-Vibe Therapy:

- Non-invasive: No painful procedures or aggressive medications.
- Natural: No chemicals or side effects.
- Personalized: Unique algorithm tailored to patient pathology.
- Effective: Rapid and visible improvements in overall health.
- Easy to use: Suitable for daily wear, including nighttime.

Conclusions:

The Q-Vibe device offers a groundbreaking complementary solution for Hashimoto's thyroiditis and thyroid nodules, restoring hormonal balance and enhancing patient quality of life.

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0745170879

https://www.healthyvibe.ro/product/incarcare-dispozitiv-q-vibe-medium-inflamatii/?_gl=1*1r3963g*_up*MQ..*_ga*MTc3Mzc5MDcxLjE3Mzk0MzgwMjA.*_ga_BZ5RWJGVXF*MTczOTQ0MzI5NS4yLjAuMTczOTQ0MzI5NS4wLjAuMA..

CASE 1st AID DISTRIBUTOR

Thaninkit Prasitdumrong, Pran Udomsawaengsup, Sirarin Prasitdumrong, Lapas Udomsawaengsup
Mentor : Jeerasak Jitrotjanarak

F

Accidents and injuries are common occurrences in various locations, such as tourist attractions, playgrounds, and parks, where first aid care may not always be readily available. To address this issue, the CASE 1st Aid Distributor has been invented as a vending machine designed to provide first aid care kits when needed. This innovative machine features three channels, each controlled by a sling mechanism, and each containing a different type of kit set box. The kits are tailored to specific types of injuries or medical situations and come equipped with essential supplies and detailed instructions.

How to use the machine:
1. Insect coin (or scan QR code for paying)
2. Choose the type of box set and press the corresponding button
3. Receive the kit set
4. Follow the instruction

1. **Wound Care Kit**: This kit is designed to treat abrasions and cut wounds. It includes sterile swabs, gauzes, a 0.9% NaCl solution, and antiseptic medication. An instruction leafle t is provided, along with QR codes that link to a PDF file and a video clip with instructions for mobile devices.

2. **Fainting Kit**: This kit is intended for use with conscious patients experiencing dizziness. It contains a glucose solution and an ammonium swab. An instruction leaflet guides users on what to do if they encounter a fainting person. It emphasizes that if the patient is unconscious, an initial evaluation for breathing and pulse must be conducted, and the kit should not be used—instead, CPR guidelines and calling for an ambulance should be considered. QR codes are available for accessing a PDF file and a video clip with instructions.

3. **Insect Bite Kit**: This kit provides relief from insect bites and includes an anti-inflammat ory medication tube. An instruction leaflet is included, as well as QR codes for a PDF file and a video clip with instructions for mobile devices.

Contact: j_jerasak@hotmail.com , +66846396363

Ankle Hero

Saving the Day for your feet

When someone hurts their ankle or foot, it can take a long time to heal and recover. This is because it’s hard to move the ankle, and the muscles and joints can get stiff. Traditionally, doctors will use fixed braces or casts and manual exercises to help, but these methods don’t always give the ankle the movement it needs to get better faster.

That’s why we created the “ Ankle Hero”. It’s a special machine that helps people move their ankles in a safe and controlled way. The “ Ankle Hero” has a motor and special mechanics to moves the ankle in a safety range and it can be adjusted to fit each person’s physical condition such as speed and frequent control. It’s like having a personal trainer for your ankle!

The advantages of our device is small, portable, easy to apply and can be used at home or in a hospital. It helps make the ankle stronger, more flexible, and helps people recover faster after prolonged casting or surgery of foot or ankle. We’re still working on making it even better by adding sensors or smart technology to make it super helpful and easier to use.

With the “ Ankle Hero” we hope to make healing faster with better functional outcome for everyone with ankle or foot injuries. It’s a fun and smart way to use “Ankle Hero” to help people feel better!

Baramate Charoenchaisombat

Kantapon Prasarnsuk

Supakorn Kittananun

Jennavat Uthaicharatratsame

254 Soi.Chula 11 Phaya Thai Road, Wang Mai Subdistrict, Pathum Wan District, Bangkok Thailand

Wellness Armor … *Innovations Against NCDs*

Master Waranyu Kittithawornkul
Chulalongkorn University Demonstration Secondary School

F

Currently, chronic diseases, or NCDs (e.g. heart disease, stroke, cancer, and diabetes, etc.) are a global health crisis, responsible for 70% of deaths worldwide. Half of those are on disability which being a family burden. Many countries face issues related to these problems.

"Wellness Armor" is a platform designed to effectively prevent diseases and reduce risk factors associated with NCDs by incorporating modern technology in the following ways:

1. Smart Wristband

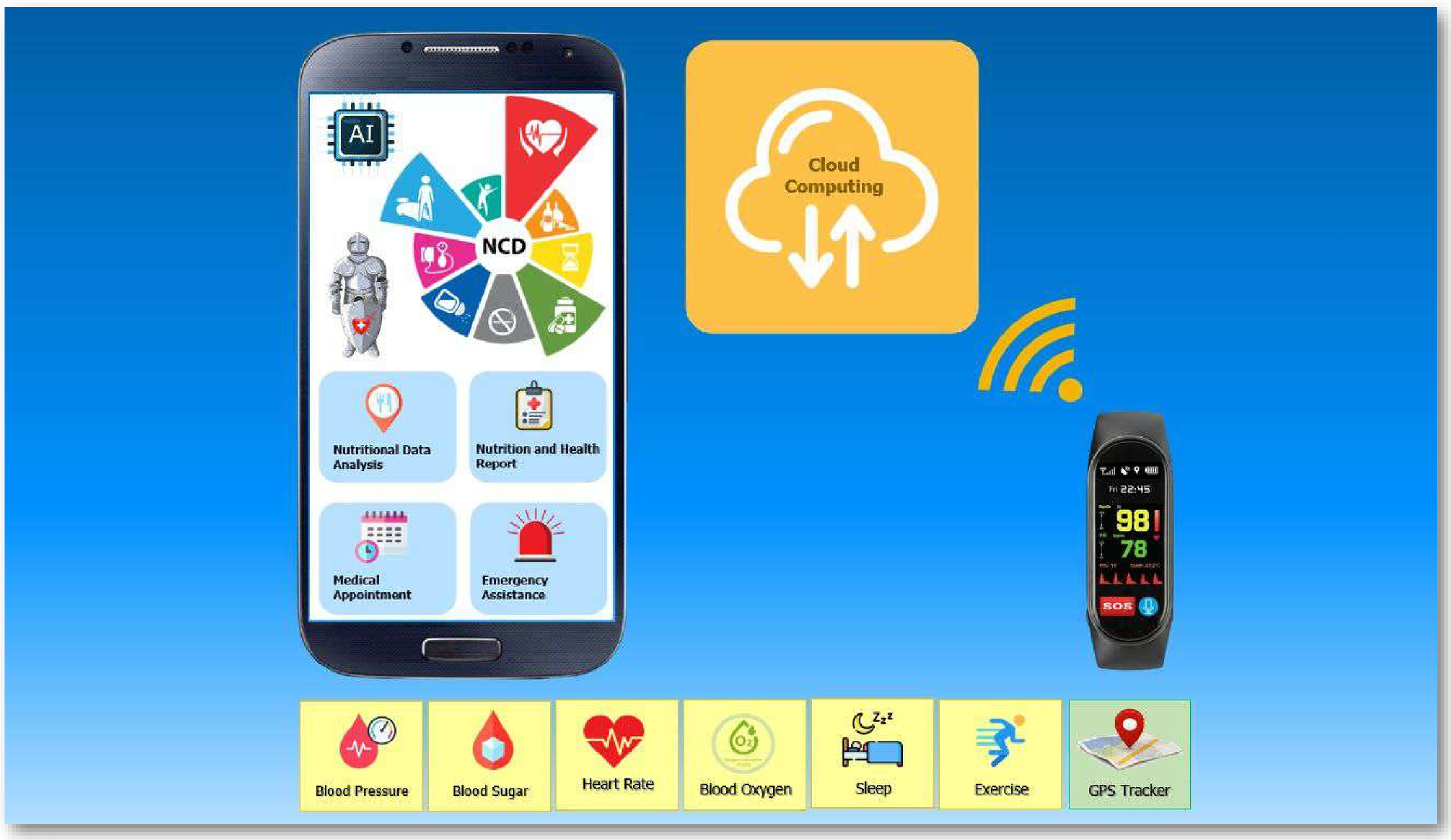
Equipped with IoT devices to continuously monitor health data, including sensors for measuring blood pressure, blood sugar levels, heart rate, oxygen levels, sleep patterns, and appropriate exercise. It also features a GPS tracker to continuously monitor the location of individuals with health issues. All this data is collected and automatically stored on a cloud server.

2. Smart Application

A mobile application that acts as a personal nutritionist and health advisor. It analyzes the food consumed in each meal and promptly alerts users of any abnormal symptoms. Utilizing Big Data and artificial intelligence (AI), it analyzes and evaluates nutritional information and health risk factors. This Smart Application includes 4 functions:

2.1 Nutritional Data Analysis　　2.2 Nutrition and Health Report
2.3 Medical Appointment　　2.4 Emergency Assistance

Remark: This invention achieved the award of Gold Medal and Special Prize at 9th annual edition of iCAN 2024.



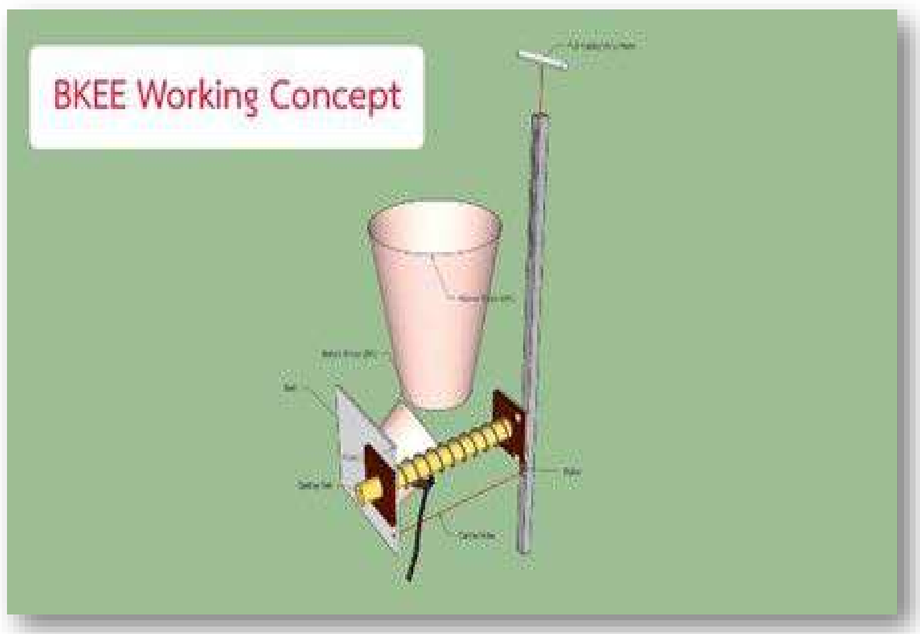
Contact: waranyu.arty@gmail.com, j_jerasak@hotmail.com

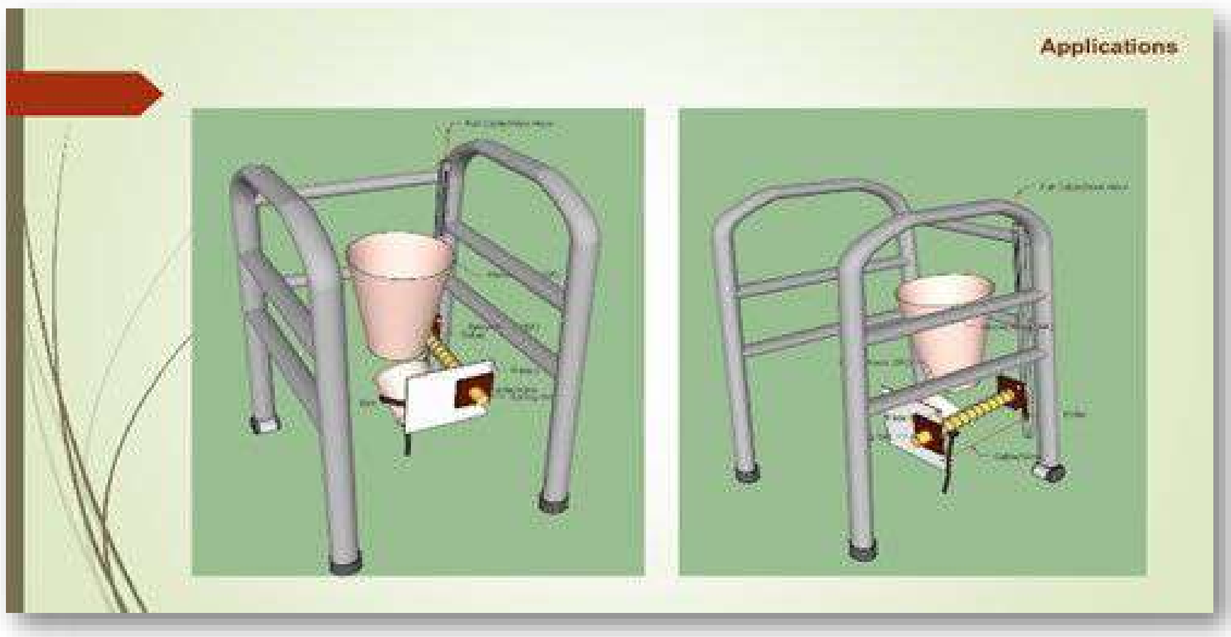
BEE KNEE

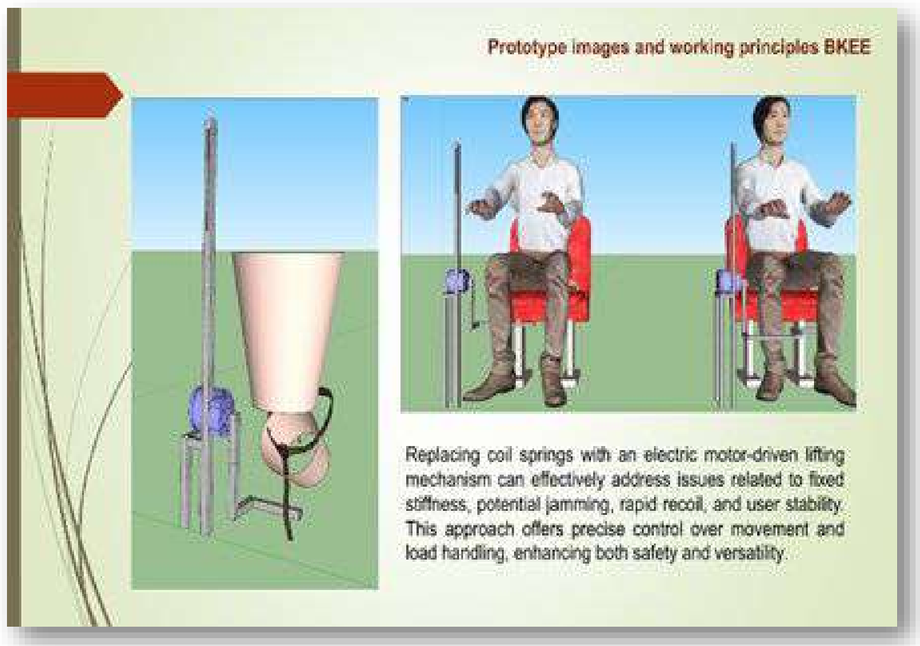
Jinnipa Jinwan, Ratchanon Adisakpirom,
and Phichphanita Mathasuriyapong

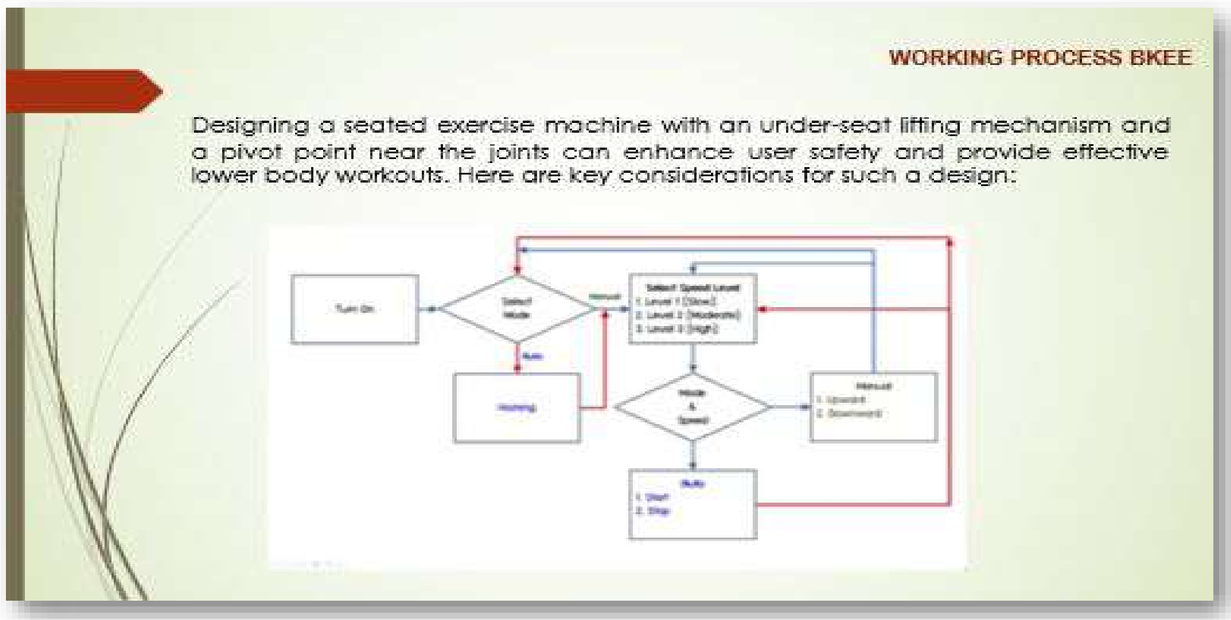
F

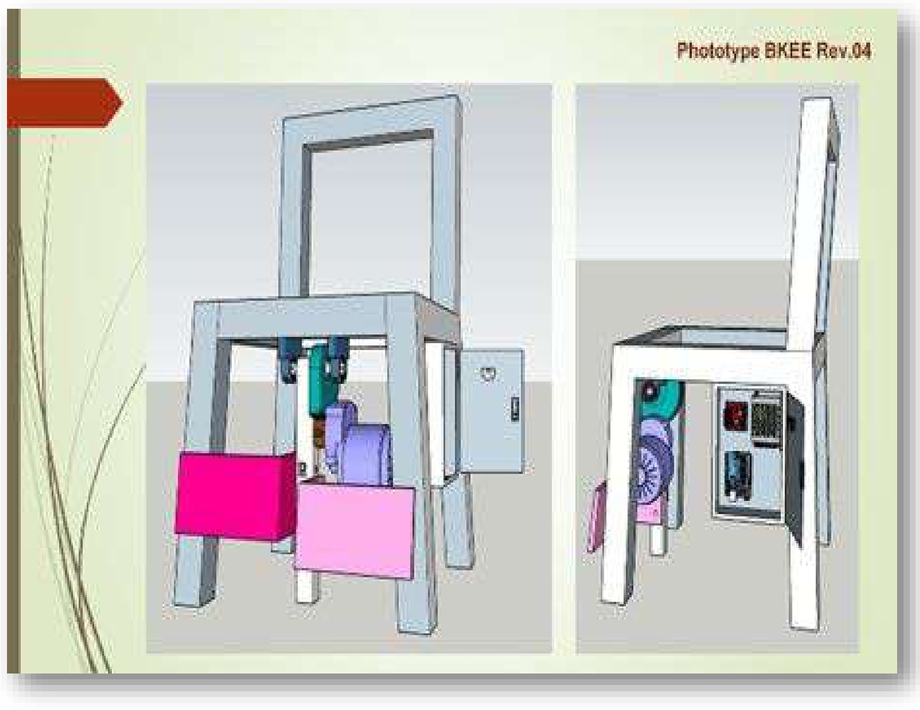
The design of the Below Knee Exercise Equipment (BKEE) using a coil spring as the main mechanism offers several advantages, but it also comes with certain limitations that need to be considered: Replacing coil springs with an electric motor-driven lifting mechanism can effectively address issues related to fixed stiffness, potential jamming, rapid recoil, and user stability. This approach offers precise control over movement and load handling, enhancing both safety and versatility.











CONTACT : **Mr. Jeerasak Jitrotjanarak**
Satit Chula Innovation Hub

AI- Guided Ventilator Mangement:
Can Machine Learning Improves Outcomes?

Authors: EUGEN - ȘTEFAN NICOLESCU, ANDREI BODOR
Scientific coordinator: Assoc. Prof. GABRIEL-PETRE GORECKI

F

STUDENT RESEARCH PROJECT

Artificial intelligence (AI) is revolutionizing the management of mechanical ventilation in intensive care, providing advanced solutions for optimizing the treatment of critically ill patients. This technology enables continuous monitoring and automatic adjustment of ventilator parameters, reducing human errors and improving the precision of medical interventions. By using machine learning algorithms, AI can analyze real-time physiological data of the patient, including respiratory rate, lung compliance and resistance, Tidal volume and airways pressure

Material and method:

Our study is based on an extensive review of recent studies, including randomized clinical trial, metanalyses and observational studies that were published in high impact medical journals that analyzed the application of AI in mechanical ventilation and optimizing ventilatory support for critical patients.

The reviewed studies highlight the need for large-scale, multicenter clinical trials to further validate AI's effectiveness in ICU patients. While further research is necessary to refine this technologies and establish standardized protocols, the current evidence strongly supports the integration of AI as a key component in the future of critical care medicine.

The implementation of artificial intelligence in mechanical ventilation represents a significant step toward more precise and efficient intensive care medicine, contributing to improved patient outcomes and survival rates.

Advantages/Novelty:

- Early detection of respiratory complications and improving patient outcomes
- AI can facilitate remote patient monitoring, enabling timely interventions even in ICU's with limited staff.
- Decreasing the duration of mechanical ventilation, thereby lowering the risk of nosocomial infections and ventilator associated pneumonia
- Significant reduction in the number of human errors
- Provide personalized care based on individual patients needs
- Shortening of the stay in the ICU and decreasing in healthcare costs

The implementation of artificial intelligence in mechanical ventilation represents a significant step toward more precise and efficient intensive care medicine, contributing to improved patient outcomes and survival rates

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Factors associated with MDR in *Helicobacter pylori* infection

F

Author: Andrei MITACHE
Scientific coordinator: Assoc. Prof. Gabriel Petre Gorecki, MD, PhD

INTRODUCTION

The widespread misuse of antibiotics contributes to multidrug resistance (MDR) in Helicobacter pylori, with outpatient antibiotic consumption linked to resistance to macrolides and fluoroquinolones. Efflux pumps, biofilms, and poor adherence to treatment guidelines further exacerbate MDR, making detection and eradication more challenging.

OBJECTIVES

The objectives of this student scientific review is to analyze and summarize the various factors contributing to multidrug resistance (MDR) in Helicobacter pylori infection, including the role of antibiotic overuse, efflux pumps, biofilms, genetic mutations, and treatment adherence, as well as to explore potential strategies for improving eradication therapies and addressing resistance in different geographical regions.

CONCLUSIONS

Global antibiotic resistance in Helicobacter pylori (Hp) is reducing treatment effectiveness, with about 10% of patients experiencing persistent infections, highlighting the need for new strategies. Bismuth-containing quadruple therapies (BQTs) remain a recommended first-line treatment, and adding bismuth to a 14-day triple therapy can improve eradication rates by up to 40%, particularly in regions with high resistance to clarithromycin and metronidazole.

Pylera, a combination of metronidazole, tetracycline, and bismuth subcitrate, has been FDA-approved and shows over 90% success in treating metronidazole-resistant Hp, even after clarithromycin-based therapies. Maintaining a gastric pH > 6 is key for Helicobacter pylori eradication, and second-generation PPIs like esomeprazole and rabeprazole are more effective in extensive metabolizers, especially in regions with many rapid metabolizers.

Vonoprazan offers superior efficacy for Helicobacter pylori eradication, particularly in clarithromycin-resistant cases, and, along with new treatments like probiotics, anti-biofilm strategies, and vaccines, could improve eradication outcomes, with strain susceptibility testing playing a key role in optimizing therapy.

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Resistance and virulence patterns in gram negative and gram positive rods isolated from the hospital environment

F

Author: Andra-Denisa Gorecki
Scientific coordinator: Assoc. Prof. Mihaela-Magdalena Mitache

INTRODUCTION

Antimicrobial resistance (AMR) is a growing public health issue, particularly in hospital settings, where multidrug-resistant (MDR) and virulent bacteria, such as those in the ESKAPE group, cause infections, with factors like excessive antibiotic use, genetic mutations, and horizontal gene transfer contributing to its spread and increasing mortality rates, especially in intensive care units (ICUs)..

OBJECTIVES

The objective of this student scientific review is to analyze and summarize the resistance and virulence patterns of Gram-negative and Gram-positive rods isolated from hospital environment in Bucharest, Romania, focuse on their antibiotic resistance mechanisms, virulence factors, and implications in hospital-acquired infections and treatment strategies.

CONCLUSIONS

The study investigated antibiotic resistance and virulence markers in Gram-negative and Gram-positive bacterial strains isolated from hospital environments and surgical wound infections, revealing significant resistance to beta-lactams, quinolones, aminoglycosides, and tetracyclines, as well as the presence of multiple virulence factors in strains like E. coli, A. baumannii, and S. aureus, with a notable prevalence of MRSA and carbapenemase producers, suggesting that these factors contribute to the nosocomial origin and pathogenic potential of these strains.

This data showed that the isolated strains possess multiple drug resistance and virulence factors, highlighting the need for screening and intervention measures to prevent infections caused by MDR and virulent strains in hospitalized patients.

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ADJUSTABLE PESSARY FOR GENITAL PROLAPSE

Romina-Marina Sima, Gabriel-Petre Gorecki, Liana Pleș

Patent application nr. A 00125/2023

Introduction:

Genital prolapse is a condition characterized by a descensus of the pelvic organs at the perineal level. It is found most frequently in patients with advanced age and associated medical or surgical pathologies. The surgical methods are multiple and often have a favorable result. However, there is a separate category of patients who can no longer benefit from surgical interventions for various medical reasons. In these patients, a non-invasive treatment such as cervical pessaries for genital prolapse is recommended

Description:

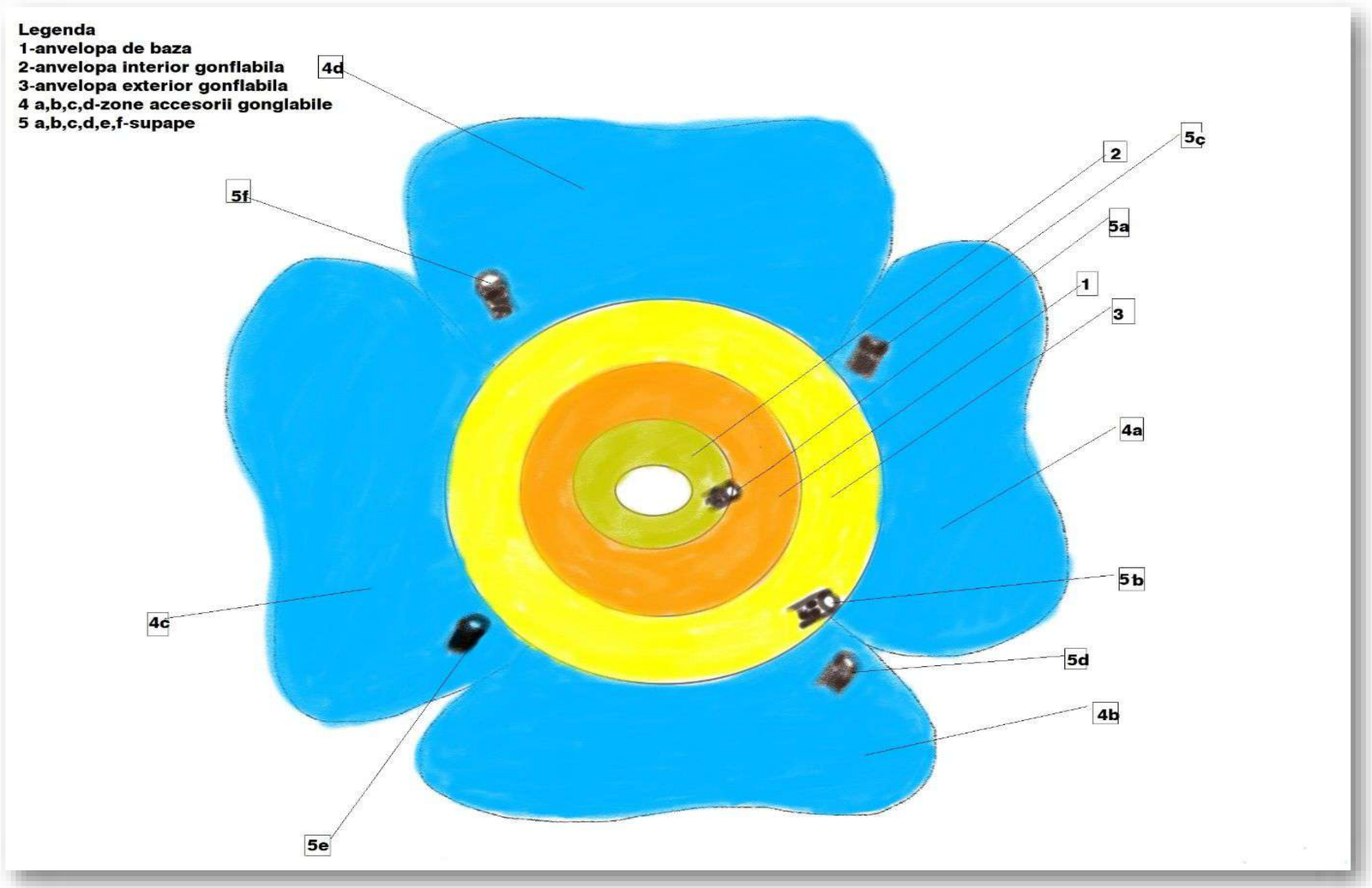
The adjustable pessary for genital prolapse, according to the invention, is a device made of silicone with different densities, consisting of a silicone anvelope - the basic anvelope, inside which is another smaller inflatable anvelope provided with a valve on the outside. On the outside of the basic anvelope there is an accessory anvelope and 4 additional side areas, all of these areas are inflatable and each has its own valve.

The peculiarity of the adjustable pessary for genital prolapse according to the invention compared to other devices is that it has the possibility of adjustment depending on the clinical and anatomical particularities of the patient.

The pessary is folded laterally and placed in the vagina with the dominant hand.

After placement in the vagina, it is adjusted according to the patient's characteristics as follows: inflate anvelopes or accessory areas as needed through the valves that connect to the empty syringe.

The accessory areas that are not needed are detached by manual traction (they are easily detached from the base tire).



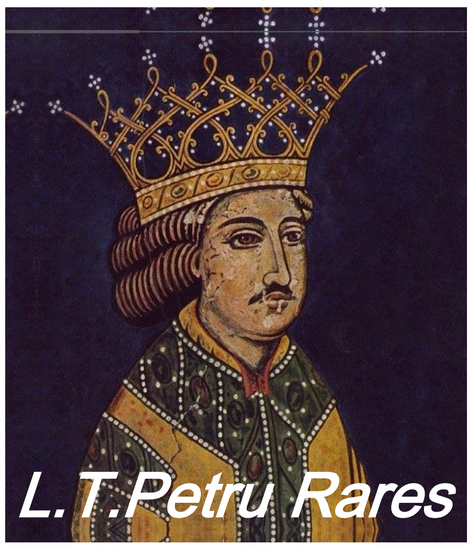
Novelty/Advantages:

The invention refers to an adjustable, personalized cervical pessary for genital prolapse, which can be used in medicine, for therapeutic purposes in patients with genital prolapse who cannot be approached surgical

The adjustable pessary for genital prolapse (AP-GP) according to the invention has the following advantages:

- allows the therapeutic approach of patients who have a genital prolapse that cannot be surgically solved because of associated pathologies or surpased surgical therapeutic solutions. It can also be used in patients who have already used other pessary-type intravaginal devices, but with suboptimal results.
-it has a shape that can be modified and eliminates the inconvenience of therapeutic attempts through the purchase of multiple devices and reduces costs.
-offers the possibility of using it in optimal conditions by physicians from different surgical or medical specialties who treat chronically ill patients and who also have associated pathology such as genital prolapse, after an initial assessment and insertion of the device by the gynecologist

Contact: gabriel.gorecki@prof.utm.ro



Humidity sense

Author: Ciubuc Vasile

Mentor: physics teacher

Ciuvaga Victor

F

The HumidiSens project is an innovative solution that combines Arduino technology with a smart humidifier system. This project utilizes sensors, a microcontroller, and intelligent algorithms to continuously monitor and control the humidity levels in a given space, ensuring that the environment remains at a comfortable and healthy humidity level.

The system is based on an Arduino platform, allowing for easy customization and programmability to suit a variety of needs. A humidity sensor (such as DHT11 or DHT22) provides real-time data, which the system uses to regulate the humidifier, turning it on or off as necessary to maintain optimal air quality.

The user interface can be designed to display current humidity levels and settings, making the system interactive and user-friendly. It may include features such as an LCD screen or a mobile app for remote control.

The intelligent design of the HumidiSens project ensures that the humidifier operates efficiently, reducing energy consumption by activating only when needed. The system can also be customized to include additional sensors or features like temperature measurement or Wi-Fi connectivity for further automation.

This project showcases the potential of Arduino-based systems in creating smart home solutions, offering an affordable and effective way to improve indoor air quality.

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PLACENTA PROCESSING DEVICE

Patent/project number: MD 2625

Author/s: Jian Mariana, Savca Ion, Balan Mihail, Nacu Viorel, Cobzac Vitalie, Mostovei Andrei, Solomon Oleg

F

The invention relates to the medical technique, namely to a device for processing the placenta at the stage of blood removal in the process of extracting total collagen, which can be used in regenerative medicine and tissue engineering. The advantages of the device consist in creating a device that allows a wash effective of the placenta in the collagen extraction process, at the scheduled time and speed desired, avoiding the unexpected stoppage of the rotation of the material in the vessel, thus preventing distortion this one.

The result of the invention consists in processing the pieces of placenta and avoiding stopping

of the blood washing process, namely the elaborated device allows the exact control of the number of rotations of the vessel in which the material is located and the processing time, thus it is avoided the long process of washing and denaturing the protein needed to extract it from the placenta. The device is convenient, mobile, practical, compact, portable and has a relatively low price for manufacturing.

State of development: the invention is carried out within the project with the code 23.70105.8007.01T.

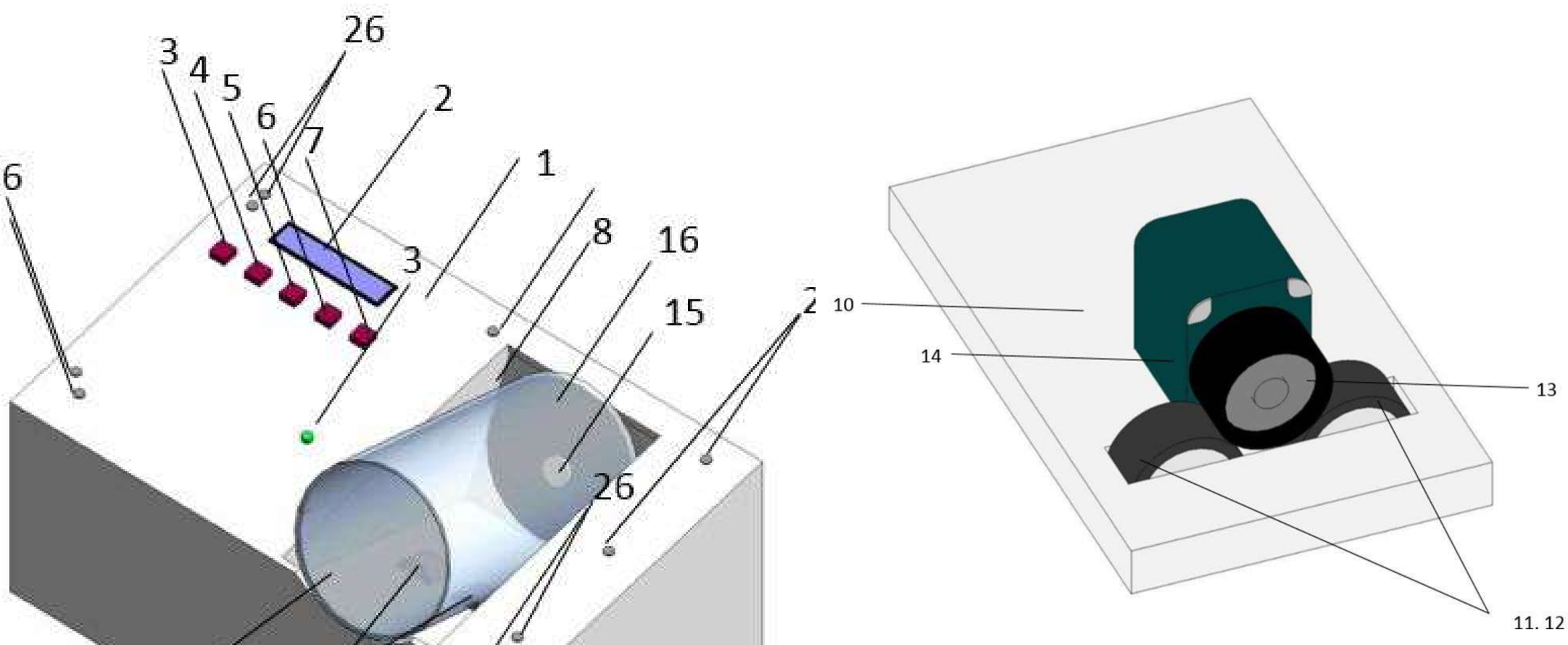

Figure 1.
The overall view of the device and the rotation system

Contact: mariana.jian@usmf.md tel: +373 68974524

T U I A S I
"Gheorghe Asachi" Technical
University of Iasi

Iasi, Romania

RAPID FEEDBACK DEVICE FOR CARDIOPULMONARY RESUSCITATION

Patent/project number: A-2019/00155-OSIM
Author: PhD Student Dimitrie-Cristian FODOR

F

Description of the invention

Cardiopulmonary resuscitation (CPR) is an emergency procedure that combines chest compressions with artificial ventilation in an effort to preserve intact brain function until further measures are taken to restore spontaneous blood circulation and breathing in a person who is in cardiac arrest (CA). A device with fast feedback for CPR has been designed (Fig. 1.1, 1.2) to operate by a single rescuer (Fig. 2 - prepared or unprepared for first aid, even with low-grade physical disabilities), which can be used in combination with an automated external defibrillator (AED), (Fig. 3) to get the maximum benefit of the person in the cardiac arrest.

Novelty and originality

The rescuer, while performing chest compressions, receives continuous feedback from the device, with regard to the CPR maneuvers which he performs on the victim, also, the device measures and stores certain biomedical parameters of the victim, making out of this tool an innovative and necessary device for medical emergency.

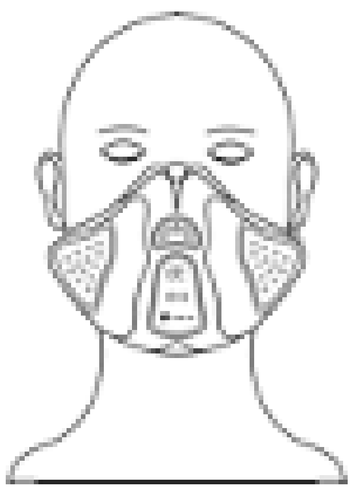

Fig. 1.1 – The concept of the device

Fig. 1.2 – The prototype of the device

Advantages

The device provides an optimal amount of respiratory medium in the victim's lungs, after automatic, personalized and customized airways unlocking (depending on the individual phenotype of the victims), at optimal parameters for the human body, to extend vital functions until the emergency medical crew arrives.

There are some CPR devices in the market, such as resuscitation balloons, requiring the action of two or three rescuers: a rescuer attaches the mask to the victim's face and manually unblocks the airways, the second rescuer administers the ventilation, and third performs cardiac massage. Also, it is only recommended to perform chest compressions by unprepared rescuers and not to perform artificial respiration by infusion.

Conclusions

The prototype of the device was successfully tested at the Romanian Red Cross (the Iasi Branch), in the presence and under the guidance of a physician in the field of emergency medicine. 23 volunteers from this institution attended the simulation of emergency cases and used the prototype in the victim's rescue procedure (also used in combination with AED) under the first aid protocols in force.

Fig. 2 – Performing cardiac massage by a volunteer (image during the **test**)

Fig. 3 – Using the device with an automatic external defibrillator (AED)

Fig. 4 – The resuscitation device used by a **single rescuer with one hand** (the other being injured)

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SPECIMEN FIXING RACK DEVICE FOR TESTING AT CYTOTOXICITY

F

Patent/project number: MD 2612

Author/s: Cobzac Vitalie, Jian Mariana, Nacu Viorel, Mariţoi Tatiana, Mostovei Andrei, Solomon Oleg

The invention relates to regenerative medicine and cell engineering. The problem that the invention solves is the creation of a device that allows the suspension of flat and large samples, in the nutrition medium, above the layer of adherent cells, thus avoiding the mechanical influence on them. The use of that device allows cytotoxicity tests to be performed on flat, heavy and large samples with high precision.

The result is that the said device can be used to neutralize any mechanical action of flat, heavy and large samples on the layer of adherent cells in the wells of cell culture plates in which cytotoxicity tests are performed, thus avoiding false negative results.

The advantages of the device are easy loading of the device shelf with flat, heavy and large samples, and thanks to the side wings that rest on the edges of the wells, there is no direct contact of the device and the required samples to be tested with the layer of adherent cells on the cell culture surface, however, the length of the wings can vary depending on the diameter of the plate wells, and the diameter of the cylinder can vary depending on the size of the sample and the plate wells.

State of development: the invention is carried out within the project with the code 24.80012.8007.02TC.

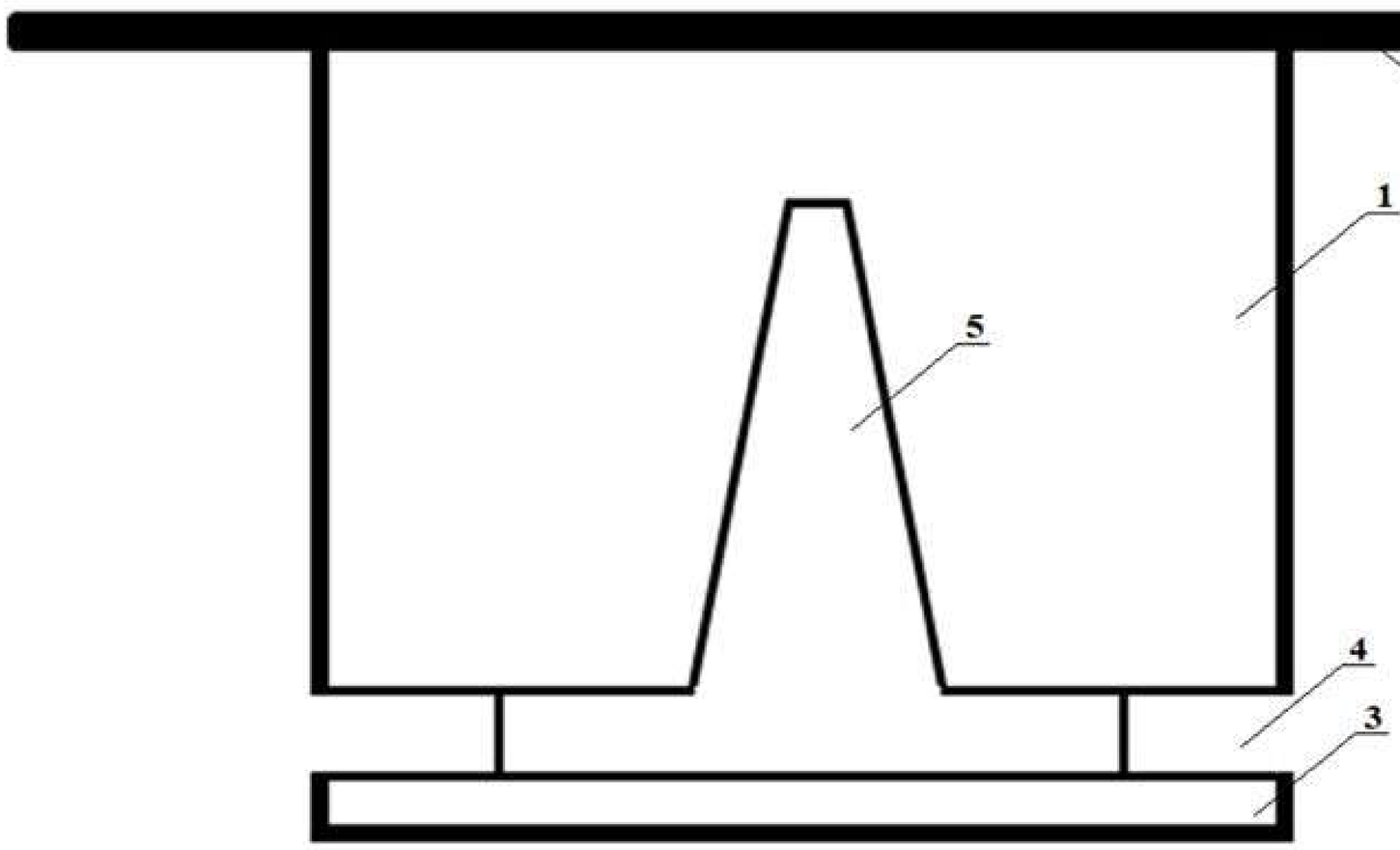

Figure 1. Schematic device structure
1 – device body; 2 – lateral support wing; 3 – shelf; 4 – shelf aperture; 5 – opening for nutrient medium circulation

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MODULAR-ADAPTIVE STEM FOR TOTAL HIP PROSTHESIS, USING SMART MATERIALS

Patent number: **RO 132628/ 30.01.2025**

F

Authors

Tarnita Danut Nicolae, University of Medicine and Pharmacy, Craiova
Tarnita Daniela, University of Craiova

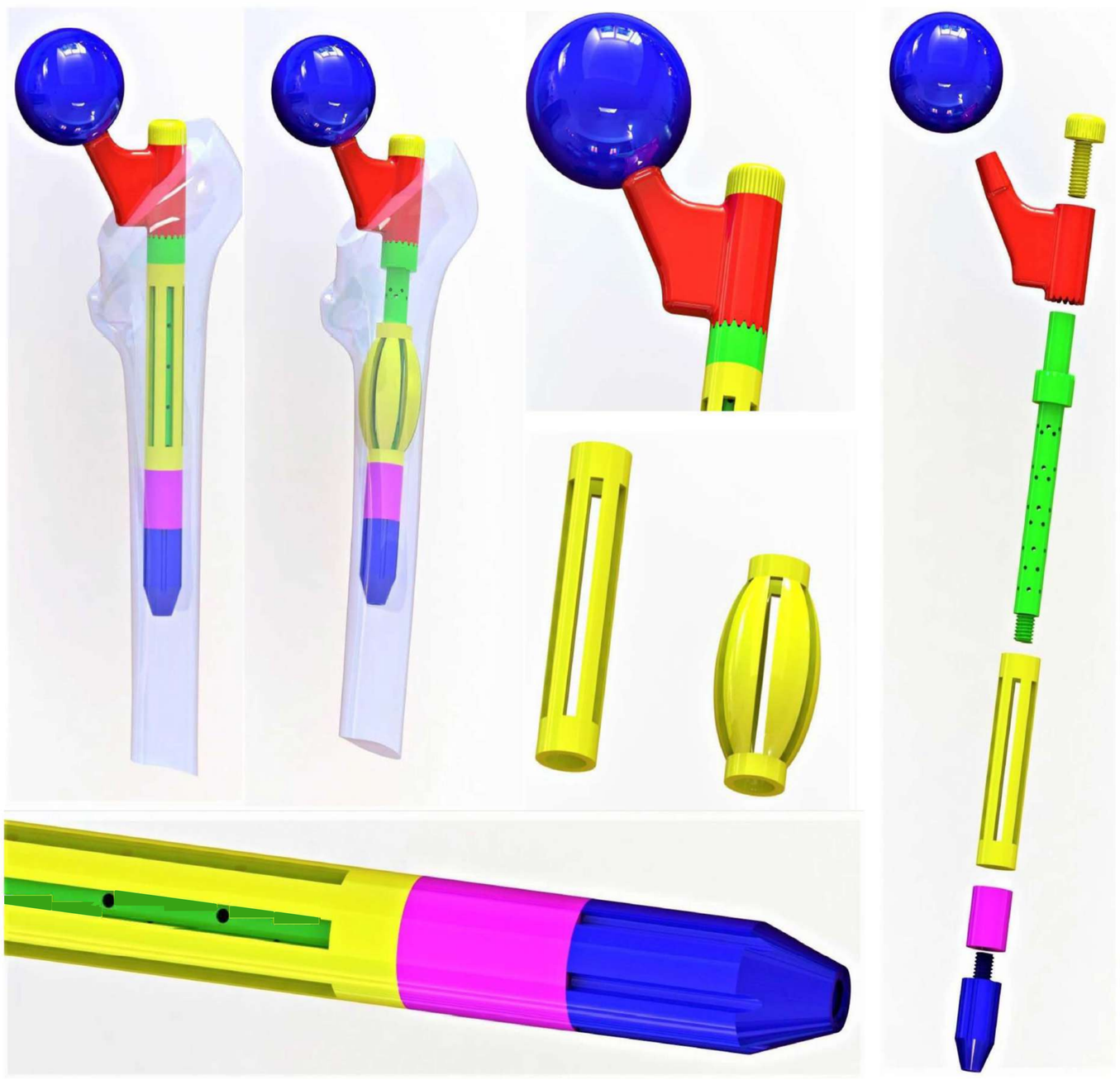
Description

The invention relates to a modular-adaptiv modular total hip prosthesis using smart materials. It is part of a hip prosthesis and it is placed in the femoral canal and serves to stabilize the hip prosthesis into the medullary canal of the femur. It consists of three modules: A, B and C.

The modular design of the stem allows more accurately adapt stem femur length that can vary from patient to patient.

Module B is dressed by a cylinder composed of Nitinol bars, a shape memory material, and it can achieve a more superior fixation of the stem in the femoral canal and a better adaptation to the femoral canal imperfections.

Module A is a cylinder that can rotate 360 degrees around the B module, and allows the femoral neck optimal anteversion in relation to the acetabular component.



Applications

Orthopaedics, Medicine.

Advantages

Module A is a cylinder that can rotate 360 degrees around the B module, and allows the femoral neck optimal anteversion in relation to the acetabular component.

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ORTHOTIC DEVICE USED FOR HUMAN KNEE JOINT AFFECTED BY GONARTHROSIS

RO 132075/ 30.09.2019
Patent Assignee: UNIV din CRAIOVA

F

Authors

Prof.univ.dr.ing. Tarniță Daniela, University of Craiova
Dr.ing. Catană Marius
Prof.univ.dr. Tarniță Dănuț Nicolae, University of Medicine anc

Description

The invention relates to a mobile knee orthosis, provided with a lateral stabilization system, which, by actuation, corrects the varus or valgus of the knee affected by gonarthrosis and fixes it in the corrected position, preventing abnormal movements in the frontal plane, favored by gonarthrosis.The dimensional and mass characteristics of the device are optimal with the positioning and tightening on the right lower limb for people affected by gonarthrosis in the medial compartment, regardless of the stage of the condition. Also, the orthotic device presents on the lateral side of the knee a system consisting of two bars, two chain links and a central pulley being actuated by two screws that allow the movement of the pulley towards the medial, thus correcting the varus and stabilizing the knee with regard to the abnormal lateral movements occurring in gonarthrosis, but allowing, at the same time, flexion and extension movements.

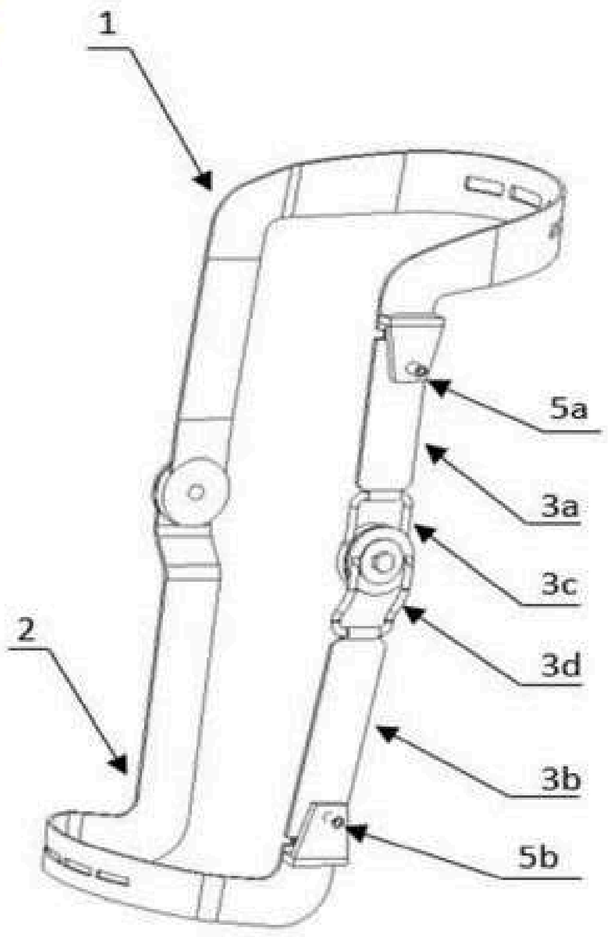


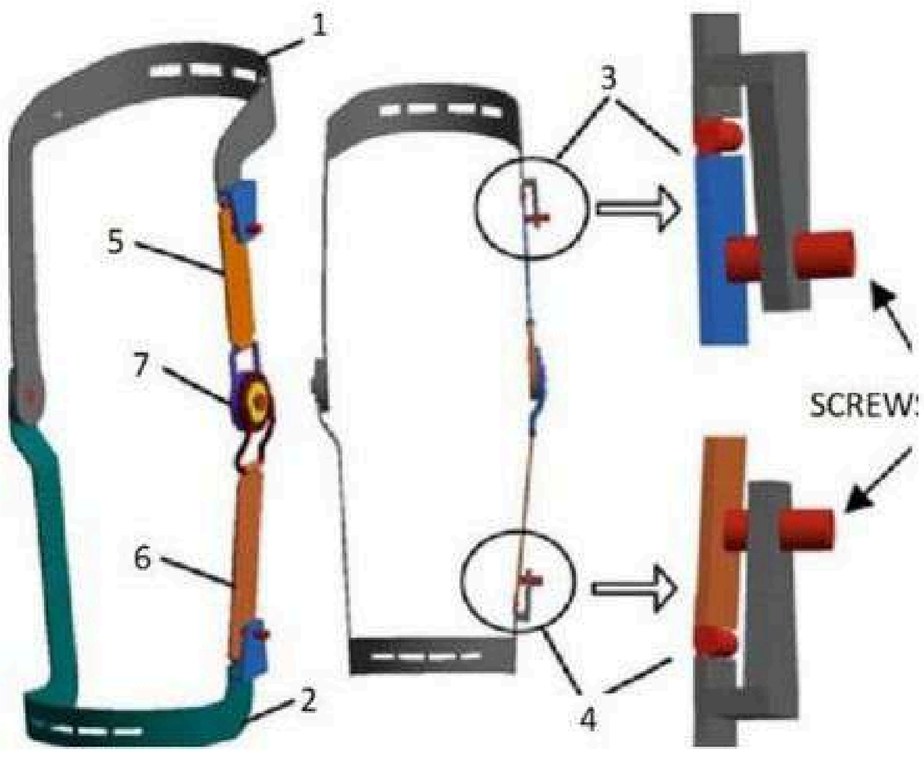
Fig.3

Applications

Rehabilitation

Advantages

This system has the advantage of being much simpler to make, has a much lower cost, is lighter, has no blunt elements that can damage tissues, is more flexible and adapts much more easily to the knee due to the multiple joints of the system which offer it much greater adaptability to the landmarks of the affected knee.



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MODULAR PLATE SYSTEM FOR THE OSTHEOSYNTHESIS OF THE LONG BONES FRACTURES AND METHOD FOR THEIR USE

Patent Number: **RO126084-A2; RO126084-B1, 2013**

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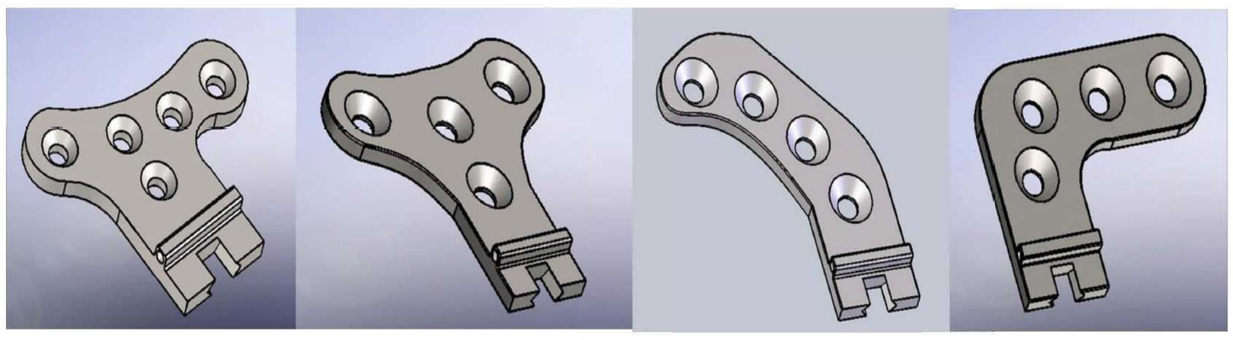
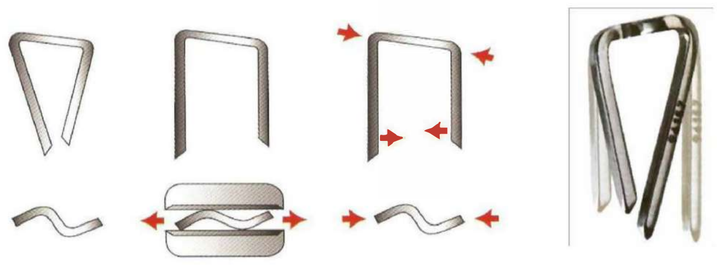
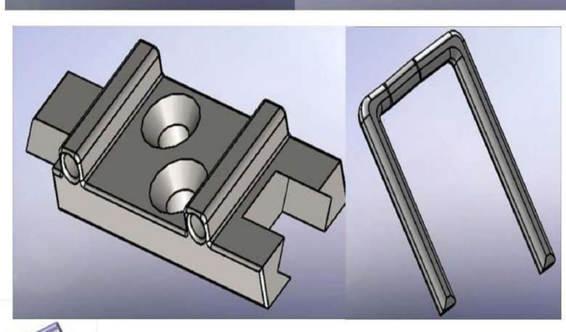
Prof.dr. Tarnita Danut Nicolae, University of Medicine and Pharmacy, Craiova
Prof.dr.ing. Bizdoaca Nicu, Universitatea din Craiova

Description





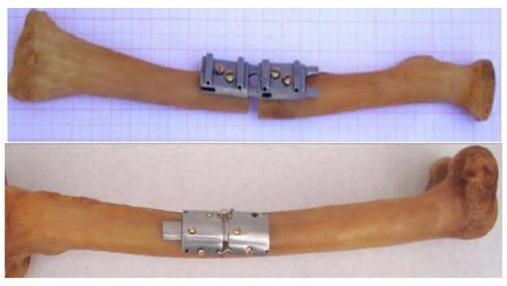


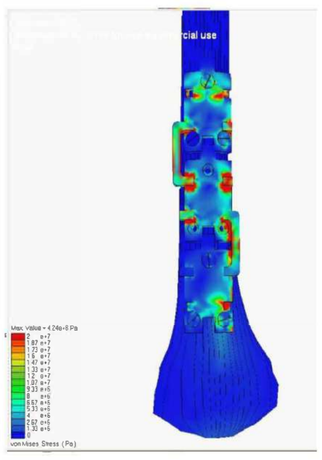
The patent's subject refers to the fabrication of modular orthopaedics implants for the osteosynthesis of the long bone fractures which comprise a predefined number of modules which, by mechanical coupling, and forms various dimension plates adaptable to the fractured bones and to the tensions developed in the bone by muscular forces.

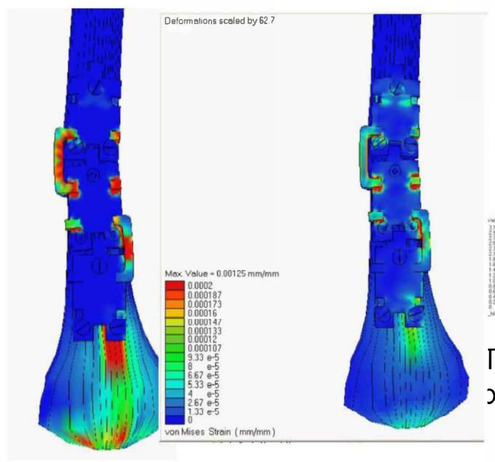
The coupling system of the adjacent modules with regard to the fracture place is made of Nitinol clips which act by the property of shape memory which enables the continues compression over the fracture fragments.

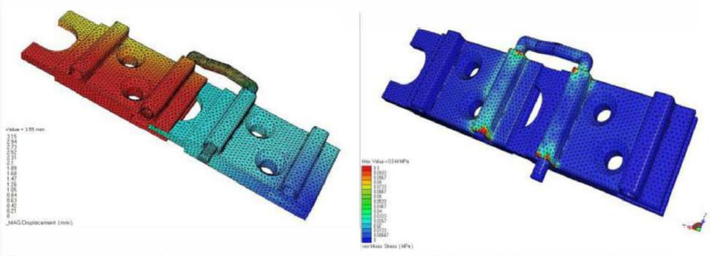
Aplicatii / *Applications*

Oorthopedics implants for osteosynthesis of long bones

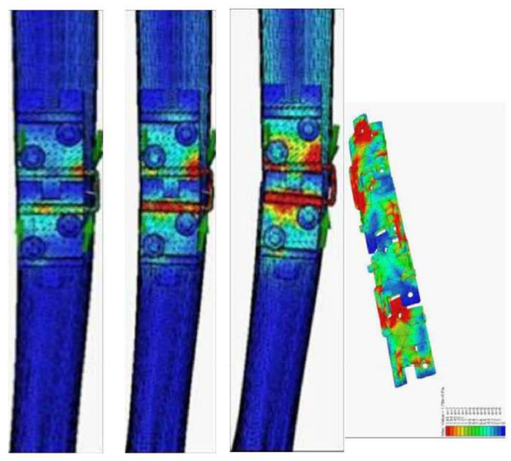


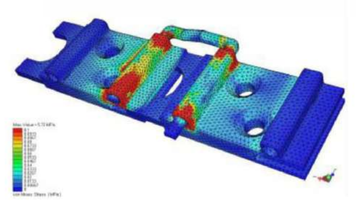


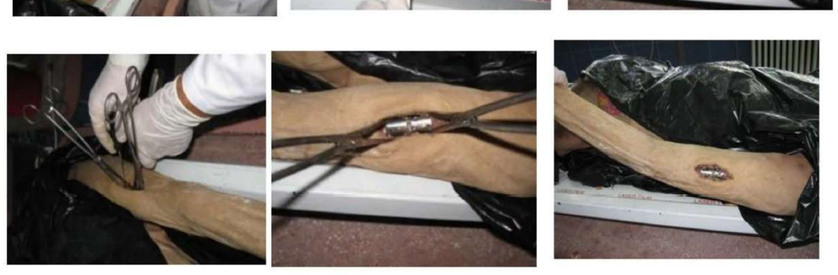




Two stages of the stress simulation of the virtual modular plate







Advantages

1) by combining a certain number of modules we can obtain implants with various lengths depending of type, position or dimension of the fracture;
2) the use of Nitinol staple enables the stabilization of the implants and the good union of the bone fractures, a key element in the healing process;
3) the small sizes of the modules enable the surgeon to use minimally invasive surgical techniques, having the following advantages:

▪***reduction of soft tissues destruction;*** ▪ ***eliminating intra-operator infections***;▪
▪***reduction of blood losses***; ▪ ***the reduction of infection risk***;▪ the ***re- duction of the healing***
▪***time for the plagues***;▪ ***reduction of the scar (the aesthetic aspect).***

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ELBOW PROSTHESIS TYPE BALL JOINT

Patent Number: 129147/2018 Patent Assignee: UNIV din CRAIOVA

Authors

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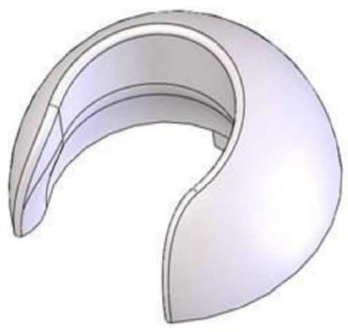
Prof.univ.dr.ing. Tarnita Daniela, University of Craiova
Dr.Boborelu Cristian, University of Medicine and Pharmacy, Craiova
Conf.dr.ing.Popa Dragos, University of Craiova

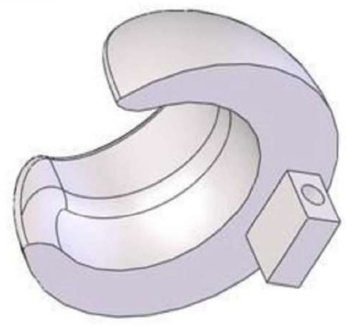
Description

The invention relates to a new model of elbow prosthesis which has the operating principle hinge model, with a spherical shape.

The elbow prosthesis according to the invention has the following advantages:

. It has a simple construction, easy to perform;
. It consists of two components that are implanted separately easily;
. The destruction of bone for implantation is small;
. Intracapsular implantation is performed, which provides greater stability elbow prosthesis after implantation;
. The two components are coupled without using other devices.





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din Legea nr.64/1991 republicată
OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI
BREVET DE INVENȚIE
Nr. 129147
Acordat în temeiul Legii nr.64/1991 privind brevetele de invenție, republicată în Monitorul Oficial al României, Partea I, nr.613, din 19 august 2014.
Titular: ARTEGO S.A., TÂRGU JIU, GJ, RO
Titlul invenției: PROTEZĂ DE COT TIP CUPLĂ SFERICĂ
Inventatori: TARNIȚĂ DĂNUȚ NICOLAE, CRAIOVA, DJ, RO; TARNIȚĂ DANIELA, CRAIOVA, DJ, RO; BOBORELU CRISTIAN, CRAIOVA, DJ, RO; POPA DRAGOȘ-LAURENȚIU, CRAIOVA, DJ, RO
Descrierea invenției, revendicările și desenele la care se face referință în acestea, fac parte integrantă din prezentul brevet de invenție.
Durata brevetului de invenție este de 20 ani, cu începere de la data de 11/07/2013, cu condiția plății taxelor anuale de menținere în vigoare a brevetului.
Confirm cele de mai sus prin semnarea și aplicarea sigiliului
Director General
București, Data eliberării 30/08/2018

Applications

Orthopaedics, bone recovery

Advantages

Regarding the design and the insertion – the new prosthetic model, consisting of two components, abundantly fulfils the criterion of simplicity;

The simplicity of the prosthetic components allows them to be made with classical tools in small workshops with no special equipment;

Due to the simplicity of the components, the costs are much smaller than in the case of current prostheses;

Making the prosthesis from stainless steel, titanium or cobalt-chrome gives the prosthesis a high durability in terms of component wear and mechanical strength;

By increasing the options and reducing the technical barriers in the revision surgery of the damaged prosthetic components, the

service is easy to carry out due to the very simple manner of implantation which does not involve difficult and hard to conduct manoeuvres;

The implantation kit is simple and it does not use special tools.

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MODULAR-ADAPTIVE CENTROMDEULAR ROD USED FOR THE OSTHEOSYNTHESIS OF THE LONG BONES

PATENT NO RO127375-A2; RO127375-B1, 2013

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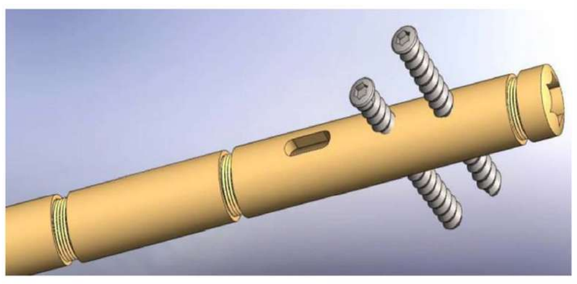
Prof.dr. Tarniță Dănut Nicolae, University of Medicine and Pharmacy, Craiova
Dr.ing.Berceanu Cosmin
Ing. Cismaru Florin

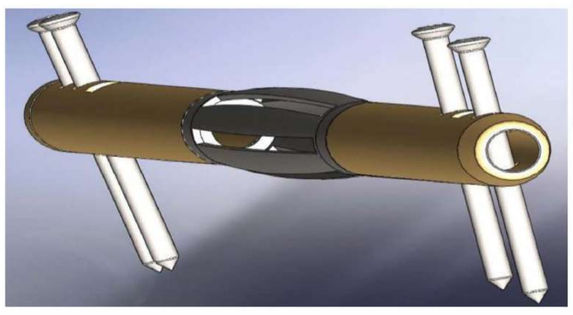
Description

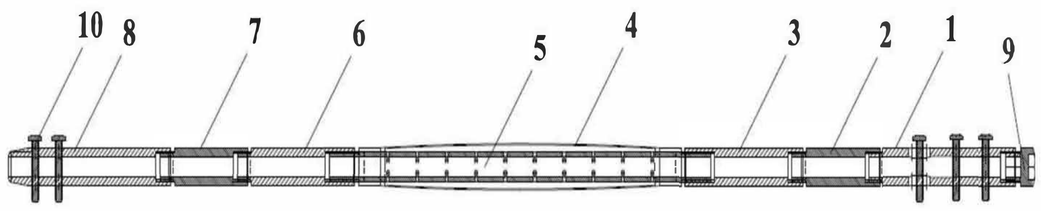


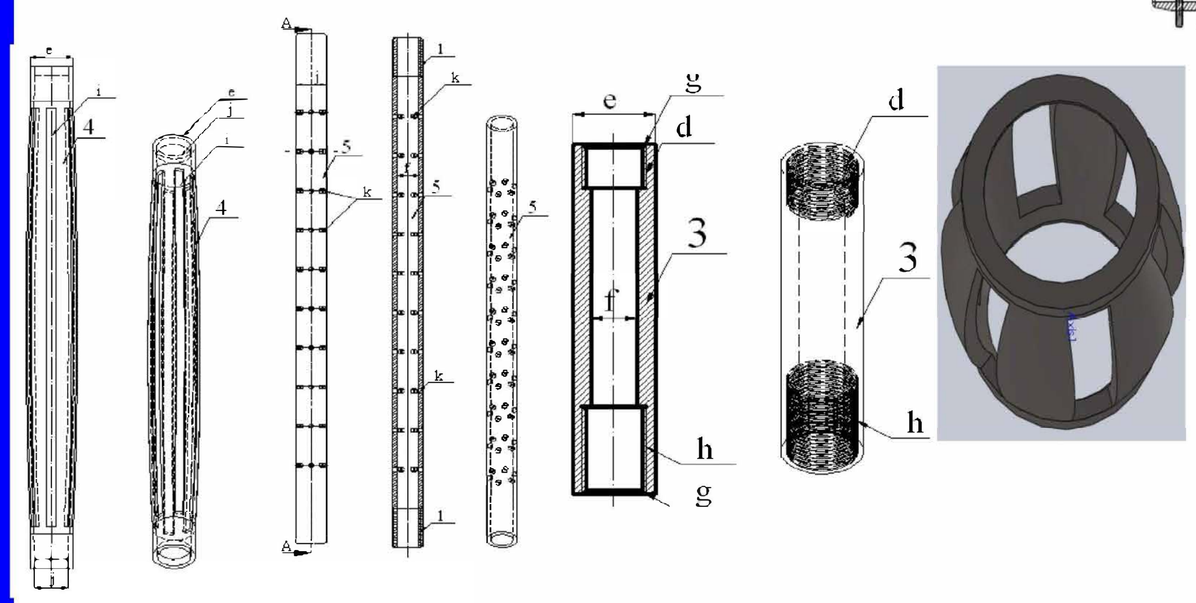
The patent's subject refers to a modular-adaptive centromedular rod (orthopaedic implant) used for the ostheosynthesis of the long bone fractures which incorporates in the structure intelligent materials like Nitinol, material with the property of shape memory.
The orthopaedic rod is an assembly made from 9 components divided in three zones: a epiphiseal zone (components 1, 2, 3 and 9), a diaphiseal zone (components 4 and 5) and a metaphiseal zone (components 6, 7, 8 and 9).

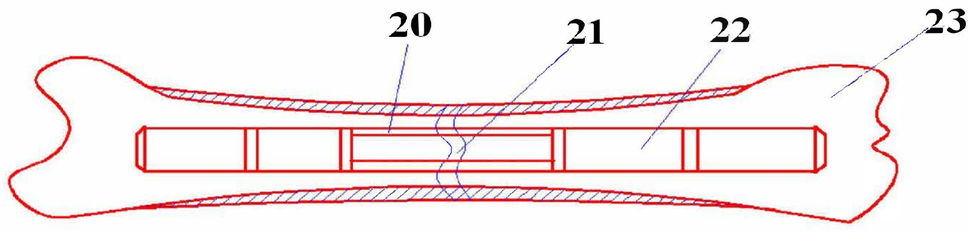
Applications

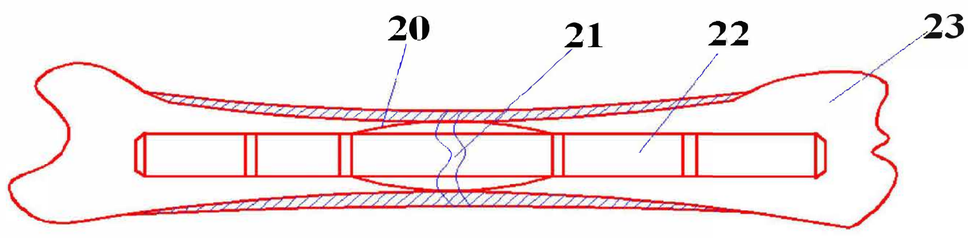
Modular-adaptive orthopaedic implants for the treatment of the long bones fractures.











Advantages

Advantages:
1.the rod is modular and adaptable to various long bones;
2.smart materials like Nitinol ensure a permanent pressure and a good cohesion between the orthopaedic rod and medular channel of the bone;
1.the rod doesn't allow micro-mouvements between the bone fragments
2.it avoids the occurrence of important degenerative-dystrophic lesions in the contact area of the focus of the fracture.
3.the components used are simple in shape thus the rod is easy to manufacture;
4.the rod is easy to implant and to extract by the surgeon by cooling the Nitinol component.
5.the healing period decreases, the infections risks decrease
6.the downtime decreases, faster integrations in the professional and domestic activities

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în baza Art.35 alin.(2),
din Legea nr.64/1991 republicată
OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

Brevet de invenție

Nr. 127375

Acordat în temeiul Legii nr.64/1991 privind brevetele de invenție, republicată în Monitorul Oficial al României, Partea I, nr.541, din 08 august 2007.

Titular: UNIVERSITATEA DIN CRAIOVA, CRAIOVA, DJ, RO

Titlul invenției: TIJĂ ORTOPEDICĂ CENTROMEDULARĂ, MODULAR-ADAPTIVĂ, UTILIZATĂ LA TRATAREA FRACTURILOR DIAFIZARE ALE OASELOR LUNGI

[redacted] TARNIȚĂ DANIELA, CRAIOVA, DJ, RO; CISMARU FLORIN, CRAIOVA, DJ, RO; TARNIȚĂ DĂNUȚ NICOLAE, CRAIOVA, DJ, RO; BERCEANU COSMIN RĂZVAN, COMUNA BISTREȚ, DJ, RO

Descrierea invenției, revendicările și desenele la care se face referință în acestea, fac parte integrantă din prezentul brevet de invenție.
Durata brevetului de invenție este de 20 ani, cu începere de la data de 25.11.2010, cu condiția plății taxelor anuale de menținere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea și aplicarea ștampilei
Director General

București, Data eliberării 30.05.2013

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Agriculture

Veterinary medicine

WOOL-BASED FERTILIZER ENRICHED WITH BENEFICIAL BACTERIA, FOR PLANT FERTILIZATION - PRODUCTION PROCEDURE -

Patent Application No. A-00514 / 2025

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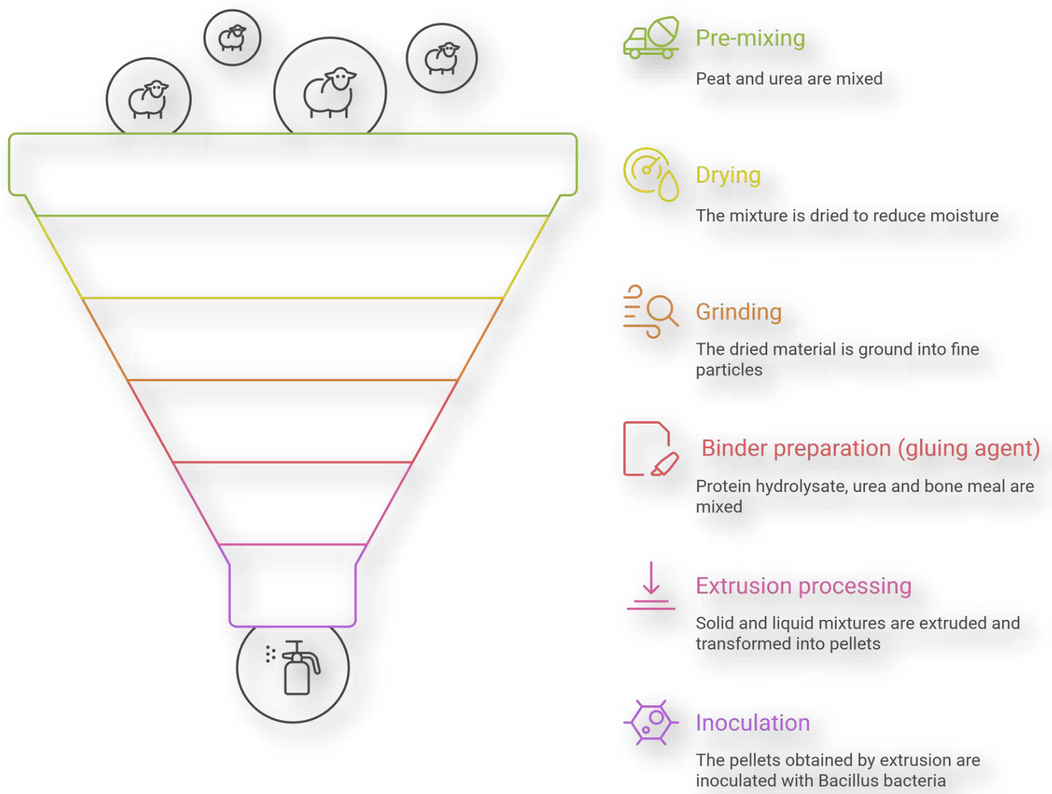
ABSTRACT:

The invention refers to the process of producing wool-based pellets, enriched with Bacillus bacteria, by extrusion, in order to obtain a fertilizer that supports the increase in the number and activity of beneficial microorganisms in the soil, improves soil fertility, water retention, increases crop resistance to diseases and improves crop yield.

Fig.1 - **Wool-Based Fertilizer Pellet Manufacturing Process**



DESCRIPTION:

Wool fibers are composed of essential nutrients such as carbon (C, 50%), nitrogen (N, 16–17%) and sulfur (S, 3–4%). These elements, together with various micronutrients such as copper (Cu), manganese (Mn), iron (Fe) and zinc (Zn), are essential for plant nutrition. In addition, wool fibers have good water absorption and retention properties with a favourable effect on plant development and can reduce the pH in very alkaline soils. Also, the slow release of nitrogen into the soil, due to the complex structure of wool keratin, compared to the rapid release from mineral fertilizers that cause nitrate runoff, can reduce water contamination, allowing soil fertility to be maintained over time, thus reducing the use of synthetic fertilizers.

The main disadvantage of raw, unwashed and unprocessed wool, if its use in agriculture is considered, is determined by the fact that raw wool contains lanolin (15%) and potential contaminants, such as various impurities on the fibers (4%), soluble contaminants, such as potassium salts from sweat and feces, and pesticide residues used to protect sheep from ectoparasites.

The solution obtained after washing the wool with hot water contains salts, ammonia and urea, which, when present in large quantities, can affect the soil by changing the pH, reducing fertility and preventing plant growth.

At the same time, some studies have shown that wool can be used as a bioindicator of sheep exposure to heavy metals, as well as for biomonitoring the content of trace elements in animals. Trace elements tend to accumulate in wool fibers in concentrations at least ten times higher than those found in blood serum and urine, and this may be related to lanolin's high capacity to absorb contaminants. Soil contaminants, air pollutants, food contaminants, plants and animal excrement can also be detected on wool fibers.

Incorrect disposal practices (such as burying) of potentially contaminated unwashed wool and/or wool waste can lead to the accumulation of pollutants in the soil, with potentially dangerous consequences for leaching and groundwater pollution.

COMPONENT / METHOD OF IMPLEMENTATION:

In order to be used in the manufacture of granular fertilizers, it is necessary for wool to be subjected to treatments that eliminate these shortcomings.

According to the invention, the disadvantages of existing wool-based granular fertilizers and their manufacturing technologies are eliminated both by washing and degreasing the wool, the proposed chemical composition and the technology for obtaining them.

Regarding the manufacturing technologies existing in the state of the art, they do not include precise control of the temperature and pelletization pressure, which can influence the physical and mechanical characteristics of the pellets obtained.

According to the invention, wool-based fertilizer pellets contain: 10-30% wool (preferably 20-30%), 20-40% wool protein hydrolysate (preferably 25-40%), 9-15% peat (preferably 12-15%), 6-15% urea (preferably 10-15%), 2-6% bone meal (preferably 3.5 - 6%), 15-30% starch (preferably 20-25%). They also contain beneficial bacteria that enhance the biological activity of processes in both soil and plants, namely 3% bacteria of the genus Bacillus.

The technology for manufacturing wool-based fertilizer pellets (Fig. 1) includes the stage of pre-mixing the peat, the solid phase S, with a part, preferably 20-30%, of the total urea introduced, after which the mixture thus formed is subjected to air drying in a rotary drum dryer at a temperature of 70-90oC until the moisture content of the material drops to 20-30%, preferably 22-25%, depending on the nature and origin of the peat. The mixture thus dried is introduced into a hammer mill in which the material is crushed to a particle diameter of max. 0.5 mm, followed by mixing with 10-15% starch powder, as a binding element. At the same time, the binding agent, the liquid phase, L, is prepared, which consists of 0.9-1.6 kg of wool protein hydrolysate, in the form of a solution with a concentration of 12-16%, in which the difference of 70-80% of the total urea used and 2-6% bone meal is dissolved, after which it is mixed with 10-30% sheared wool.

ADVANTAGES:

- ❑ increases the efficiency of assimilation of macroelements N, P, K;
- ❑ reduces the consumption of mineral fertilizers by 20-30%;
- ❑ determines the increase in the quality and volume of production by 15-30%;
- ❑ optimizes (reduces) the period of time until plants reach maturity;
- ❑ improves the structure and chemical composition of the soil;
- ❑ increases the resistance of plants to drought and any other form of stress;
- ❑ determines a rapid recovery of plants after stress caused by hail or storms;
- ❑ eliminates from the composition of the product compounds with an inhibitory effect on plant development originating from peat;
- ❑ the presence of beneficial bacteria in the composition of the product contributes to the decomposition of organic matter, both from pellets and from the soil, and its transformation into nutrients that can be absorbed by plants.

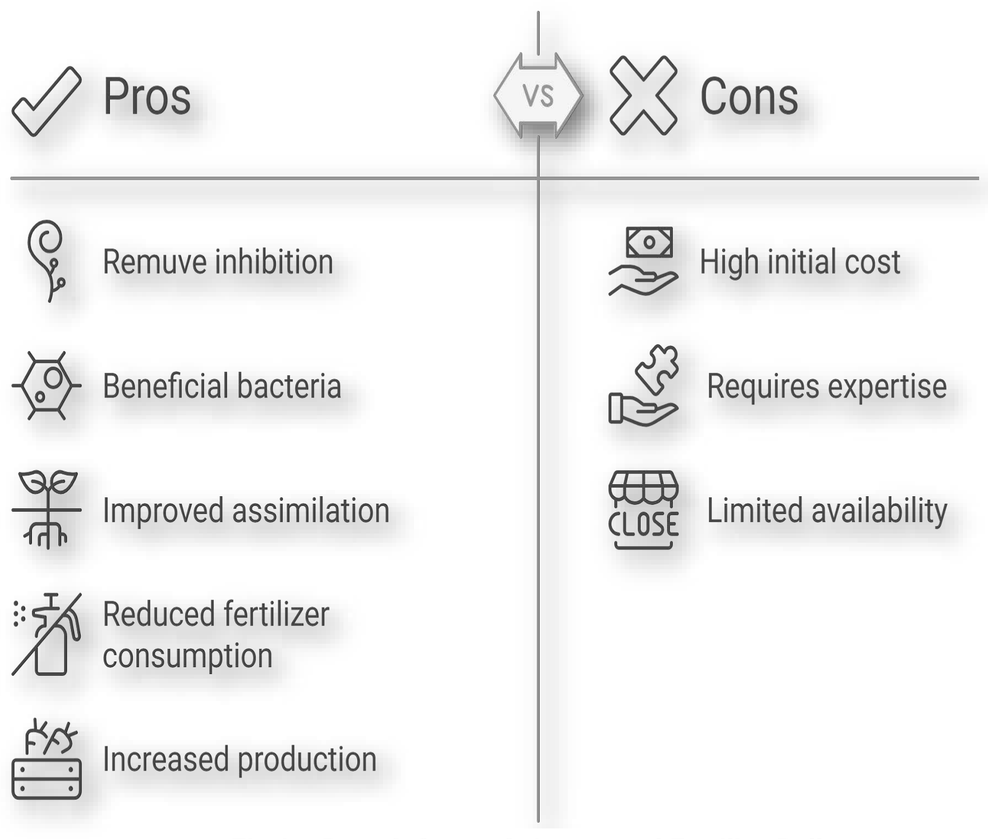


Fig.2 – Pros & Cons of sheep wool Fertilize Pellets

ACKNOWLEDGEMENT:

This project was funded by the Ministry of Research, Innovation and Digitalization through the project *"Research on the use of wool waste to obtain organic fertilizers for agriculture in order to improve soil properties and reduce environmental pollution"* – PN 23 04 02 02 – Ctr. 9N/01.01.2023.

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CONTINUOUS FLOW DISINFECTION SYSTEM FOR MICROPLANTS SEEDLING TRAYS FOR VERTICAL AGRICULTURE

Patent Application No. A-00513 / 2025

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ABSTRACT:

The invention presents a continuous flow disinfection system for trays sown with microplants, used in vertical farming systems, with the aim of achieving complete sterilization of the trays, substrate and seeds without the use of aggressive chemicals and without affecting seed germination. The equipment ensures uniform, safe and energy-efficient sanitation, reducing water and disinfectant consumption, being easily integrated into modular vertical farming infrastructures.

DESCRIPTION:

Microplants, young leaves and aromatic plants contain proteins, amino acids, fatty acids, flavonoids and numerous bioactive compounds with high nutritional value. However, the warm and humid conditions required for the development of these fast-growing crops also favor the emergence of microorganisms, pathogens and fungi, especially in vertical systems with high plant density.

Disinfection of seeds and trays is a crucial step in preventing the introduction and spread of pathogens that can affect the crop and reduce productivity. In a vertical system, where crops are grown in closed spaces and in overlapping layers, controlled and rapid sanitation of seed trays becomes an essential step in obtaining healthy, safe and sustainable crops.

Currently, the disinfection of microplant trays is performed manually or semi-automatically, using chemical solutions (sodium hypochlorite, hydrogen peroxide, ethyl alcohol) or hot water, methods that present a number of ***disadvantages***:

- ❑ they do not allow the disinfection of trays already sown with microplants, without affecting the seeds or the substrate;
- ❑ they do not provide automated and adaptive control of parameters (duration, intensity, humidity, temperature);
- ❑ they do not integrate combined disinfection sources (UV-C and ozonated fog) in a protective housing with sensors and HEPA filtration;
- ❑ they cannot be directly integrated into vertical production modules or controlled rack infrastructures.

The proposed invention solves these shortcomings by creating a compact, automatic and intelligent system for disinfecting trays sown with microplants, using UV-C radiation combined with ozonated nebulization, monitored and controlled in real time by a PLC-based electronic module, which adjusts the process parameters, to ensure complete sterilization without affecting the culture. The proposed system is capable of ensuring controlled and non-invasive sterilization, so that the seeds and substrate are not affected, and contaminants are completely eliminated.

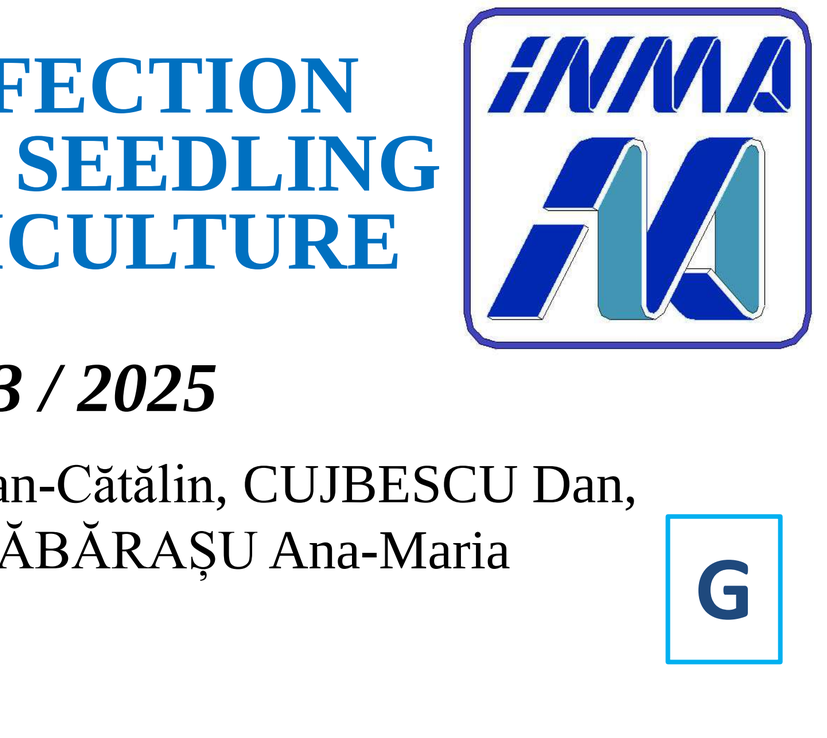

Fig.1 - Continuous flow disinfection system for trays sown with microplants – general assembly

ADVANTAGES:

- ❑ allows safe disinfection of seed trays without damaging the seeds;
- ❑ eliminates the need to use aggressive chemicals;
- ❑ reduces water consumption and cleaning time;
- ❑ allows complete automation of the sanitation stage;
- ❑ easily integrates into vertical modular infrastructures;
- ❑ reduces the risk of fungal contamination and crop losses.

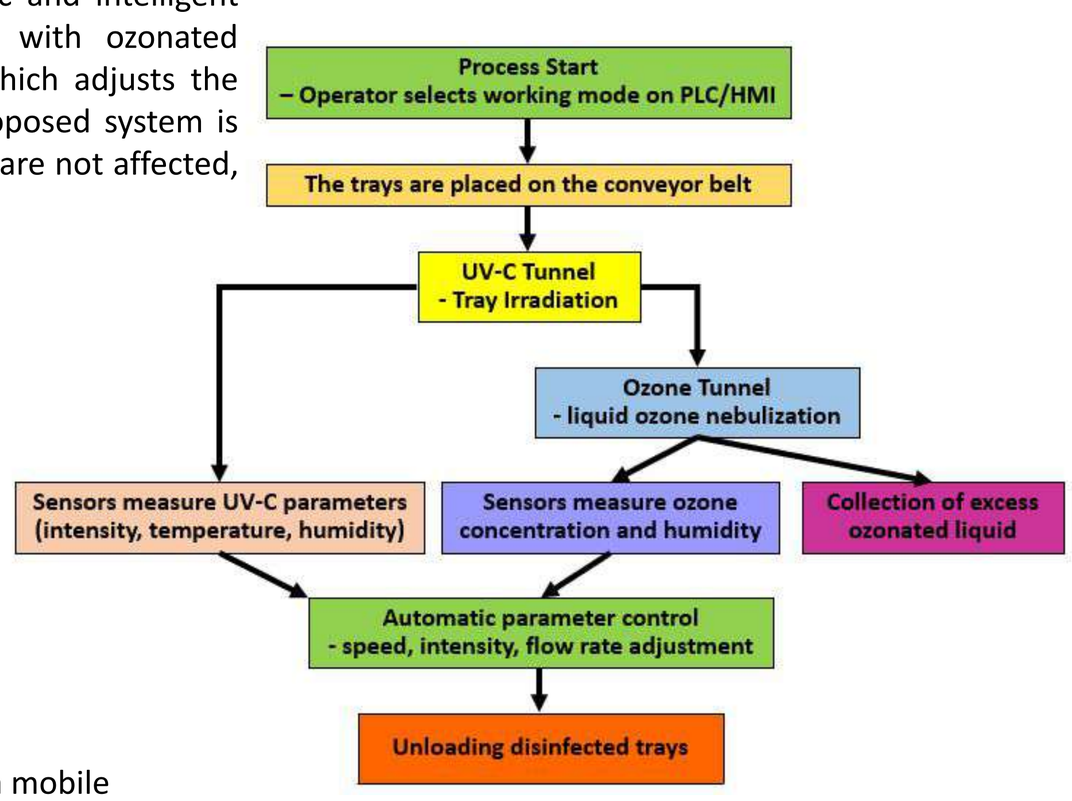

Fig.2 - Operating Logic Diagram

COMPONENTS / IMPLEMENTATION:

The continuous flow disinfection system for trays sown with microplants is designed as a mobile continuous flow equipment, intended for integration into the production flows of vertical farming systems.

The equipment allows continuous movement of seeded trays through two successive treatment tunnels – one with UV-C radiation and one with liquid ozone mist – achieving complete, ecological and automatically controlled disinfection.

The system consists of the following main components: **mobile support frame (1); motorized transport system (2)** for moving the trays; **UV-C radiation treatment tunnel (3)**; **ozone treatment tunnel (4)** equipped with **generator (5)** and **liquid ozone solution distribution system (6); excess liquid collection system (7); process sensors (8)** for measuring temperature, humidity, UV-C intensity, ozone concentration and travel speed; **integrated control module and digital interface (9)** based on PLC / HMI for automatic parameter monitoring and adjustment; **disinfected tray unloading section (10).**

The **system operates continuously**, with the trays being moved successively through the UV-C tunnel **(3)** and the ozone tunnel **(4)**, the treatments being monitored and adjusted automatically according to the data transmitted by the sensors **(8).**

The system can operate in **three modes selectable** from the digital interface **(9)**: a) UV-C exclusive mode, b) ozone exclusive mode, c) UV-C + ozone combined mode, the controller **(9)** synchronizing the parameters for a complementary photonic-biological disinfection.

The system is **integrable in modular vertical farming infrastructures** and **can communicate via IoT protocol** with the control systems of the vertical farm, for the traceability of process parameters.

ACKNOWLEDGEMENT:

This project was funded by the Ministry of Research, Innovation and Digitalization through the project *"Intelligent plant growth systems in controlled environmental conditions"* – PN 23 04 01 04 – Ctr. 9N/01.01.2023.

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AUTONOMOUS LEAF-COLLECTION ROBOT, WITH AUTOMATIC UNLOADING SYSTEM AND PHOTOVOLTAIC-POWERED BASE AUTOMATIC CHARGING SYSTEM

Patent Application No. A-00314 / 2025

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ABSTRACT:

The invention refers to an autonomous robot for collecting leaves from outdoor environments, equipped with an autonomous navigation, detection and suction system, as well as a docking station equipped with photovoltaic panels for automatic loading and emptying of leaves.

DESCRIPTION:

Currently, in the field of autonomous robots for leaf collection or outdoor cleaning, various solutions have been proposed, but most of them have significant limitations in terms of energy autonomy, collection capacity, or automatic maintenance functionality.

The main ***disadvantages*** of existing solutions are that they are not specialized for autonomous leaf collection in outdoor environments, do not integrate a docking station with automatic unloading, or a sustainable energy replenishment system. Most existing solutions are either dependent on human intervention, are limited to use in indoor spaces, or lack the ability for intelligent autonomous navigation and an automated mechanism for emptying the collection container. They also do not use renewable energy sources, which limits operational autonomy and sustainability of operation.

The technical problem that the proposed solution solves is to create a ***fully autonomous*** leaf-collecting robot, equipped with an intelligent navigation system and a docking station equipped with photovoltaic panels, so as to allow fully autonomous and efficient cleaning of outdoor spaces, by automatically vacuuming, storing and unloading leaves, without human intervention, while ensuring energy sustainability and long-term operation.

The robot integrates LiDAR type detection and scanning sensors, SLAM algorithms and a centrifugal ventilation system for leaf collection. The docking station allows both automatic recharging of the robot's battery and the transfer of collected leaves to a 1000 litre tank.

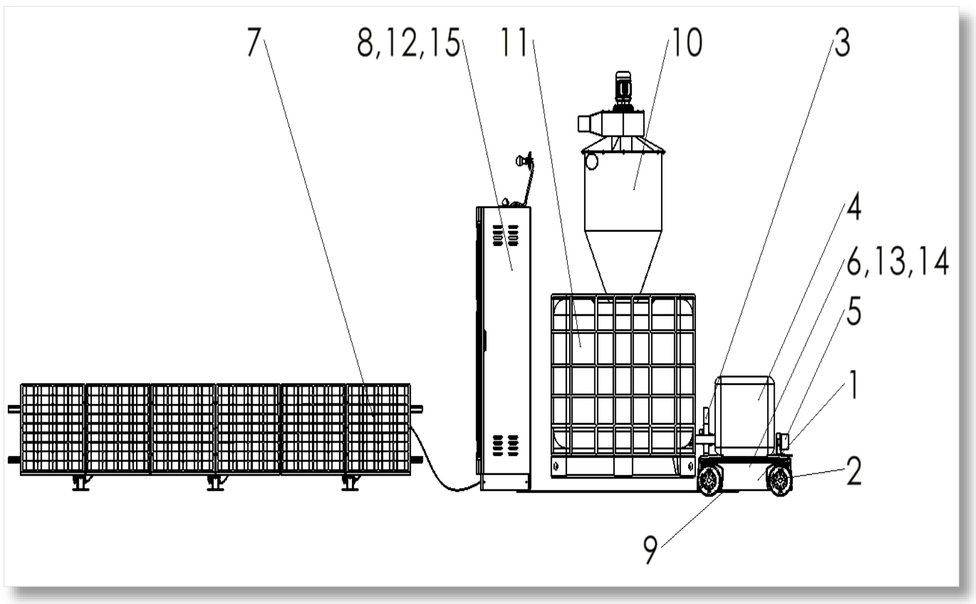

Fig.1 – side view

COMPONENTS & OPERATION:

The autonomous leaf-collecting robot with automatic unloading and automatic charging system at a photovoltaic-powered base charging system, is built on a mobile chassis (**1**), equipped with two electric motors with encoders (**2**), for differential propulsion, which allow precise movement in outdoor spaces. It is equipped with a centrifugal suction mechanism (**3**), capable of collecting leaves of various sizes and weights, including wet ones. The leaves are sucked and stored in a container (**4**), located on the robot body, which allows for quick and automatic emptying. Autonomous navigation is provided by a LiDAR detection and scanning sensor (**5**), which generates 3D maps and measures the distance to obstacles. All these components are connected to a central processor (**6**), which runs SLAM algorithms for autonomous navigation, obstacle avoidance and optimal route planning. When the container is full or the battery drops below a preset threshold, the robot moves autonomously to a fixed docking station, composed of photovoltaic panels (**7**), which ensure automatic recharging of the batteries in the control panel (**8**), a charging system by physical contact with metal plates of the robot battery (**9**), an extraction fan (**10**), which extracts the leaves from the robot and a 1000 litre IBC tank (**11**), where the extracted leaves are collected. The entire system is managed by a programmable logic controller (PLC) (12), which coordinates the detection, movement, suction, docking and automatic unloading functions.

For fully autonomous operation, the robot can be additionally equipped with: a GPS module (**13**) for global positioning and routing; a wireless module (**14**) for remote monitoring and control; a software platform (**15**), through which the user can program the routes, operating areas and frequency of the collection cycles.

Throughout its operation, the robot uses a **LiDAR type sensor** (**5**) to generate 3D maps and detect obstacles in the environment, avoiding collisions by adjusting the route in real time. All data is processed in real time by the central processor (**6**), which runs SLAM algorithms for autonomous navigation, optimal route planning and returning to the station when:

- ❑ the container 4 reaches its maximum filling capacity;
- ❑ the mobile chassis battery level drops below a safe threshold.

At the end of the cycle, or when one of the return conditions occurs, the robot moves autonomously to the **docking station.**

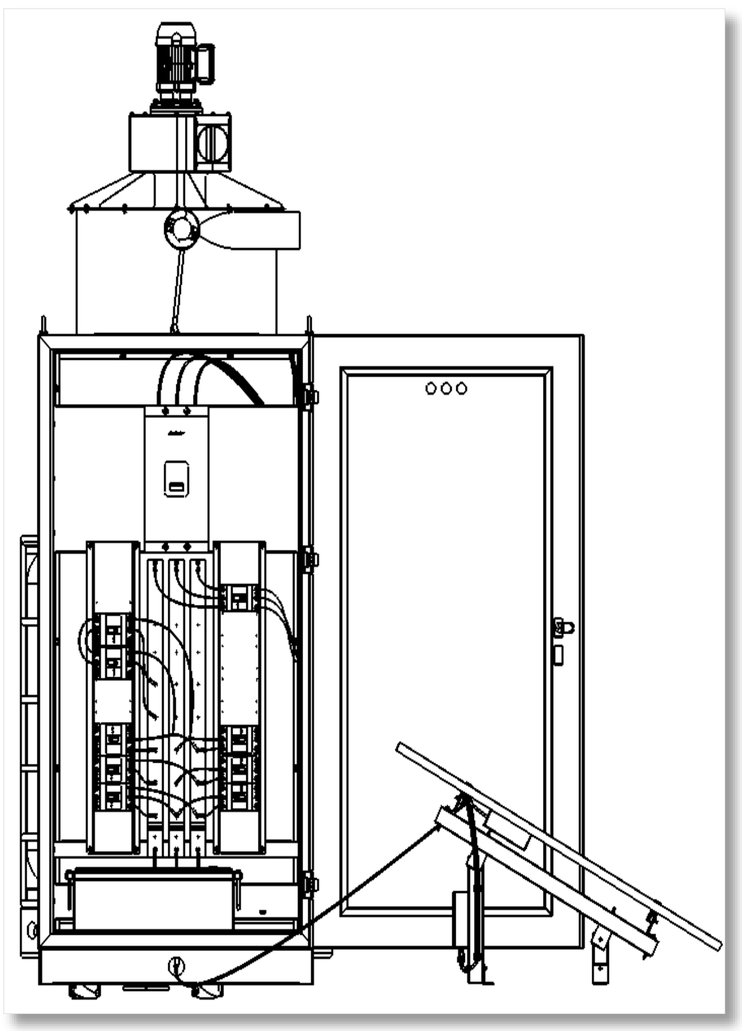

Fig.2 – rear view

CONCLUSIONS / ADVANTAGES:

- ❑ Thanks to the integration of all these components, the robot is able to operate in a completely autonomous mode, optimize energy resources and reduce human effort for the maintenance of urban or industrial green spaces.

ACKNOWLEDGEMENT:

This project was supported by the Ministry of Research, Innovation and Digitalization through “Nucleu” Project no. ***9N / 01.01.2023: "Multidisciplinary research in the field of digital agriculture for economic competitiveness and sustainable development, in the context of climate change Sustain-Digi-Agri", Project PN 23 04 01 02: "Intelligent automatic system for georeferenced soil sampling".***

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PIVOTING MOWER WITH TRIAXIAL DISPLACEMENT OF THE CUTTING ROTOR

Patent Application No. A-00296 / 2025

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ABSTRACT:

The invention refers to a pivoting mower with a triaxial movement system of the cutting rotor, intended for performing mowing work near the trunk of trees, under the crowns of trees in maintained fruit plantations.

DESCRIPTION:

The disadvantages of mowers known to date consist of the following:

- ❑ the movement of the mower for mowing under the tree crowns is done only in the horizontal plane, on two axes, which, in the event of unevenness or differences in level, can lead to the destruction of the mower blades, through the contact of the blades with the ground;
- ❑ it does not ensure mowing the grass at the same height.

The technical problem that the proposed solution solves consists of creating a pivoting mower with the possibility of moving on the three axes, Ox, Oy, Oz, which would achieve, in addition to mowing in areas inaccessible to the central mower, maintaining the grass cutting level, through a system with a cylindrical joint that ensures movement on the Ox, Oy axes, combined with a deformable parallelogram system, which ensures movement on the Oz axis, thus modifying the rotor position in the vertical plane, for copying the terrain and protecting the blades.

COMPONENTS & OPERATION:

The pivoting mower with triaxial movement of the cutting rotor consists of a cylindrical joint (**1**), around which the lever (**2**) rotates, at the end of which the hydraulic cylinder is attached, with which the mower rotates in the horizontal plane, a parallelogram system made up of two side plates (**3**), two arms (**4**), welded at the ends to some bushings (**6**), two plates (**5**), between which the arms (**4**) are attached, with the help of bolts (**7**), a housing (**8**), in which a rotor with articulated knives (**9**) is mounted, having a spherical joint at the bottom, unmarked, and on the housing there is a support (**10**), on which the rotating hydraulic motor that drives the rotor with knives is attached.

The mower's hydraulic system is coupled to the tractor's hydraulic system, by means of quick-coupling valves, unmarked in the drawing.

To start the CPT pivoting mower with triaxial movement of the cutting rotor, the first section of the electro-hydraulic distributor DH is activated from a CD control box, mounted inside the tractor, by pressing the ON/OFF button, ensuring the power supply and starting of the rotary hydraulic motor (**1**), which, in turn, drives the rotor with articulated knives (**2**). To position the pivoting mower between the trees in a row, the second ON/OFF button is activated from the CD control box, located in the tractor, which sends the signal to the second section of the distributor, via electrical cables, which controls the hydraulic cylinder CH. The pivoting mower performs mowing between trees one by one, moving horizontally on two axes, Ox and Oy, rotating around the cylindrical joint (**3**), to bypass the tree trunk, the movement being ensured by the hydraulic cylinder CH, but also in the vertical plane, in the Oz direction, to follow the unevenness of the terrain.

The movement in the vertical plane is ensured by means of a deformable parallelogram formed by two arms (**4**), articulated by means of bolts (**5**) to the plates (**6**), a construction that ensures the parallel plane movement in the vertical direction of the rotor.

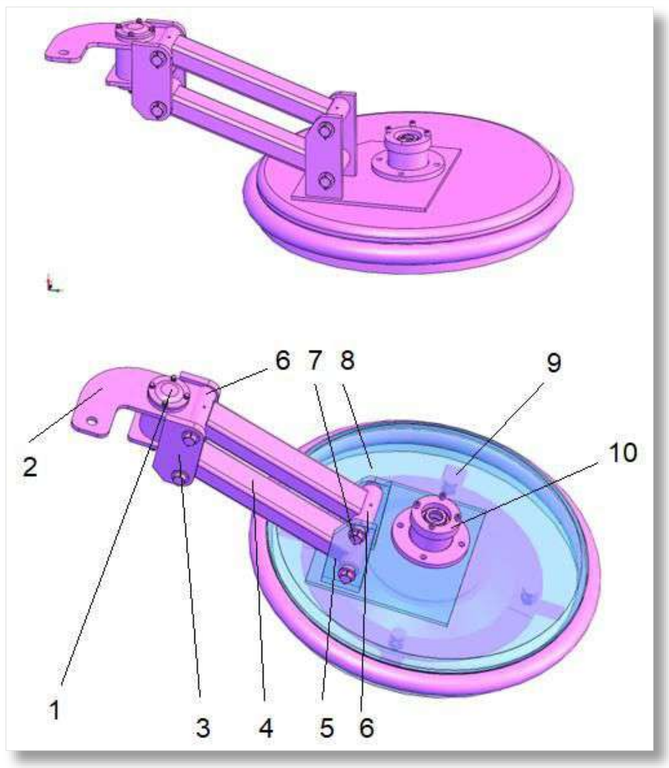

Fig.1 - Pivoting mower with triaxial displacement of the cutting rotor

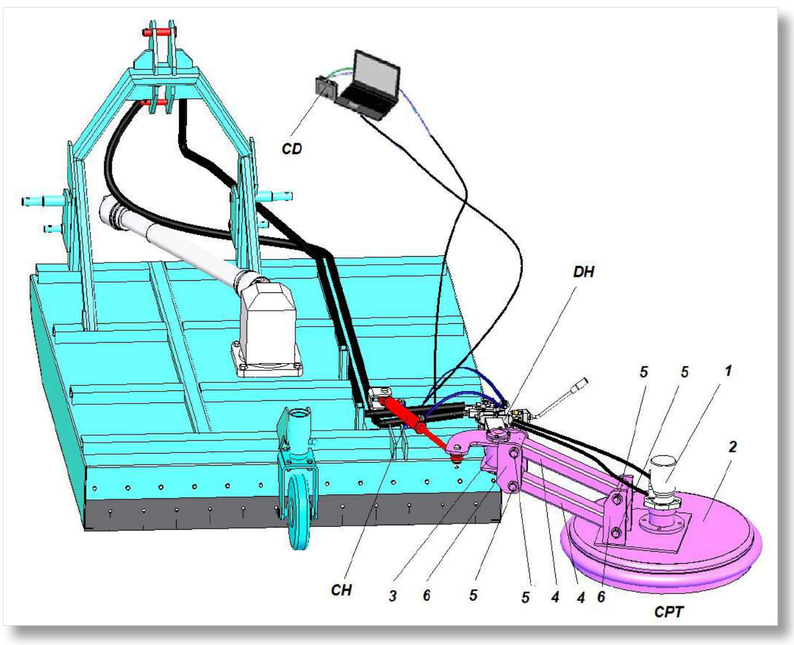

Fig.2 - Combined mowing equipment for fruit orchards

ADVANTAGES:

The main advantages of using a pivoting mower with triaxial movement of the cutting rotor are:

- ❑ copying the terrain by moving in a vertical plane using the deformable parallelogram and protecting the knives;
- ❑ mowing under the crown of trees by pivoting around the cylindrical joint as well as protecting the trunk of fruit trees and, implicitly, by retracting the mower when in contact with the trunk, contributing to protecting the trunk and increasing the production and quality of fruits;
- ❑ carrying out mowing and mulching work, according to current requirements for maintaining grass cover, excluding or limiting soil mobilization work, with implications for the optimal development of the fruit plantation and fruit production.

ACKNOWLEDGEMENT:

This project was supported by the Ministry of Research, Innovation and Digitalization through the Nucleu Project no.***9N / 01.01.2023: "Multidisciplinary research in the field of digital agriculture for economic competitiveness and sustainable development, in the context of climate change Sustain-Digi-Agri", Project PN 23 04 02 03: "Innovative technology for grassing the interval between rows of vines and fruit trees to avoid soil structure degradation"***

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ROTATING MICROGREENHOUSE WITH AUTOMATIC NUTRIENT DELIVERY AND ZONAL DISTRIBUTION

Patent Application No. A-00154 / 2025

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VOICEA Iulian-Florin, TĂBĂRAȘU Ana-Maria

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ABSTRACT:

The invention refers to the field of Controlled Environment Agriculture (CEA) and, more specifically, to advanced hydroponic systems and automated plant cultivation technologies, and presents an innovative, high-performance solution of a research equipment for the optimal growth of vegetables on a small scale, in a rotating environment.

DESCRIPTION:

The existing systems have a number of drawbacks, relying on rudimentary methods such as submerging plant trays or containers in a bath of nutrient solution, which leads to several significant limitations:

- **Uneven watering** and nutrient distribution;
- **Root zone problems** due to prolonged submersion or excessive moisture;
- ***Lack of precision in nutrient delivery***: Traditional methods often lack the ability to precisely control nutrient dosage, making it difficult to optimize nutrient delivery based on specific plant needs or growth stages;
- ***Inability to adapt to specific plant needs***: Existing rotary systems typically do not allow for adjustments in nutrient delivery based on individual plant characteristics such as age, size, species or specific nutrient requirements;
- ***Limited control over environmental factors***: Many existing systems do not integrate full environmental control features such as temperature, humidity and light intensity regulation, further limiting their ability to create an ideal growing environment;
- ***Static nutrient formulations***: Current systems generally use a single nutrient solution for all plants, regardless of their individual needs. This “one size fits all” approach does not take into account the varying nutrient requirements of different plant species.

The present invention addresses the above issues by designing a system that overcomes these limitations by delivering precise and controlled doses of nutrient solution directly to each plant in a rotating environment, simultaneously minimizing waste, preventing oversaturation and adapting to the individual needs of the plant.

COMPONENTS*:*

The microgreenhouse is made on the basis of an electromechanical construction, consisting of a mobile base (**1**) with a set of wheels (**2**), a central cabinet (**3**) supporting a tub (**8**) and some supports with guide rollers (**9**) and (**10**), which support and drive a rotating polygonal drum (**11**), with 2 sets of vegetable pots (**15**). The system is built in such a way as to develop commands for sequential rotation with a precise angular value, so that each set of pots (**15**) reaches with the central part exactly in a vertical direction with respect to each set of injectors (**23**) and (**24**) with nozzles (**25**) to allow the injection of the nutrient solution into the centre of each pot (**15**), by moving the vertical slide with linear positioning (**28**), which supports the system (**18**) for the delivery of nutrients. The equipment contains an electrical panel with a programmable controller (**38**) that controls the rotation of the rotating drum (**11**) by means of the electric motor (**12**) and the worm gear (**13**), controls the movement of the vertical slide with linear positioning (**28**) driven by the step-by-step electric motor (**29**), to allow the injectors (**15**), together with the nozzles (**25**), to penetrate the centre of the pots (**15**) and inject the amount of fertilizer supplied by the peristaltic pump (**33**), regulates the operation of the peristaltic pump (**33**) to establish the amount of nutrient solution depending on the type of plant, the growth stage, the desired concentration of nutrients, etc., the controller also manages the operation of the T8 LED tube (**37**).

The rotating drum (**11**) has each row of holes offset by ½ linear step from the previous row to allow for economical placement of plant pots (**15**) and, for this reason, two sets of injectors (**23**) and (**24**) with nozzles (**25**) are required which are mounted on separate pipes (**20**), (**21**) connected to flexible pipes (**31**), (**32**) to separately supply nutrients to each row of plants. The peristaltic pump (**33**) has a two-way distributor to send the nutrient solution to the two distribution branches.

The pots (**15**) contain a soilless hydroponic growing medium (**35**) (a mixture of coconut, perlite and vermiculite), providing support for the plant roots and hydrogel granules (**36**) which absorb and retain a significant amount of water, slowly releasing it to the plant roots.

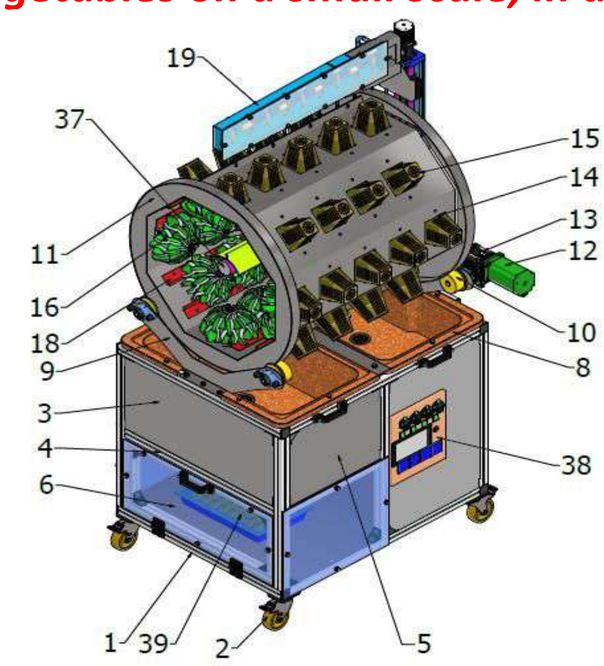


Fig.1 - front view of the rotating microgreenhouse

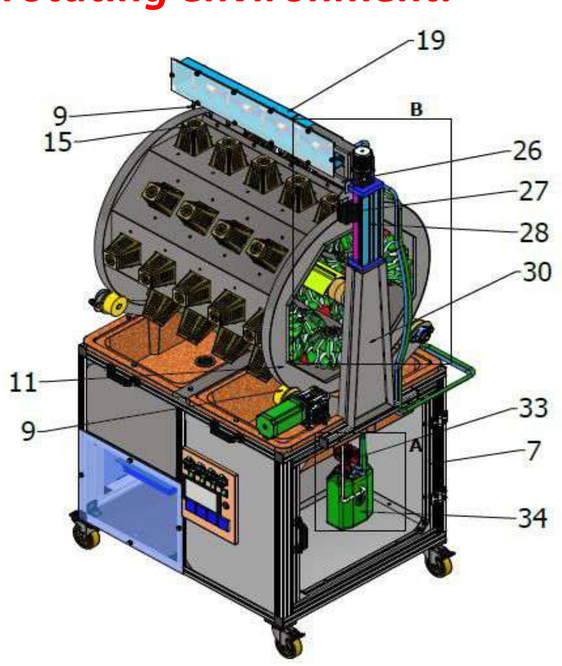
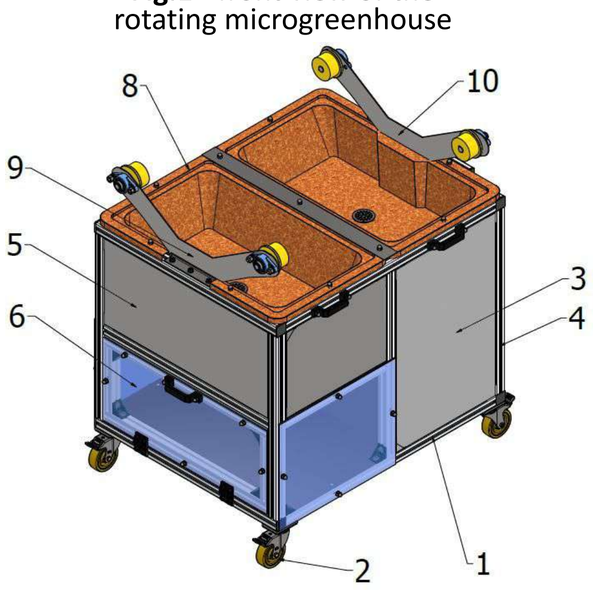
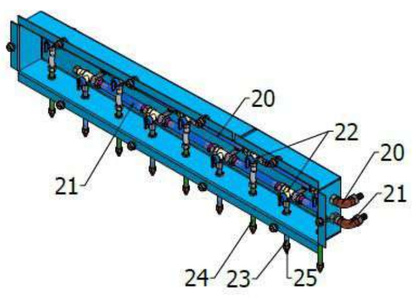


Fig.2 - rear view of the rotating microgreenhouse





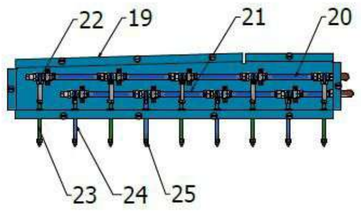


Fig.5 - nutrient delivery system and zonal arrangement of nozzles

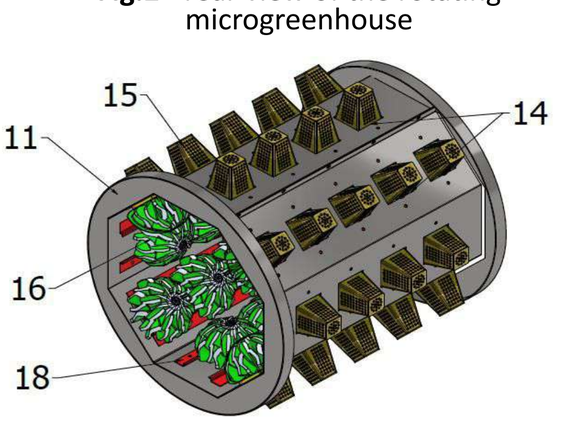


Fig.4 - Rotating polygonal drum

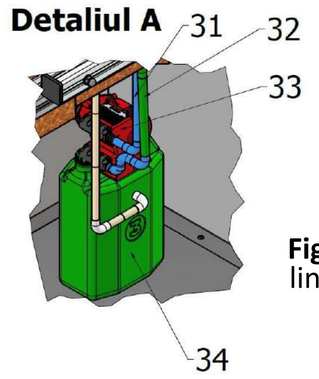


Fig.6 - detail A - fertilizer tank and peristaltic pump

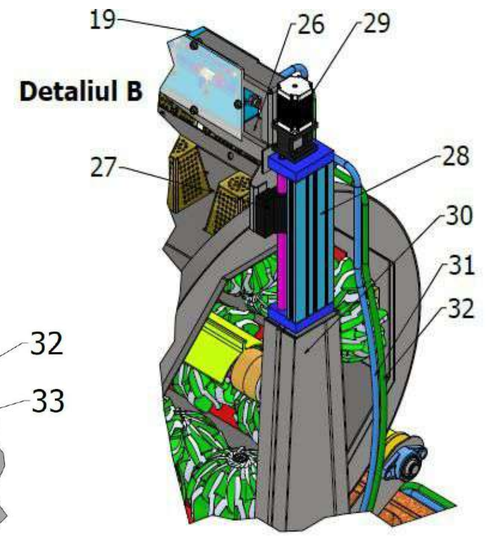


Fig.7 - detail B - vertical sled, with linear positioning, supporting the nutrient delivery system

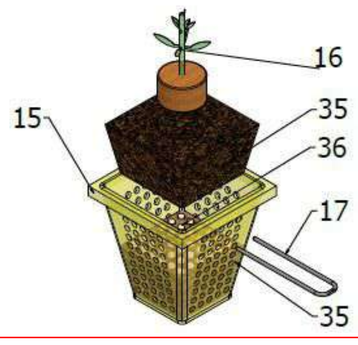


Fig.8 - components of a seedling pot

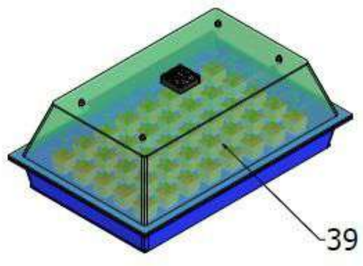


Fig.9 - equipment for seed germination and primary seedling growth

CONCLUSIONS / ADVANTAGES:

- **Precise and controlled nutrient delivery**, using a high-precision peristaltic pump;
- **Automatic operation**, through a programmable controller that automates the entire process;
- **Adjustable nutrient dosage**, based on factors such as: plant age, size, species, environmental conditions;
- **Zonal distribution**: the two sets of nozzles allow for zonal distribution, allowing different solutions or nutrient concentrations to be delivered to different groups of plants within the same rotating drum;
- **Efficient use of resources**: precise nutrient delivery, combined with the use of hydrogel granules and optional recycling of excess solution, minimizes water and fertilizer waste;
- **Remote control and monitoring**: The system can be integrated with a network connection;
- **Versatility**: the adaptability of the system makes it suitable for a wide range of applications, including home gardening, commercial crop production, research and education.

ACKNOWLEDGEMENT:

This work was supported by the Romanian Ministry of Research Innovation and Digitalization, through the project *“Intelligent plant growth systems under controlled environmental conditions” – PN 23 04 01 04– Ctr. 9N/01.01.2023.*

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HIGH-EFFICIENCY MULTILAYER FILTRATION SYSTEM WITH AUTOMATIC CLEANING AND BACKWASHING FOR AQUAPONICS

Patent Application No. A-00140 / 2025

VOICEA Iulian, OLAN Mihai, VLĂDUȚ Valentin, NENCIU Florin, OPRESCU Remus

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ABSTRACT:

The invention refers to an aquaponics system and, in particular, to an integrated filtration equipment that purifies water, efficiently circulates nutrients, and minimizes maintenance through an automation system for fish culture and farming. The invention solves the problems of existing aquaponics systems, such as poor filtration, clogging, maintenance difficulties, and excessive energy consumption, and contributes to building a more stable and efficient aquaponics system.

DESCRIPTION:

The system presents a multi-layer filtration equipment for purifying water and nutrients circulating in an aquaponic system, which integrates automatic cleaning and backwashing functions to minimize maintenance and maximize system efficiency and stability. The invention can be applied in various environments, from small-scale aquaponic systems for domestic use to large-scale commercial systems, and can contribute to the development of sustainable agricultural methods.

At its core technology, the hydroponic systems are circulatory systems in which plants absorb nutrients from fish waste and purified water is returned to the fish, using various filtration methods, but in general, the methods used within the ***existing solutions on the market*** have the following ***disadvantages***:

1. **Sponge filters** - low filtration efficiency: frequent clogging, limited filtration;
2. **Sand/Gravel Filters** - Limitations on Fine Particle Removal: Sand and gravel are effective in filtering relatively large particles, but have limitations in removing fine particles;
3. **Drum Filters** - High Cost and Energy Consumption: Drum filters are easy to maintain as they have a self-cleaning function, but they are expensive to install and consume a lot of energy;
4. **Bead Filters** - Clogging and Backwashing Problems: Bead filters also become clogged over time and require backwashing. Beneficial bacteria can be lost during the backwashing process, and regular maintenance is required to maintain the performance of the bead filter.

The technical problem solved by the invention is to perform staged filtration, using filter plates with different densities and surfaces, to utilize gravity flow, and to increase energy efficiency through an automated system.

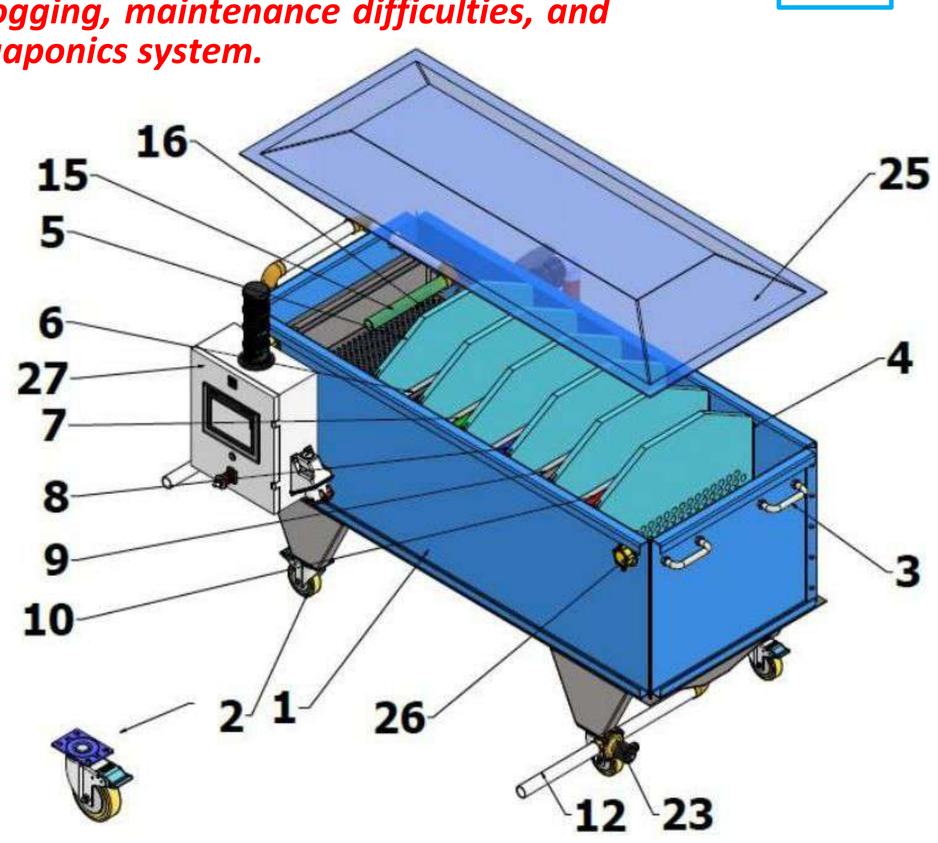

Fig.1 - Front view - perspective

COMPONENTS:

The high-efficiency, self-cleaning, backwash multi-layer filtration system for aquaponics comprises: a housing **(1)** made of a corrosion-resistant material; vertical guides (**4**) installed inside the above housing (**1**); a separator plate (**5**) mounted on the above vertical guide (**4**) and having at its end a guide channel and a series of holes through which the filtered water can pass; a set of filter plates (**6, 7, 8, 9, 10**) having different densities and surfaces arranged vertically in the space between the above separator plates (**5**); a set of grids (**11**) maintaining a uniform distance of 2 cm between the filter plates to induce laminar flow and minimize clogging; a pump (**13**) for supplying water to the above filtration device; a discharge tank (**21**) located in the lower part of the above housing (**1**) and connected to an electronic valve (**23**) through a pipe (**22**); water level sensors (**26**) that detect the water level in the above discharge tank (**21**) and control the electronic valve (**23**); an electrical panel (**27**) that receives a signal from the water level sensor (**26**) and controls the pump (**13**) and the electronic valve (**23**); a multilayer filtration device characterized by the inclusion of an automatic backwash function that operates the pump (**13**) in the reverse direction and removes contaminants accumulated on the filter plate (**6, 7, 8, 9, 10**) through the solenoid valve (**23**). The filter plate sets (**6, 7, 8, 9, 10**) - made of polypropylene (**PP**) material - have an area ranging from 190 m^2/m^3 to 500 m^2/m^3 and are arranged in order of density from lowest to highest density. The electrical panel (**27**) includes a function for performing automatic backwashing according to a set time interval or a detection result of the water level sensor (**26**). The electrical control panel additionally includes a function for monitoring the system status in real time and controlling it remotely via a smartphone application or web interface.

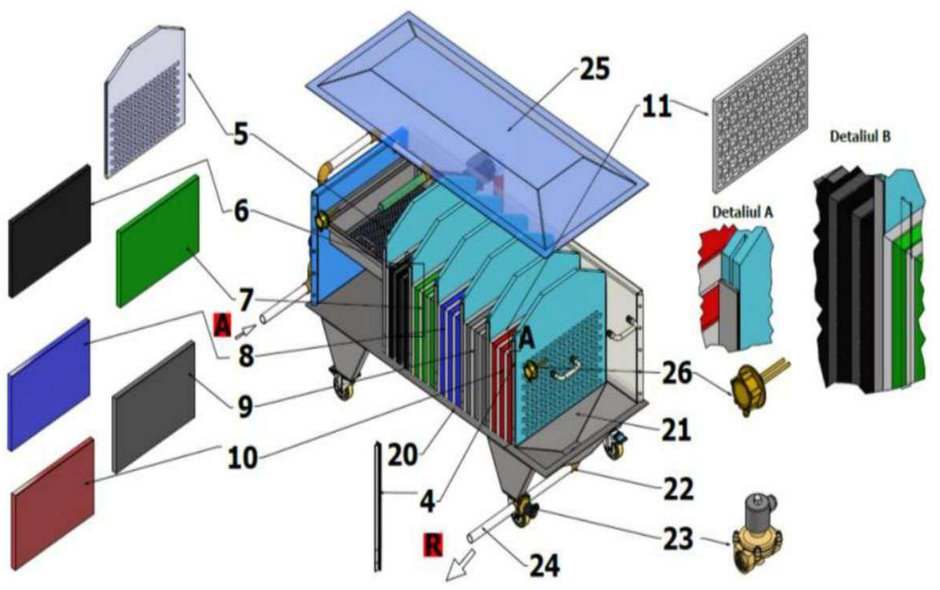

Fig.2 - Perspective view - exploded

ADVANTAGES:

1). Exceptional filtration efficiency – by using progressive filter surfaces, organic matter is better dissolved than in conventional filters, reducing the production of eddies in the water by over 90%. This provides a healthy environment for both fish and plants;

- Removes over 95% of total suspended solids (TSS) and increases light transmission, enhancing the photosynthetic efficiency of plants;
- Ammonia removal efficiency of over 80%;

2). Clogging prevention and long-term stable performance (>1 year): Laminar flow induction design, optimized filter plate arrangement and automatic backwash function reduce clogging;

3). Ease of maintenance: Cleaning time reduced by over 50% as well as easy cleaning / replacement, reducing maintenance costs;

4). Increased user comfort through automatic water level control system + WiFi / web app remote monitoring and control;

5). Increased energy efficiency - Energy savings of up to 30%, through the use of low-power pump and components;

6). High scalability and flexibility, thanks to the modular design, which allows easy adjustment of the capacity of the filter unit.

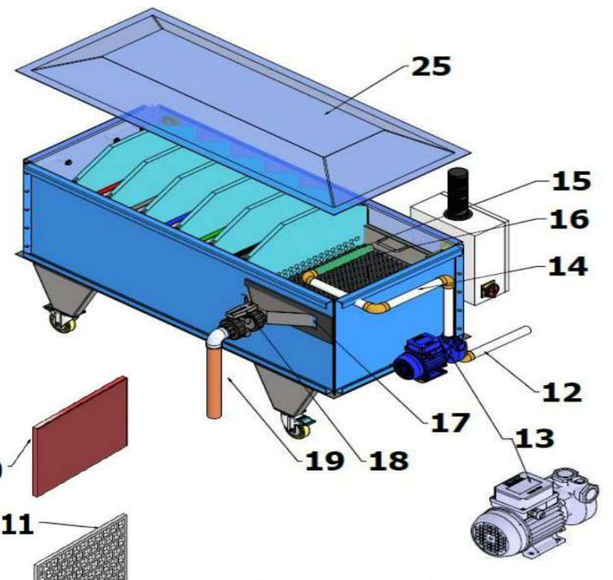

Fig.3 - perspective rear view

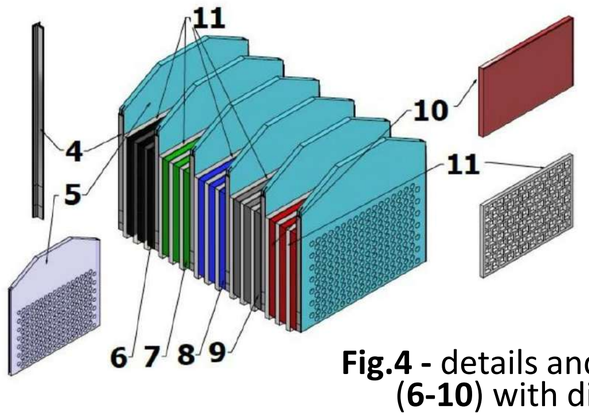

Fig.4 - details and arrangement of filter plates (**6-10**) with different densities and surfaces

ACKNOWLEDGEMENT:

This project was supported by the Ministry of Agriculture and Rural Development of Romania, through the Financing Contract: No. ADER 25.2.2 / 18.07.2023: "*Vertical aquaponic farm adapted to current climate change*"

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SEMI-AUTOMATIC MACHINE FOR TRANSPLANTING VEGETABLE SEEDLINGS ON TWO ROWS

Patent Application No. A-00032 / 2025

VOICEA Iulian, VLĂDUȚ Valentin, OLAN Mihai, MATACHE Mihai

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ABSTRACT:

The invention presents an innovative, high-performance solution of a semi-automatic machine for transplanting vegetable seedlings on two rows, with improved handling of seedlings and planting capacity, with high precision.

DESCRIPTION:

The current methods for transplanting vegetable seedlings often involve manual labour, which requires time and physical effort, and can lead to inconsistencies in planting depth and distance. Existing mechanical transplanters can be complex, expensive or lack the precision needed for delicate seedlings. There are some automated systems, but they often require significant infrastructure and are not suitable for small and medium-sized farms. What is needed is a cost-effective, semi-automated solution that can improve transplanting efficiency and accuracy while reducing reliance on manual labour. Current solutions often lack the ability to handle seedlings in organic cubes with a semi-automated process, requiring manual placement of each seedling into the planting mechanism. This invention addresses these limitations by providing a semi-automated system that is both efficient and accurate.

The technical problem solved by this invention lies in the design of a semi-automated system that can reduce labour costs, improve planting accuracy, and efficiently handle seedlings in organic cubes. Specific technical challenges include the need for a reliable mechanism to place seedlings in the soil at a constant depth and distance and to do so in a two-row configuration, all while maintaining the integrity of the seedling and this organic cube.

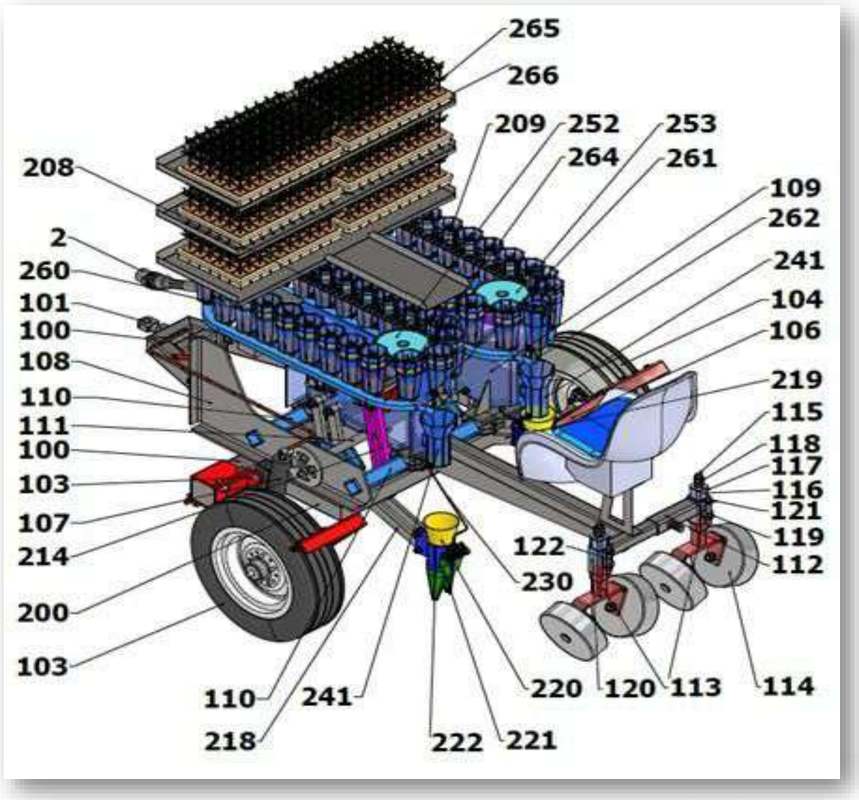

Fig.1 – back-view

COMPONENTS:

The machine is made up of several ***subsystems and components***, as follows:

-a metal frame (**100**) having a metal structure (**102**), the metal frame (**100**) is coupled to the tiller (**1**) by means of a joint (**101**) and the cardan shaft (**2**), and the metal structure (**102**) allows the mounting on the sides of two wheels (**103**) and (**104**) each having an articulated metal support (**105**) and (**106**) which are adjusted by means of hydraulic cylinders (**107**) which allow the modification of the working height of the equipment, the machine for transplanting seedlings having as its component a ***Power Transmission Subsystem - STP***, for taking power from a tiller (**1**) and transmitting it to a mechanism with articulated levers (**218**) and (**219**) and for driving the Gall chain transmissions with attachments (**208**) and (**209**) supporting the seedling feeding buckets, a ***Seedling Digging Subsystem –SSG***, which consists of articulated lever mechanisms (**218**) and (**219**) that support buckets (**220**) containing two articulated alveoli (**221**) and (**222**), which will create the holes for planting seedlings; a ***Seedling Feeding Subsystem –SAR***, which consists of two transport systems (**250**) and (**251**) with two Gall chain transmissions with attachments (**208**) and (**209**) that will support the seedling feeding and transport buckets (**261**); a ***Subsystem for Adjusting the Distance between Rows - SRD***, which is made with the help of the screw-nut transmission (**111**) that will move the wall of the housing (**109**) on the guides (**110**), which is then blocked with the rectangular clamps (**124**), it is also necessary to move the pressure rollers according to the distance established between the rows by axially moving the mobile support (**127**) relative to the fixed support (**126**) and a ***Subsystem for Adjusting the Working Height of the Seedlings -SRI*** respectively, which is made by controlling the hydraulic cylinders (**107**), which will act on the articulated metal supports (**105**) and (**106**) that support the side wheels (**103**) and (**104**). For different widths of the planting soils, it is also necessary to move the articulated supports (**105**) and (**106**) on the horizontal crossbar of the metal frame (**100**). To change the distance between nests in a row, the ratio of the Gall chain drive gears (**204**) and (**205**) will be changed. The ***Power Transmission Subsystem –STP*** is the source of mechanical energy for the ***Seedling Feeding Subsystem – SAR*** and the ***Seedling Digging Subsystem –SSG***, which takes the seedlings from the ***SAR*** subsystem and automatically moves them for planting.

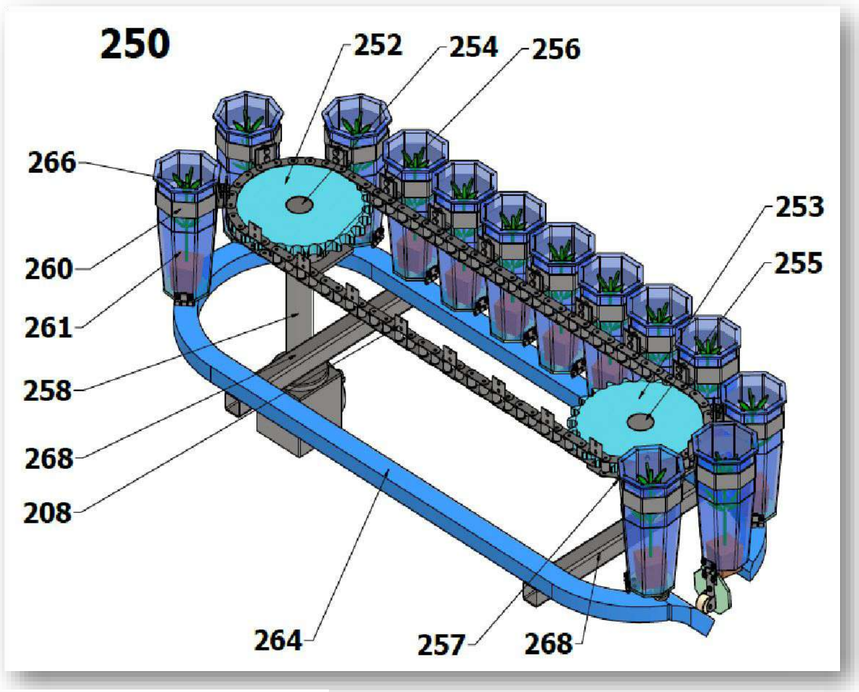

Fig.2 – side-view of the mechanical seedling feeding system

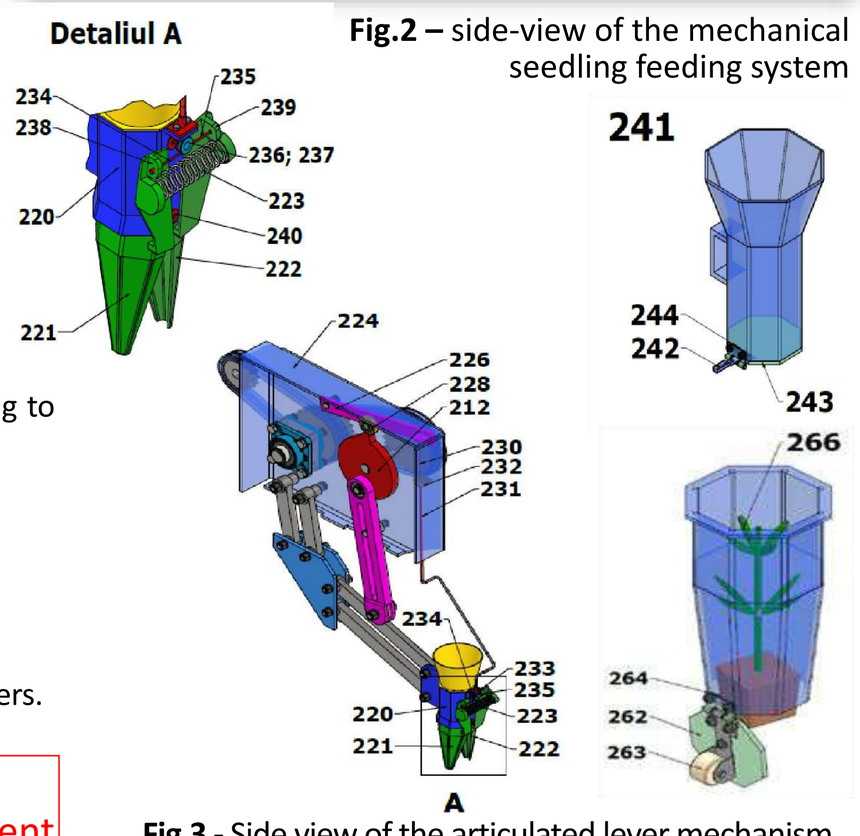

Fig.3 - Side view of the articulated lever mechanism, Detail A showing the construction of the seedling planting cup and the intermediate and planting cups

ADVANTAGES:

- ❑ significantly reduces the labour required for transplanting, by automating the seedling transfer and planting process;
- ❑ being semi-automated, it allows for precise placement of seedlings, ensuring consistent depth and spacing, leading to better crop yields;
- ❑ the machine's ability to handle seedlings in organic cubes simplifies the process and reduces transplant shock;
- ❑ the two-row configuration increases efficiency, by planting two rows simultaneously;
- ❑ mechanical synchronization of all operations ensures a smooth and consistent planting process;
- ❑ the adjustable spacing between rows and seedlings allows flexibility in planting different types of vegetables;
- ❑ the machine is designed to be driven by a standard walk-behind tractor, making it accessible to a wide range of farmers.

ACKNOWLEDGEMENT:

This project was supported by the Ministry of Agriculture and Rural Development through the ***ADER Project #25.1.2 / 2023: "Innovative Technology for Minimum Tillage of Agricultural Land Adapted to Current Climate Change"***

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DEVICE FOR PRECISION APPLICATION OF GRANULAR FERTILIZERS IN STRIP-TILLAGE

Patent Application No. A-00653 / 2025

MANEA Dragoș, MARIN Eugen

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ABSTRACT:

The invention relates to a device for the precise application of granular fertilizers together with soil cultivation in narrow strips, intended for agricultural equipment that performs conservative soil cultivation and in particular for strip-till technology, which combines localized soil loosening with fertilizer application before sowing.

DESCRIPTION:

The ***Strip-Till*** technology consists of working only the strip of soil on which the seeds are sown. The advantages of this technology are: soil compaction is considerably reduced; the soil is protected, because the stubble left over from the previous harvest blocks the sun's rays; at the same time, evapotranspiration is considerably reduced, so that the water in the superficial layers is preserved much better; the plant residues left in place rot and return much of the organic matter they took from the soil, which makes the need for additional fertilizers decrease considerably; at the same time, in the shelter offered by the plant residues, the bacteria in the soil develop better and thus, the soil becomes looser and richer in nutrients.

In agricultural practice, the application of granular fertilizers is usually carried out at the same time as sowing, by using special coulters, which apply the fertilizer at a greater depth than the sown row and at a lateral distance from it, according to agrotechnical requirements.

The disadvantages of the existing technical solutions for applying granular fertilizer are: they cannot apply granular fertilizer at two working depths at the same time and at different distances from the seed row; they cannot be attached to equipment for working and fertilizing the soil in strips.

The technical problem solved by this invention consists in creating a constructively simple device that can precisely apply granular fertilizer at two working depths simultaneously and at two different distances from the row of seeds sown subsequently and that can be easily attached to strip-till equipment with fertilization.

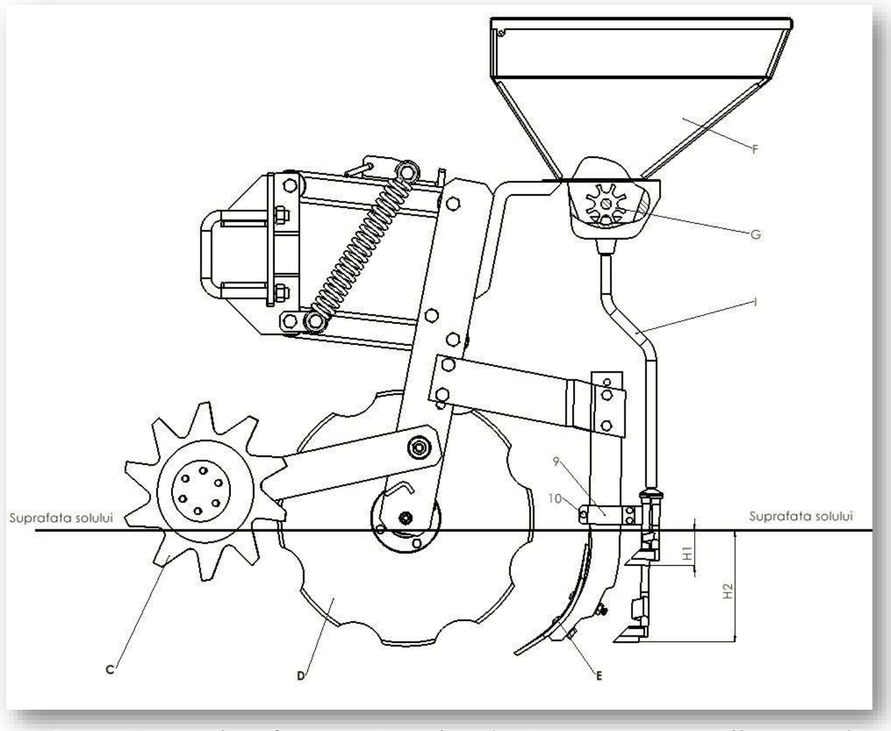


Fig.1 - Example of mounting the device on a strip tillage and fertilizing equipment – SIDE VIEW

COMPONENTS:

The device for the precise application of granular fertilizers when working the soil in strips, according to an embodiment, is a welded construction, consisting of a fertilizer distribution head (**1**), two round pipes (**2**) curved at angles *alpha* in a vertical plane, two round pipes (**3**), also curved at the same angles *alpha* in the same vertical plane and shorter than the pipes (**1**), the coulters (**4**) welded to the lower ends of the pipes (**2**) and (**3**), cutting edges (**5**) welded to the pipes (**2**), cutting edges (**6**) welded to the pipes (**3**), a piece (**7**) for attaching the device to the support of the chisel-type soil loosening organ and another piece (**8**) for stiffening the pipes (**2**) at the bottom.

The distribution head (**1**) of frustoconical shape consists of a cover (**a**) provided with a spigot (**b**) at the top, a frustoconical body (**c**) in which four vertical holes are drilled in connection with four vertical tubes (**d**) and some ribs (**e**) arranged radially on the surface of the body (**c**) and which separate the fertilizer flow into four equal parts.

The component elements of the device for the precise application of fertilizers when working the soil in strips are located symmetrically with respect to a vertical plane parallel to the direction of movement of the soil-working equipment in operation. Thus, the axis of the coulters (**4**) welded on the pipes (**3**) is at the same distance (**x**) from the vertical plane, and the axis of the coulters (**4**) welded on the pipes (**2**) is at the same distance (**y**) from the vertical plane.

The device for the precise application of granular fertilizers when working the soil in strips is easily mounted or dismantled on, or from, the support of the soil chisel-type element (**E**), by means of semi-flanges (**9**) and screw-nut type assembly elements (**10**).

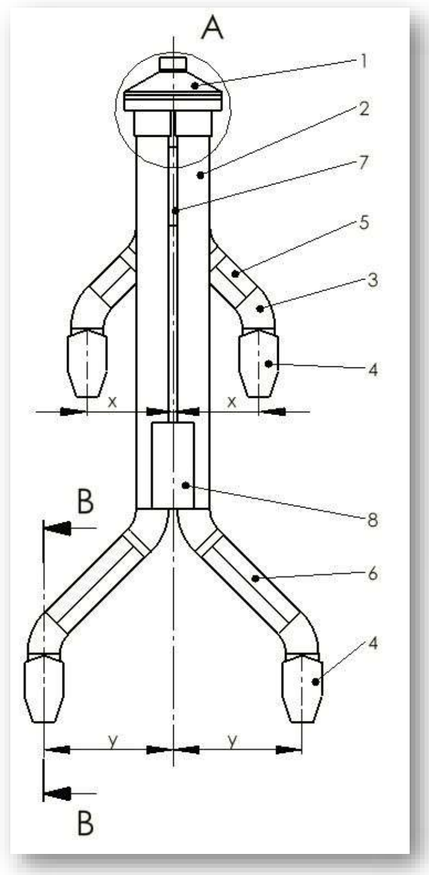


Fig.2 – Front View

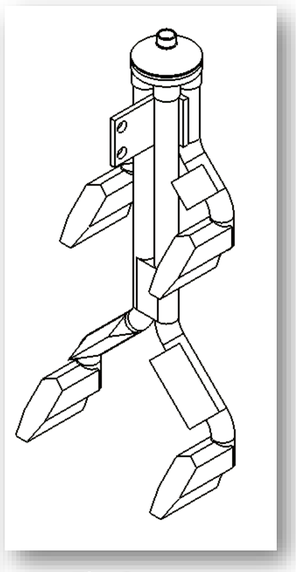
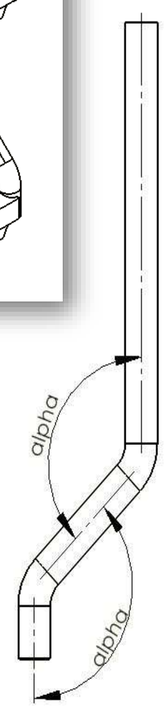


Fig.3 – Perspective View



Frontal view of Pipe (**2**)

OPERATING PRINCIPLE:

The fertilizer is applied to the soil both at two depth levels H_1 and H_2, and bilaterally, at distances **x** and **y** from the row of seeds that will be sown later. By placing the fertilizer in the soil in this way, the plants will benefit from the fertilizer both in the early stages of development, when the root system will reach the fertilizer applied at depth H_1, and in the advanced stages of development when the root system will reach the fertilizer applied at depth H_2.

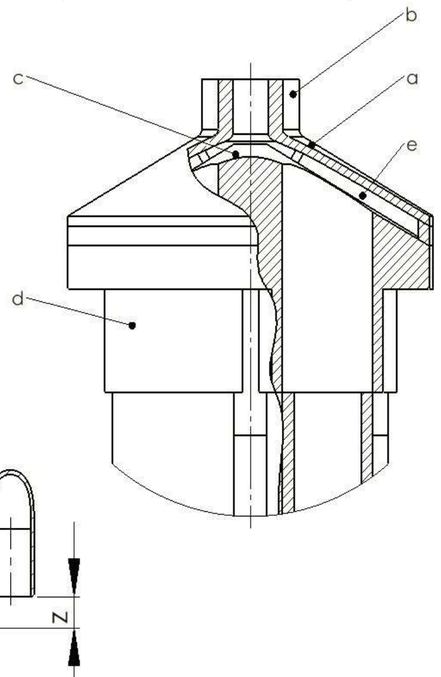


Fig.4 - B-B section through the coulter

Fig.5 - detail A of the distribution head

ADVANTAGES:

- ❑ - has a simple construction, which allows adaptation to various types of soil loosening organs of strip-till equipment;
- ❑ - easy maintenance;
- ❑ - increased durability.

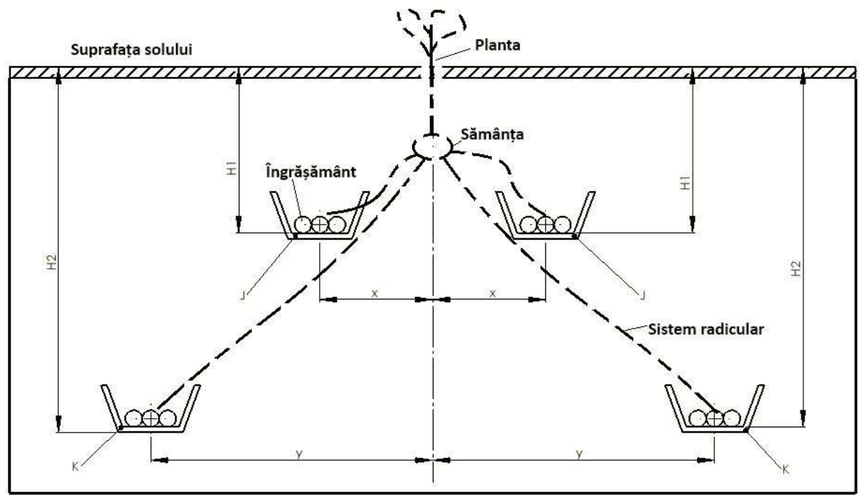


Fig.6 -the section of the soil strip, in a plane perpendicular to the direction of movement of the agricultural equipment

ACKNOWLEDGEMENT:

This project was supported by the Ministry of Agriculture and Rural Development through the ***ADER Project #25.1.2 / 2023: "Innovative Technology for Minimum Tillage of Agricultural Land Adapted to Current Climate Changes - TEHCONS"***

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TUNNEL-TYPE ROTARY EQUIPMENT, WITH INTERNAL PEDESTRIAN ACCESS, AQUAPONIC NUTRIENT CIRCUIT AND MULTISPECTRAL SYSTEM, THAT STIMULATES THE GROWTH OF FLOWERS AND VEGETABLES

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Patent Application No.: A-00652 / 2025

OLAN Mihai, VLĂDUȚ Valentin, MATACHE Mihai, CIUPERCĂ Radu, GĂGEANU Iuliana

ABSTRACT:

The invention falls within the technical field of advanced agricultural technologies (AgriTech) and mechanized engineering for intensive plant cultivation, consisting of a rotating tunnel-type equipment for plant cultivation, with internal pedestrian access and aquaponic nutrient circuit, intended for the intensive cultivation of low-height flowers and vegetables, making vertical farming possible in an autonomous and modular form.

The invention is applicable in horticulture, vertical farming and exhibition installations, offering increased yield, energy autonomy and an innovative multisensory experience.

DESCRIPTION:

The invention combines in a single structure the following elements: **a modular rotating drum, a closed aquaponic nutrient circuit, a multispectral lighting system, an acoustic stimulation system and an electronic control unit.**

The Rotating Tunnel System brings a series of **major technical and economic benefits** that overcome the limitations of known solutions from the state of the art by efficiently and simultaneously integrating three essential functionalities: **automatic rotation, aquaponic nutrient circuit and internal pedestrian accessibility.** These functionalities are complemented by two major technological improvements: **multispectral LED lighting and programmed acoustic stimulation**, elements not present in known systems.

The rotating drum, formed by cylindrical modules with bearing discs and guide rings, ensures uniform exposure of the plants through slow controlled rotation. At the base of the equipment is a nutrient tank fed from a fish tank, constituting a recirculated aquaponic circuit that provides hydration and nutrient supply by cyclically passing the roots through the solution.

An internal pedestrian walkway, separated from the irrigation area by a transparent roof, allows direct access for inspection and operation without interrupting the drum's operation.

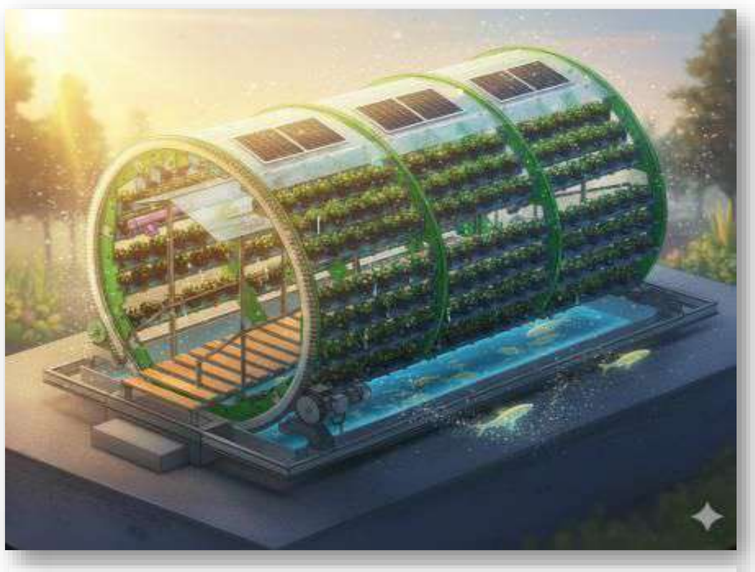
The equipment is powered by **solar panels** (**11**), providing autonomy and reducing external consumption.

The system includes configurable **LED bodies for emitting selective photobiological spectra** (red, blue, UV-A, far-red, warm/cold white), designed to optimize photosynthetic and phenological processes. In addition, acoustic micro-speakers emit controlled frequencies that influence plant metabolism.

All subsystems are coordinated by a **programmable electronic unit**, which manages rotation, multispectral lighting and acoustic stimulation based on preset profiles for different types of plants.

The **technical problem solved by the invention** is to achieve superior uniformity in plant development through constant light exposure, controlled hydration and multisensory stimulation, with minimal energy consumption.

The resulting technical solution provides an **integrated and autonomous equipment for intensive cultivation, uniformity of growth factors and optimization of resources, unprecedented in the state of the art.**



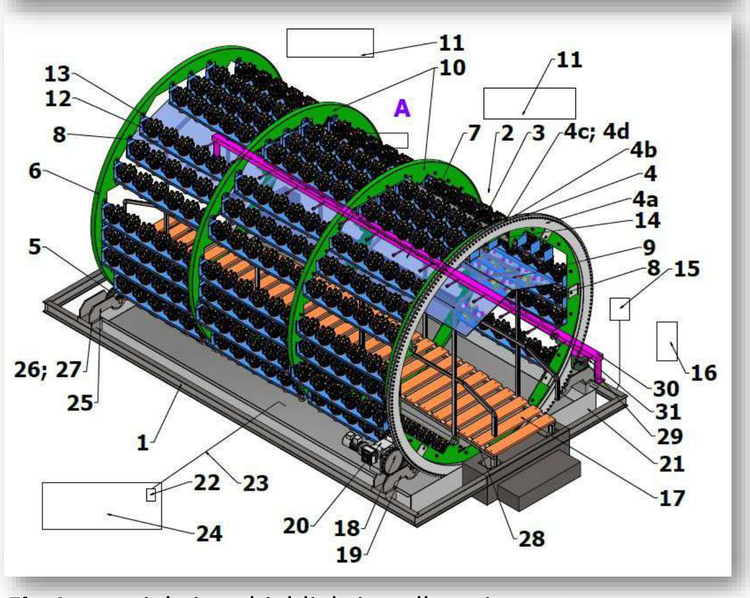


Fig.1 - spatial view, highlighting all equipment components

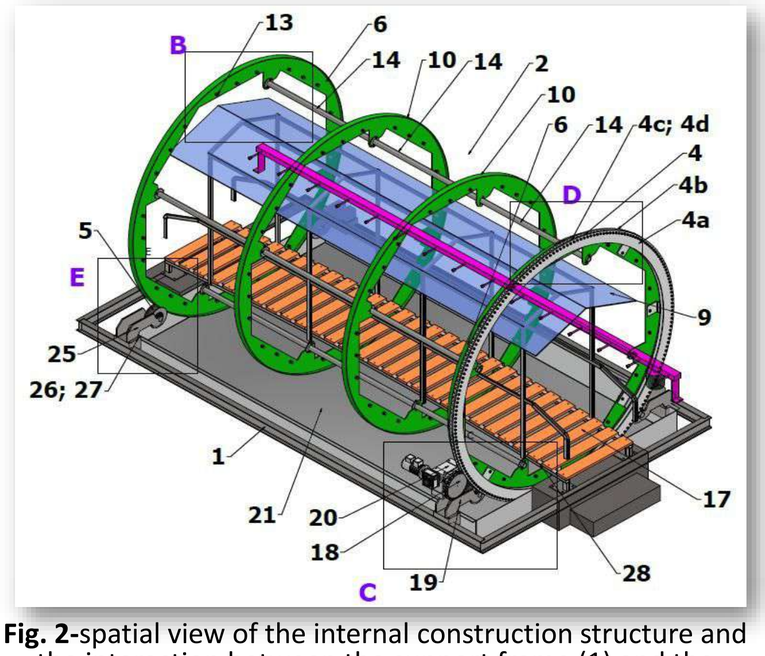


Fig. 2-spatial view of the internal construction structure and the interaction between the support frame (1) and the rotating drum (2)

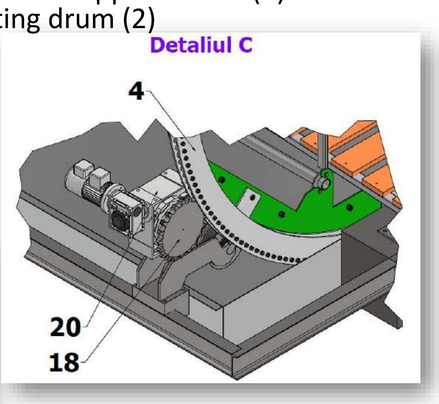
COMPONENTS:

The equipment includes a rotating drum (**2**) made up of guide rings (**6**), support discs (**10**) and metal trays (**8**) that support the pots (**3**). The slow rotation, generated by a gear motor (**20**) powered by solar panels (**11**), optimizes the distribution of light and achieves sequential contact of the roots with the nutrient solution in the tank (**22**). This is continuously fed from a fish tank (**26**), implementing a sustainable aquaponic circuit.

The equipment also includes an LED lighting system (**7**) with a selective spectrum – red, blue, warm/cool white, UV-A and far-red – configured to stimulate photosynthesis, flowering and the production of aromatic oils, as well as an assembly of acoustic micro-speakers (**15**) for the reproduction of musical frequencies calibrated to the type of plants grown. These elements are coordinated by a programmable electronic unit, which adjusts the light intensity, the duration of exposure and the acoustic regime depending on the floral mix and microclimate parameters.

Visitor access is ensured through a pedestrian walkway (**17**) protected by a transparent roof (**9**), giving the installation both a horticultural and touristic use.

Fig.3 -Detail C -Drive system (crown gear (4), drive pinion (18) and gearmotor (20))



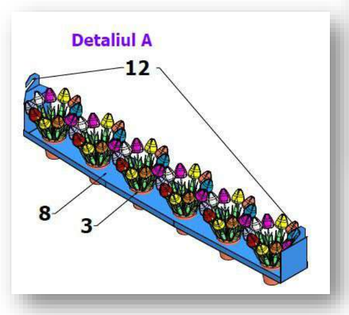


Fig.4 -Detail A - Tray mounting mechanism (metal trays (8), pots (3) and end arms (12))

ADVANTAGES (technical & economical):

- ***Uniformity of light and growth:*** The continuous rotation of the rotating drum ensures uniform exposure of all plants to light, eliminating problems of shading and uncontrolled gravitropism, which leads to an improved growth rate and a homogeneous final harvest.
- ***Optimization of irrigation and nutrition:*** By implementing the aquaponics system and the contact irrigation in the water tank, uniform watering of the roots is allowed, ensuring a constant source of nutrient-rich water, resulting in better plant health and increased yield.
- ***Superior space efficiency:*** The cylindrical tunnel design allows optimal use of vertical space (vertical cultivation), increasing the planting density per square meter of ground footprint.
- ***Energy autonomy and minimal costs:*** The system is powered by solar panels (**11**), which minimizes energy consumption and operating costs, making it environmentally friendly and cost-effective.
- ***Cost-effectiveness of the structure:*** The system eliminates the need for an expensive classic crown gear, using a stiffened Gall chain as the drive sprocket (**4**). This engineering solution significantly reduces the manufacturing cost of the rotating drum and the drive system.
- ***Reduced Water Consumption:*** The aquaponic integration drastically reduces water waste by constantly recycling the water in the circuit.
- ***Labour Efficiency:*** The pedestrian walkway (**17**) allows easy and quick access for maintenance, weeding and harvesting, reducing work time and associated labour costs.

ACKNOWLEDGEMENT:

This work was supported by the Romanian Ministry of Research Innovation and Digitalization, through the project "Intelligent plant growth systems under controlled environmental conditions" – PN 23 04 01 04– Ctr. 9N/01.01.2023.

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BIOSTIMULATOR WITH MICROORGANISMS FOR FOLIAR FERTILIZATION AND PREPARATION RECIPE FOR FERTILIZATION WITH MICROORGANISMS

Patent Application #: A-00632 / 2025

LĂCĂTUȘU Anca-Rovena[1)], DOMNARIU Horia[1)], MORARU Irina Ramona[1)], MARICA Dora[1)], VLĂDUȚ Nicolae-Valentin[2)], CONSTANTINESCU Mihai[2)]

[1)]ICPA Bucharest, [2)]INMA Bucharest

ABSTRACT:

In the current context of sustainable agriculture, microbial biopreparations represent a viable alternative to conventional chemical fertilizers, contributing to reducing the consumption of synthetic inputs, increasing the efficiency of nutrient use and restoring the microbiological balance of the soil.

The invention relates to the creation of a Biostimulator type biopreparation with Microorganisms intended for Foliar Fertilization as well as to a Fertilization Preparation Recipe using Microorganisms.

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DESCRIPTION:

The invention relates to the production of a Bio**stimulator type biopreparation with Microorganisms intended for Foliar Fertilization** as well as to a **Fertilization Preparation Recipe using Microorganisms**, which would replace conventional chemical fertilizers, with a positive impact on fertility and microbiological activity, by selecting effective bacterial strains, chosen according to their capacity to solubilize phosphates, to produce phytohormones (auxins, gibberellins) and to their antifungal activity, mechanisms that directly contribute to stimulating the root system and increasing the resilience of plants under abiotic stress conditions. The bacterial strains belong to the genera *Pseudomonas* and *Arthrobacter*, being isolated directly from agricultural soils of interest and therefore exhibiting a high capacity to adapt to local pedoclimatic conditions, survival capacity and interaction with the soil microbiome.

Fig.1 - Petri dishes with Topping medium inoculated with soil suspension

The existing inventions in the state of the art present several ***disadvantages*** in that they are either pure chemical mixtures or biofertilizers in which the microorganisms have been inactivated without the possibility of colonizing plants and soil and exercising beneficial functions in-situ.

The solution presented in the invention is based on live and metabolically active strains of *Pseudomonas* and *Arthrobacter* that have been isolated directly from agricultural soils of interest, capable of surviving, adapting and effectively contributing to the improvement of the biological and functional properties of the soil.

The application of this biopreparation in three different experimental plots (Plot 1-**SCDA Secuieni**, Plot 2-**INMA Bucharest** and Plot 3-**University of Craiova**) led to an incre**ase in the activity of the acid phosphatase enzyme** and, consequently, an **increase in the amount of phosphorus accessible to plants.**

The advantages offered therefore aim at reducing chemical inputs and transforming agricultural systems in the sense of reducing the ecological impact and increasing sustainability.

Fig.2 - Bacterial biomass production in liquid culture medium

Fig.3 - Strains isolated in tubes with CZPA medium

ADVANTAGES:

By using the **Biostimulator with Microorganisms for Foliar Fertilization**, according to the invention, the following **advantages** are obtained, resulting from the synthetic analysis of the data from the three experimental locations, namely:

- ❑ a clear dependence of the acid phosphatase activity on the physico-chemical and biological state of the soil is highlighted. The strongest relationship was established between organic carbon ($C_{or}g$) and acid phosphatase activity, with a significant positive correlation coefficient ($r \approx 0.75–0.80$). This association indicates that soils with a higher organic matter content have intense microbial activity, which favours the synthesis and release of enzymes involved in the mineralization of organic phosphorus compounds.
- ❑ A moderate positive correlation was also found between total nitrogen (Nt) and phosphatase ($r \approx 0.5$), confirming the general role of nitrogenous organic matter in supporting microbial metabolism. In contrast, the apparent density (AD) showed a negative correlation ($r \approx -0.6$) with enzymatic activity, which shows that more compact soils limit air diffusion and the activity of microorganisms, consequently reducing enzymatic processes.
- ❑ Regarding accessible phosphorus (P_AL), the trend was inverse or variable between locations. Thus, on Plot 1 (SCDA Secuieni) a negative correlation was observed ($r \approx -0.5$), specific to the phenomenon of inhibition by the final product, where the accumulation of mineral phosphorus reduces the microbial need to produce phosphatase. In contrast, on Plot 2 (INMA Bucharest) and Plot 3 (University of Craiova), the correlation was slightly positive ($r \approx 0.3–0.4$), suggesting an active mobilization of organic phosphorus in soils with moderate organic matter input. Assimilable potassium (K_AL) did not show a significant relationship with enzymatic activity, being an element less involved in direct biological dynamics. The correlation between soil moisture (wi) and phosphatase activity was weak and negative ($r \approx -0.3$), indicating that moisture variations in the analysed range did not have a decisive impact on enzymatic activity, but too high values may limit oxygenation and microbial metabolism.

ACKNOWLEDGEMENT:

This project was supported by the Ministry of Agriculture and Rural Development through the **ADER Project 25.1.2 / 2023:** ***"INNOVATIVE MINIMUM TILLAGE TECHNOLOGY OF AGRICULTURAL LAND, ADAPTED TO CURRENT CLIMATE CHANGES - TEHCONS"***

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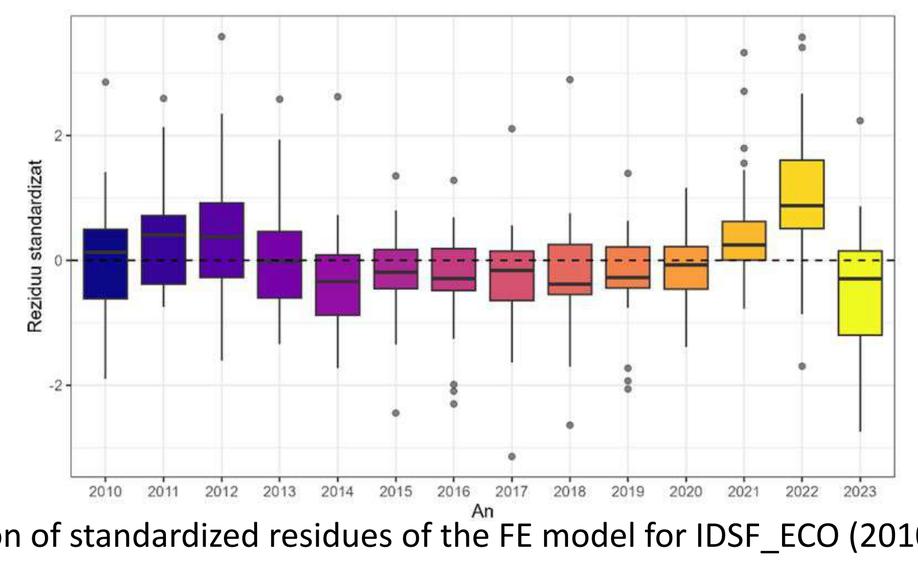
FE–MV Model for Farm Sustainability and Economic Risk Assessment

G

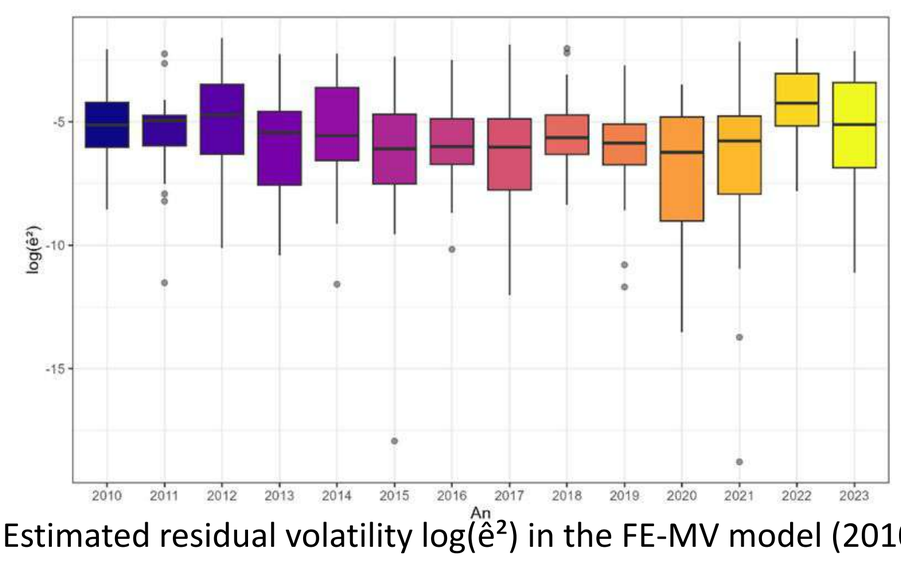
Patent/project: Econometric model / methodological innovation

Author/s: Ioan Prigoreanu, Lilia Șargu, Gabriela Ignat

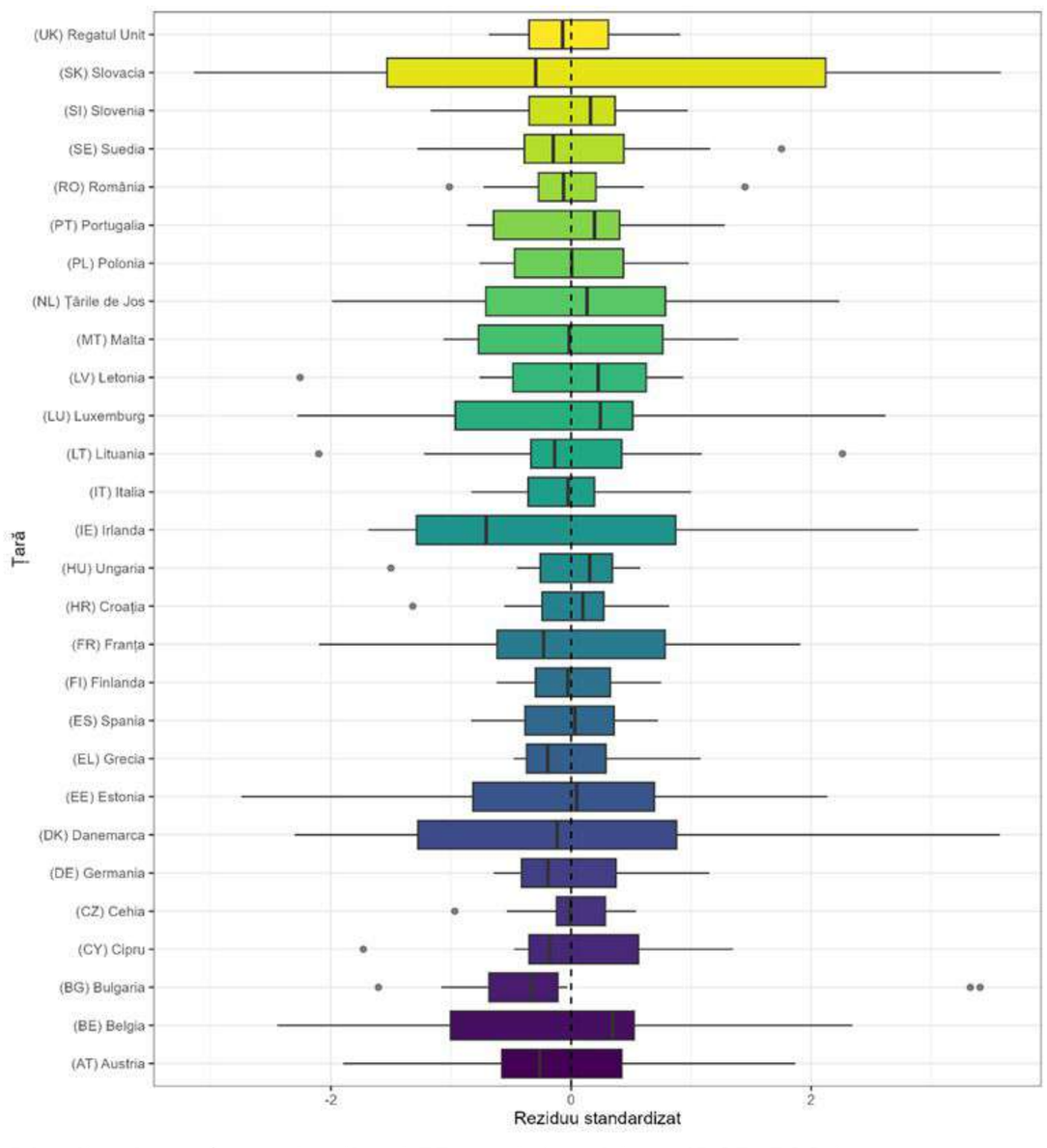
This project proposes an innovative two-stage panel econometric framework (FE–MV) that evaluates both the average level of farm economic sustainability and the volatility (risk) around that level across EU Member States over time. Standard fixed-effects panel models typically explain only the mean dynamics of performance indicators and do not explicitly quantify instability as a distinct dimension of resilience. The FE–MV approach expands conventional sustainability assessment by estimating: a mean equation (two-way fixed effects) for the economic sustainability index, capturing how structural sustainability pillars (Social, Environment, CAP/Policy) influence the average economic sustainability level; and a variance (risk) equation (two-way fixed effects) using the log of squared residuals from stage I, identifying whether the same pillars stabilize (negative effects) or amplify (positive effects) volatility in farm sustainability outcomes. Using standardized indicators (Z-scores) and one-year lagged regressors, the model delivers an interpretable "level–risk" profile for each sustainability pillar: factors that increase performance and reduce risk (resilience drivers), factors that increase performance but raise uncertainty (trade-offs), factors with weak or context-dependent effects. The framework supports evidence-based policy interpretation by separating determinants of performance from determinants of instability, showing that structural sustainability can raise average outcomes while volatility may still be driven by exogenous shocks (market, climate, energy, geopolitical).



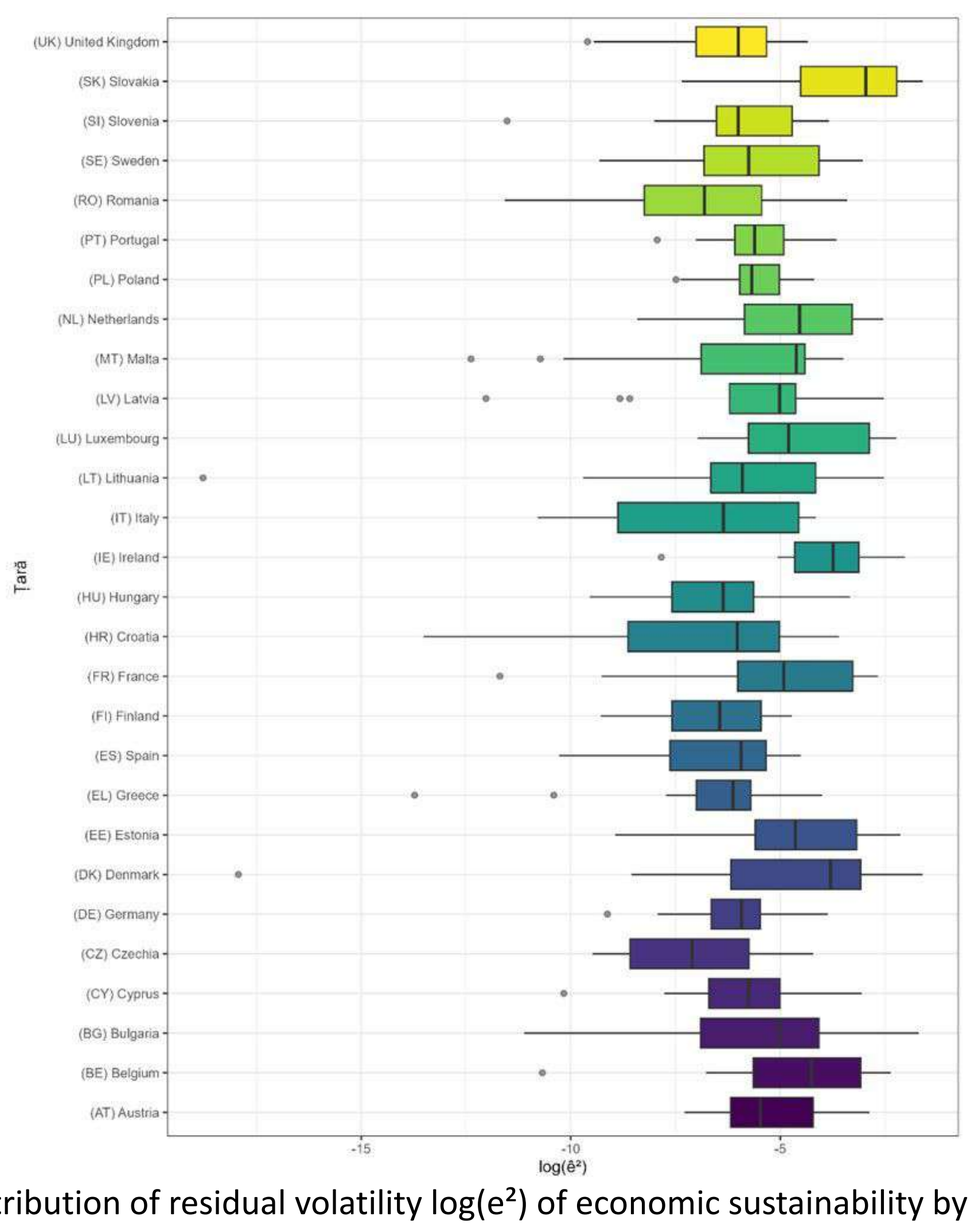
Distribution of standardized residues of the FE model for IDSF_ECO (2010–2023)



Estimated residual volatility log(ê²) in the FE-MV model (2010–2023)



Distribution of standardized FE model residues IDSF_ECO by country, 2010–2023



Distribution of residual volatility log(e²) of economic sustainability by country

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THE NEW LOCAL VARIETY 'NAZAR' OF CUP PLANT, *SILPHIUM PERFOLIATUM* L.

„Alexandru Ciubotaru" National Botanical Garden (Institute)
of Moldova State University, Republic of Moldova

Patent no. MD 648/ 2026.01.26

Author Dr. Victor ŢÎŢEI

Description: **The new local variety "NAZAR' of cup plant, *Silphium perfoliatum*, Asteraceae family, is perennial C3, plant, with 15-25 erect quadrangular tillers, branched in the upper part, 270-290 cm tall. The annual green mass productivity 118-137 t/ha.**

The green mass from *Silphium perfoliatum 'NAZAR'* harvested the early flowering stage contained 280 g/kg dry matter with 16.6% CP, 31.7% CF, 8.9 % ash, 35.2% ADF, 55.4% NDF, 4.6% ADL, 5.6% TSS, 30.6% Cel, 20.2% HC, but prepared silage is characterized by specific smell and olive colour, pH = 4.36, 3.04% organic acids, 280 g/kg dry matter with 15.7% CP, 31.1% CF, 9.5 % ash, 32.2% ADF, 53.7% NDF, 4.0% ADL, 28.2% Cel, 20.4% HC. The nutritive value of forages were 631-665 g/kg TDN, RFQ=111-121, 12.15-12.55 MJ/kg DE, 9.97-10.31 MJ/kg ME and 5.98-6.33 MJ/kg NEl.

For biogas production the fresh and ensiled substrates from had optimal C/N=19-20, and methane potential were 341 - 351 l/kg VS.

The flowering period lasts 50-55 days, the melliferous potential 150-220 kg/ha of honey

The stem dry mass collected in winter period contained 487g/kg cellulose (Cel), 274 g/kg hemicellulose (HC), 95g/kg lignin (ADL) and the theoretical ethanol yield averaged 553L/t. The calorific value of stem dry matter 18.76 MJ/kg GCV or 17.50 MJ/kg LCV.

The new local variety '*NAZAR*' of cup plant, *Silphium perfoliatum*, can be used as an alternative forage source for farm animals, honey plants, and multi-purpose feedstock for renewable energy production.

Financial support from Ministry of Education and Research, subprogram no. 01.01.02 *"Identification of valuable forms of plant resources with multiple uses for the circular economy".*

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THE LOCAL VARIETY ‘TINA’ OF FINE-LEAF VETCH *VICIA TENUIFOLIA* ROTH

„Alexandru Ciubotaru” National Botanical Garden (Institute)
of Moldova State University, Republic of Moldova
Patent no. MD 647/ 2026.01.26
Author Dr. Victor ŢÎŢEI

Description: **The local variety ‘Tina’ has been created by individual breeding of local populations of fine-leaf vetch (bramble vetch) *Vicia tenuifolia* Roth., *Fabaceae* family, perennial herb with well branched, numerous, rigid, slightly pubescent, semi-erect shoots reached 119-127 cm. The annual productivity from 2 cuts reached 48-57 t/ha green mass or 10.4-14.9 t/ha dry matter.**

The quality indices of green mass 17.2-20.0% CP, 9.6-11.8% ash, 48.8-51.9 %NDF, 31.3-34.5% ADF, 4.4-5.9 % ADL, 9.5-11.8%TSS, 26.9-28.6% CEL, 17.4-17.5 % HC, with nutritive value 611-631 g/kg DDM, 639-674g/kg TDN, RFV=109-116, RFQ= 120-135, 12.06-12.79 MJ/kg DE, 9.90-10.50 MJ/kg ME and 6.06-6.52 MJ/kg NEl.

The prepared hay contained 17.4-19.5% CP, 9.9-12.8% ash, 50.5-53.1 %NDF, 31.1-35.4% ADF, 4.8-5.7 % ADL, 7.8-8.3%TSS, 28.3-30.0% CEL, 17.4-18.4 % HC with nutritive value 611-631 g/kg DDM, 621-677g/kg TDN, RFV=109-116, RFQ=114-131, 12.07-12.43 MJ/kg DE, 9.91-10.21 MJ/kg ME and 5.93-6.22 MJ/kg NEl.

The local variety ‘*Tina*’ it is an early source of pollen and nectar for bees in May with 100-160 kg/ha potential honey.

The substrates from fine-leaf vetch ‘*Tina*’ have favorable carbon to nitrogen ratio (C/N=14-18), and the estimated biomethane potential varied from 323 to 349 l/kg organic dry matter.

The local variety ‘*Tina*’ of fine-leaf vetch is characterized by optimal yield and quality indices, may be used in monoculture or as component of the mix of grasses for the creation of temporary grasslands.

Financial support from Ministry of Education and Research, subprogram no. 01.01.02
“Identification of valuable forms of plant resources with multiple uses for the circular economy".

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THE NEW LOCAL VARIETY ‘GABI’ OF GIANT MISCANTHUS, *MISCANTHUS × GIGANTEUS*

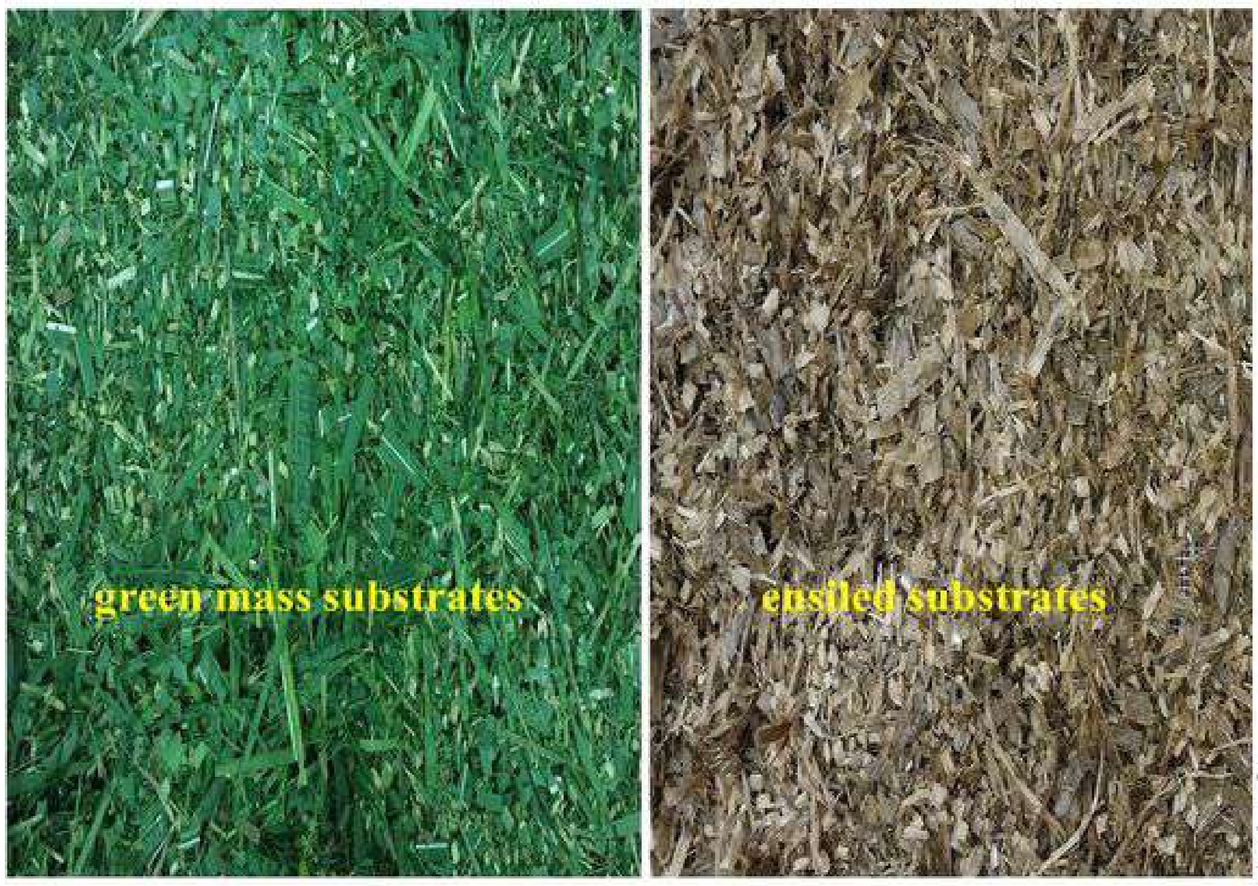
„Alexandru Ciubotaru” National Botanical Garden (Institute)
of Moldova State University, Republic of Moldova

Patent no. MD 647/ 2026.01.26

Author Dr. Victor ŢÎŢEI

Description: **The new local variety ‘GABI’of giant miscanthus ‘GABI’ *Miscanthus giganteus* Greef et Deu is perennial C4 plant with numerous tillers 360-380 cm tall, has been created by individual breeding. The annual dry matter productivity reached 20-25 t/ha.**

Multi-purpose crop: **biomass for renewable energy, biomaterials and chemicals production, ornamental plant.**



The biomethane potential of miscanthus green and ensiled substrates, prepared in June varied from 309 to 366 L/kg organic dry matter.

The miscanthus dry stalks mass collected in December- March was characterized by optimal dry matter content (84-93%), low ash content (1.6-2.9 %), high content of cellulose (491-504 g/kg), hemicellulose (330-340 g/kg). The estimated theoretical ethanol yield from hexose sugars averaged 371-380 L/t ODM and from pentose sugars 226-233 L/t ODM.
The prepared densified solid biofuels, briquettes and pellets, exhibited a high energy value 19.4-19.6 MJ/kg GCV.

The local variety of giant miscanthus ‘GABI’ is useful in phytoremediation of contaminated and polueded lands, phyto-amelioration of eroded and marginal lands, and the colected biomass may be used as biomass feedstock for renewable energy, biomaterials and chemicals production.

Financial support from Ministry of Education and Research, subprogram no. 01.01.02
“Identification of valuable forms of plant resources with multiple uses for the circular economy".

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Opportunity
CORNELIUGROUP
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Creation
INVENTCOR
Realization
Power of Creative Mind
Deva ROMANIA

The research subprogram No. 01.01.02

"IDENTIFICATION OF VALUABLE FORMS OF PLANT RESOURCES WITH MULTIPLE USES FOR THE CIRCULAR ECONOMY"

„Alexandru Ciubotaru" National Botanical Garden (Institute) of Moldova State University, Republic of Moldova

Subprogram manager, PhD Victor ȚÎȚEI, honorary member A.A.F.S.

In the context of implementing the National Development Strategy *"European Moldova 2030"*, along with the National Agricultural and Rural Development Strategy, the Energy Strategy of the Republic of Moldova, the relevant legislation on beekeeping and animal husbandry, and the promotion of renewable energy, organic farming and organic product labeling, it is essential to fully utilize the productive potential of traditional agricultural crops. At the same time, there is a need to identify, cultivate, and introduce new, non-traditional plant species that use solar energy, soil, and water more efficiently. These species can provide valuable sources of food, fodder, renewable bioenergy, and raw materials for other sectors of the circular economy. Accordingly, the main objectives of Subprogram No. 01.01.02 are to identify, study, and promote multi-purpose plant resources for use in the circular economy. As part of the implementation of the National Program, research subprogram titled ***"Identification of Valuable Forms of Plant Resources with Multiple Uses for the Circular Economy",*** within the strategic priority of ***Sustainable Agriculture and Food Security*** and the strategic direction of ***High-Productivity Cultivars and Hybrids of Agricultural, Technical, and Fodder Crops***, a collection of new and forgotten food crops has been established at NBGI MSU. The collections of melliferous, fodder, and energy plants, mobilized from local flora and various floristic regions worldwide, were expanded with the addition of 43 new taxa. Several agro-biological characteristics were assessed, including physical parameters of seeds, biochemical composition, and the nutritional and energy value of plant biomass in the form of fresh matter, hay, and silage for farm animals. In addition, the biochemical biomethane potential and cellulosic bioethanol potential of these plant substrates were evaluated. New multi-purpose cultivars were developed through breeding and have been officially registered in the Catalogue of Plant Varieties), as well as patented by the State Agency on Intellectual Property (AGEPI) of the Republic of Moldova.

Honey plants species

Fodder plants species

The mobilized plant species from the *Fabaceae* family contain 17.6-20.6% crude protein (CP), 9.73-10.45 MJ/kg metabolizable energy (ME) and 5.73-6.42 MJ/kg net energy for lactation (NEl). Species from the *Amaranthaceae* family showed 15.7-17.5% CP, 9.77-10.01 MJ/kg ME and 5.60-6.03 MJ/kg NEl. For *Brassicaceae*, values reached 15.7% CP, 10.67 MJ/kg ME, and 6.69 MJ/kg NEl; *Boraginaceae*: 13.6% CP, 10.81 MJ/kg ME, 6.83 MJ/kg NEl; *Asteraceae*: 13.3% CP, 9.95 MJ/kg ME, 5.97 MJ/kg NEl; and *Poaceae*: 8.3-12.6% CP, 8.87-9.78 MJ/kg ME and 4.88-5.79 MJ/kg NEl.

Biomass energy plants species

The biochemical methane potential of the investigated substrates from species of the *Amaranthaceae* family reached on average 319-337 L/kg; *Asteraceae* – 318 L/kg; *Boraginaceae* – 318 L/kg; *Brassicaceae* – 340 L/kg; *Fabaceae* – 327-365 L/kg; *Poaceae* – 328-378 L/kg organic matter.

The theoretical biochemical cellulosic ethanol potential of dehydrated substrates from the *Asteraceae* family reaches 460 L/t; *Brassicaceae* – 433 L/t; *Fabaceae* – 478 L/t; *Hydrophyllaceae* – 389 L/t; *Papaveraceae* – 477- 560 L/t; *Phytolaccaceae* – 520 L/t and *Poaceae* – 534-540 L/t.

The scientific achievements of the project team were widely disseminated.

Results were presented at 36 scientific events, and 200 research papers were published, including 42 journal articles indexed in Web of Science and SCOPUS, and 26 articles in other internationally recognized research journals. The subprogram's innovations were also presented at 13 international invention exhibitions held in Romania and the Republic of Moldova, earning 40 gold medals, 4 silver medal, 2 bronze medal, 12 special awards, and 22 diplomas of excellence. Two plant variety patents and two plant variety certificates were granted; one short-term invention patent was issued. Furthermore, the subprogram was featured in 15 television and radio programs.

The implementation of these research subprogram will help revitalization and development of the national beekeeping and animal husbandry sectors, ensure national food and energy security and sustainability in terms of reducing the import of food and energy, improving the environmental situation, making use of degraded, eroded soils, marginal and unused lands in traditional agriculture.

Financial support for research subprogram in 2024-2025y., three million Moldovan lei annually, was offered by the Ministry of Education and Research and Moldova State University.

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HR EXCELLENCE IN RESEARCH

NEW TOMATO VARIETIES
Solanum lycopersicum L. Dargen

MIHNEA Nadejda, LUPAȘCU Galina, CLIMĂUȚAN Diana,
ROȘCA Cristian, CRISTEA Nicolae

Plant variety patents: MD 460/2025.03.31

APPLICATION FIELDS: Agriculture.

AIM: New variety of tomato, created by intraspecific hybridization, resistant to the fusarium and alternariosis, positive low temperatures, medium resistant to high temperatures, productive, with high taste properties.

SOLUTION: The fruits of the Dargen variety are circular (round), small, average weight – 32,2 – 40,0 g, the surface of the fruit – smooth, without a green spot at the base, color until maturity – very light, at maturity – red. The fruits contain 6,5-8,0% of dry matter, 4,6...5,0% – sugars, 20,5...30,0 mg/% – vitamin C, 0.40...0.50% – acidity. The variety is early, vegetation period is 103 days. In the transplant culture, the variety ensures a yield of 30,0...53,6 t/ha, while the standard fruit yield is high (91,0...96,0%).

Advantages: The variety *Dargen* harmoniously combines high productivity, good tasting qualities with the resistance to fusarium and alternariosis, positive low temperatures, medium resistant to high temperatures. The productivity is high at cultivation through both seeds and seedling transplants.

IMPLEMENTATION STAGE: Approved since 2024.

ACKNOWLEDGEMENTS: Research was carried out within the subprogram 011102 "Extending and conservation of genetic diversity, improving gene pools of agricultural crops in the context of climate change", funded by the Ministry of Education and Research.

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A NEW WINTER COMMON WHEAT VARIETY (*TRITICUM AESTIVUM L.*) – BIJUTERIA ZÂMBRENILOR

GORE Andrei, ROTARI Silvia, LEATAMBORG Svetlana, LUPASCU Galina,
JELEV Natalia, PLATOVSCHII Nicolai, ZDIORUC Nina

Plant variety patents: MD 470/2025.12.31

APPLICATION FIELDS: Agriculture.

AIM: The obtaining of a variety of common winter wheat with high productivity, quality and resistance to adverse environmental factors by the individual selection method from the Moldova 5 spontaneous hybrid.

SOLUTION: The Bijuteria Zâmbrenilor variety was obtained through individual selection from the spontaneous common wheat hybrid Moldova 5 for 7 years. The variety is part of the *Lutescens* variety. The height of the plants – 70-85 cm. The spike is white, medium length (9.0–10.5 cm), the grain – red, the weight of 1000 grains – 36-40 g, the number of grains in the spike varies from 40 to 60, contains 13.0–13.6% protein and 26–28% gluten. The variety is mid-early, the vegetation period – 270-275 days. It has good biochemical and baking qualities. The variety is included in the Catalog of Plant Varieties of the R. of Moldova, years 2025.

Advantages: The variety is productive and its potential of productivity reaches up 3.7-8.7 t/ha. It is more productivity than control variety Kuialnic with 0.2 – 0.7 t/ha. Tolerant to drought, wintering and the main fungal diseases (rust brown, root rot, septoriosis, fusariosis).

IMPLEMENTATION STAGE: Laboratory scale.

ACKNOWLEDGMENT: Research was carried out within the subprogram 011102 "Extending and conservation of genetic diversity, improving gene pools of agricultural crops in the context of climate change", funded by the Ministry of Education and Research.

Opportunity
CORNELIUGROUP Research-Innovation Association
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INVENTCOR
Realization
Power of Creative Mind
Deva ROMANIA

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INEW TOMATO CULTIVAR – L 8/234 MMD

PATENT APPLICATION: v 2024 0015/31.08.2024

Milania MAKOVEI

APLICATION FIELDS: Applied breeding (as a donor of marker and economically valuable traits) **Genetics** (for studying the mechanisms of inheritance of mutant marker genes and increasing the biodiversity of tomatoes.

The homozygous tomato genotype L 8-234 MMD carries a large number of mutant marker genes - *sp±, u, ls, br, nor, j-2*. The plants are semi-determinate *sp±*, very compact, with limited formation and weak branching of side shoots, controlled by the *ls* gene. The leaves are erect. The inflorescence is multiaxis, with pale yellow flowers. The fruits are large (120-200 g), dense, green-yellow in color. The presence of the *nor* gene gives the fruits an increased ability to remain on the plant in the stage of biological maturity for 1-2 months. The line is high-yielding (21.7–25.4 kg/m²). It is resistant to low and high temperatures at different stages of ontogenesis: sporophyte, male gametophyte. Resistant to viral infections and the most common diseases.

ADVANTAGES:

L 8/234 MMD is a donor of valuable mutant marker genes. It has high combinatorial ability for the main economically valuable traits. Marker genes are phenotypically expressed in the early stages of ontogenesis (hypocotyl, seedlings), which allows for the selection of valuable genotypes at the seedling stage and thus reduces the time required for the selection of new forms.

APLICATION STAGE: Actively used in fundamental research in genetics, as well in applied breeding as a parental component for creating heterotic F_1 tomato hybrids with an original combination of mutant marker traits and economically valuable traits.

ACKNOLEDGMENTS: The research was carried of the Proiect in the field of science and innovation **25.80012.5107.15SE, "Genetic diversity of mutant marker genes of tomato (*Solanum lycopersicum* L.) as a source of new germplasm for the creation of varieties and heterotic hybrids capable of realizing the productivity potential under climate change"**, financed by the Ministry of Education and Research.

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NEW TOMATO CULTIVAR - DIMETRA

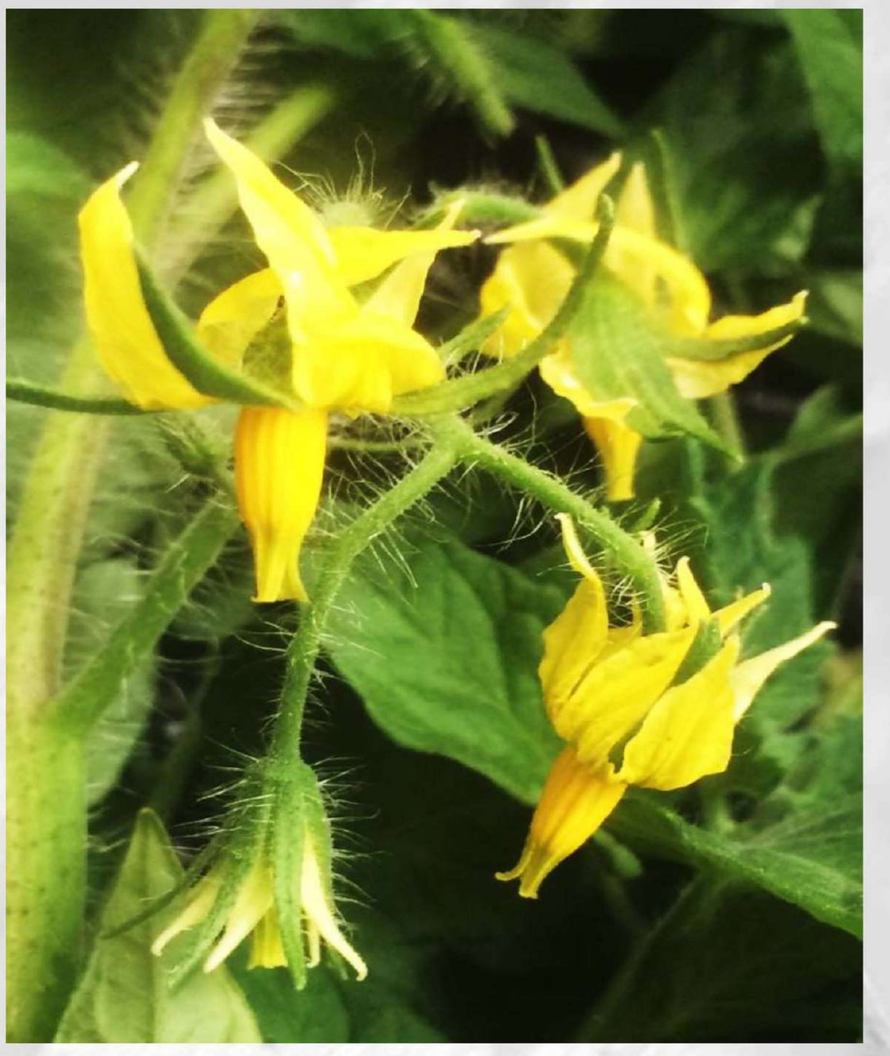
MD 372/2021. 10. 31

Milania MAKOVEI, Vasilie BOTNARI

APPLICATION FIELDS: Agriculture.

AIM: For cultivation in open field in private associations farmers and households in individual.

SOLUTION: The cultivar Dimetra are recommended for fresh use, produsing juice and other tomato products.



ADVANTAGES: The **Dimitra** cultivar early maturing (96…100 days), of superdeterminant type growth (*ssp*). High-yielding (52.7... 54.9 t/ha), with red, round fruits with excellent taste properties. The fruits contain: 5.4…6.1% dray matter, 4.8…5.3% of sugars, 33.0…34.8 mg /% of vitamin C and 0,28…0,38% of acidity. Predestined for fresh consumption and industrial processing. It is grown from seedlings and possibly from seeds in open fields. It is resistant to the most common diseases such as *Fusarium, Cladosporium*, *Alternaria* and *Tomato Mosaic Virus*. Resistant to low and high temperatures at different stages of ontogenesis: seed germination, pollen germination, and pollen tube growth.

IMPLEMENTATION STAGE: Homologated in the Republic of Moldova in 2019.

ACKNOWLEDGMENTS: The research was carried out within the **Subprogram *011102 Increasing and conservation genetic diversity, agricultural crop breeding in the context of climate change,*** financed by the Ministry of Education and Research.

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HR EXCELLENCE IN RESEARCH

Savoare, the variety of Greek oregano (*Origanum vulgare* L. ssp. *hirtum* (Link) letsw.)

PATENT: MD 425 / 2024.03.31

AUTHORS: Maria GONCEARIUC, Violeta BUTNARAS, Pantelimon BOTNARENCO, Zinaida BALMUS, Ludmila COTELEA

APPLICATION FIELDS: G- Agriculture.

AIM: Creation of a new variety of Creek oregano (*Origanum vulgare* L. ssp. *hirtum* (Link) letsw. with high quality essential oil content.

SOLUTION: The invention relates to the branch of agriculture.

Savoare variety is distinctive by: *Physiological properties*: It has very good winter hardiness; high drought resistance; high diseases resistance. *Quality features:* Essential oil content in the raw material (humidity, 60%): 1.641% and 4.102% (dry substance); Major components in essential oil: Carvacrol - 82.87%; β-Caryophyllene - 15.79%; γ-terpinene - 2.89%;
Production capacity: Fresh material production. 9.3 t/ha; Pharmaceutical herba production, humidity 13%, 1.85 t/ha; Essential oil production - 138.0 kg/ha; Yield - 15.5 kg/t.

ADVANTAGES: *Production capacity:* Fresh material production. 9.3 t/ha; Pharmaceutical herba production, humidity 13%, 1.85 t/ha; Essential oil production - 138.0 kg/ha; Yield - 15.5 kg/t. High productivity, high quality. Resistance to biotic and abiotic factors.

IMPLEMENTATION STAGE: Homologate in Republic of Moldova - 2024.

ACKNOWLEDGMENTS: This research was supported by the research subprogram *011102* Increasing and conservation genetic diversity, agricultural crop breeding in the context of climate change, financed by the Ministry of Education and Research.

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HR EXCELLENCE IN RESEARCH

METHOD FOR THE PROPHYLAXIS AND TREATMENT OF ECTOPARASITOSES IN DOMESTIC WATERFOWL

PATENT: MD 1826 (13) Y

AUTHORS: RUSU Ştefan, ERHAN Dumitru, ZAMORNEA Maria, TODERAŞ Ion, RUSU Viorelia, MASCENCO Natalia, MELNIC Victor, GOLOGAN Ion

APPLICATION FIELDS: Veterinary Medicine, Parasitology

AIM: The invention can be used for the prophylaxis and treatment of ectoparasitoses in domestic waterfowl (such as ducks and geese), both in small-scale households and in specialized poultry farms, providing an ecological solution that is safe for humans, animals, and the environment.

SOLUTION: The procedure involves the individual immersion of birds and the complete soaking of each bird's plumage in a container with a total volume of 20.0 liters, filled with 15 liters of an aqueous solution containing the preparation Ectopalmilin 30% – a 30% hydroalcoholic extract obtained from the aerial parts of the plant *Linaria vulgaris* (common toadflax). For prophylactic purposes, the treatment is applied in a single session, while for therapeutic purposes, it is applied in two sessions, 14 days apart.

ADVANTAGES: The effectiveness of the procedure lies in achieving a maximum therapeutic effect, as evidenced by a 100% recovery rate in the treated birds. Due to the use of a natural extract, there are no restrictions on the consumption of products and by-products derived from the treated birds, making the procedure safe for animals, the environment, and humans.

IMPLEMENTATION STAGE: Implementation Act dated March 23, 2025

ACKNOWLEDGMENTS: The research was carried out within the State Program 010701 "*Evaluation of the structure and functioning of biocenoses, aquatic and terrestrial habitats under the influence of biotic and abiotic factors in the context of ensuring ecological security and the well-being of the population*".

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HR EXCELLENCE IN RESEARCH

METHOD FOR THE PROPHYLAXIS AND TREATMENT OF ENDOPARASITOSES IN DOMESTIC WATERFOWL

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AIM: The invention can be used for the prophylaxis and treatment of endoparasitoses in domestic waterfowl (such as ducks and geese), both in small-scale households and in specialized poultry farms, providing an ecological solution that is safe for humans, animals, and the environment.

SOLUTION: The invention relates to veterinary medicine, in particular to parasitology, and specifically to a method for the prophylaxis and treatment of endoparasitoses in domestic waterfowl (ducks and geese). According to the invention, the method involves the oral administration, as drinking water, of the preparation Endopalmivet — an aqueous solution containing a 30% extract from the aerial parts of Tansy (*Tanacetum vulgare*). For prophylaxis, the administration is carried out in a single dose, while for treatment — in two doses at an interval of 14 days.

ADVANTAGES: The effectiveness of the procedure lies in achieving a maximum therapeutic effect, as evidenced by a 90% recovery rate in the treated birds. Due to the use of a natural extract, there are no restrictions on the consumption of products and by-products derived from the treated birds, making the procedure safe for animals, the environment, and humans.

IMPLEMENTATION STAGE: Implementation Act No. 07 of November 12, 2025

ACKNOWLEDGMENTS: The research was carried out within the State Program 010701 "*Evaluation of the structure and functioning of biocenoses, aquatic and terrestrial habitats under the influence of biotic and abiotic factors in the context of ensuring ecological security and the well-being of the population*".

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HR EXCELLENCE IN RESEARCH

POTENTIAL OF BIOLOGICAL ACTIVE SUBSTANCES TO REDUCE MELOIDOGENY HARMFULNESS ON HORTICULTURAL CROPS IN GREENHOUSES OF ITALY AND REPUBLIC OF MOLDOVA

PATENT/PATENT: Subprogram No. 010701

AUTHORS: ***Iurcu-Străistaru Elena, Toderaş Ion, Bivol Alexei, Rusu Ştefan***

APPLICATION FIELDS: AGRICULTURE

AIM: *To evaluate the effectiveness of biologically active substances in reducing the harmful impact of Meloidogyne spp. on greenhouse horticultural crops in Italy and the Republic of Moldova, and to support the development of sustainable biological control strategies.*

SOLUTION:*The innovative solution consists in the development andsubstances (BAS) derived from microorganisms, plant extracts, and natural metabolites, aimed at reducing the harmfulness implementation of an integrated biological management system based on biologically active of Meloidogyne spp. in protected horticultural crops in Italy and the Republic of Moldova.*

ADVANTAGES: *Within the limited space of protected horticultural crop systems, Meloidogyne represents a serious phytosanitary threat, causing significant damage to plants of ecological and economic importance and affecting global agricultural yields. The implementation of biological control measures combined with appropriate agrotechnological practices allows root-knot nematodes (Meloidogyne spp.) to be maintained at minimal population densities that do not require costly chemical treatments, thereby reducing soil and food contamination. Successful implementation of this program requires systematic monitoring, prevention strategies, and the application of biological and agrotechnical control methods targeting parasitic phytohelminths in vegetable agroecosystems, alongside the development of integrated protection systems that utilize natural regulatory mechanisms to control economically significant harmful species.*

a

b

c

d

Fig. 1. Destroyed roots a, d - tomato, b - cucumber, c-pepper by dangerous root-knot nematodes *Meloidogyne* spp.

a

b

c

d

Fig. 2 - a, b, c, d. Phytosanitary estimation of tomato, cucumber plantations in greenhouses

IMPLEMENTATION STAGE. *Identification of Meloidogyne spp. presence and population density in greenhouse soils in Italy and the Republic of Moldova.*

ACKNOWLEDGMENTS: *The investigations were carried out within the framework of the ZOOAQUATERRA subprogram (2024-2027), titled "Evaluation of the structure and functioning of biocenoses, aquatic and terrestrial habitats under the influence of biotic and abiotic factors, in the context of ensuring ecological security and population well-being" (Subprogram code: 010701).*

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HR EXCELLENCE IN RESEARCH

HELMINTOLOGICAL BIOLOGICAL CONTROL IN SOYBEAN (Glycine max L.) IN THE CONDITIONS OF THE REPUBLIC OF MOLDOVA

PATENT/PATENT: ***Scientific Papers. Series A. Agronomy,*** **vol. LXVII, No.1, 2024. 445-450. ISSN 2285-5785; ISSN CD-ROM 2285-5793; ISSN Online 2285-5807; ISSN-L 2285-5785**
https://agronomyjournal.usamv.ro/pdf/2024/issue_1/Art57.pdf

AUTHORS: ***Iurcu-Străistaru Elena, Toderaş Ion, Bivol Alexei, Rusu Ștefan, Cîrlig Natalia***

APPLICATION FIELDS: AGRICULTURE

AIM: *To assess the structure, distribution, and population density of parasitic phytonematodes in soybean (Glycine max L.) fields in the Republic of Moldova in order to support the development of effective integrated phytosanitary control strategies.*

SOLUTION: *Implementation of an integrated biological control system based on regular monitoring of phytonematodes, application of biological control agents, use of crop rotation and resistant soybean varieties, and improvement of soil health through organic practices, in order to reduce nematode populations below economic damage thresholds and ensure sustainable soybean production in the Republic of Moldova.*

ADVANTAGES: *Phytosanitary control of parasitic helminthological fauna plays an essential role in increasing soybean (Glycine max L.) productivity and quality in the Republic of Moldova. Investigations conducted in 10 districts across North, Central, and South-East regions included over 200 soil samples from 15 soybean sectors. The studies established population densities of 50–250 individuals per 100 g of soil, with 10–25% abundance in spring and higher attack frequencies (10–30%) in late spring–summer. A total of 22 phytonematode species from 8 families and 2 orders were identified, predominantly endoparasites from the genus Pratylenchus, followed by ectoparasitic and semiendoparasitic species, varying according to environmental conditions.*

1. 2. 3. 4. 5. 6. 7. 8.

Fig. 1–8 Phytosanitary field surveys during the dynamics of the growth stages: 1 – sowing; 2, 3 – soil analysis in the laboratory; 3–4 – bush formation; 5–8 phytosanitary control with soil sample collection for laboratory analyses, April–August, 2024.

IMPLEMENTATION STAGE: *The implementation stage includes field phytosanitary surveys and soil sampling during different soybean growth stages, laboratory identification and assessment of phytonematode populations, data analysis, and application of integrated biological and agrotechnical control measures followed by monitoring of their effectiveness.*

ACKNOWLEDGMENTS: *The investigations were carried out within the framework of the ZOOAQUATERRA subprogram (2024-2027), titled "Evaluation of the structure and functioning of biocenoses, aquatic and terrestrial habitats under the influence of biotic and abiotic factors, in the context of ensuring ecological security and population well-being" (Subprogram code: 010701), and 010102 subprogram NBGI „A. Ciubotaru".*

TECHNIQUES FOR STIMULATING PLANT PRODUCTIVITY

Patents: MD BSD 813

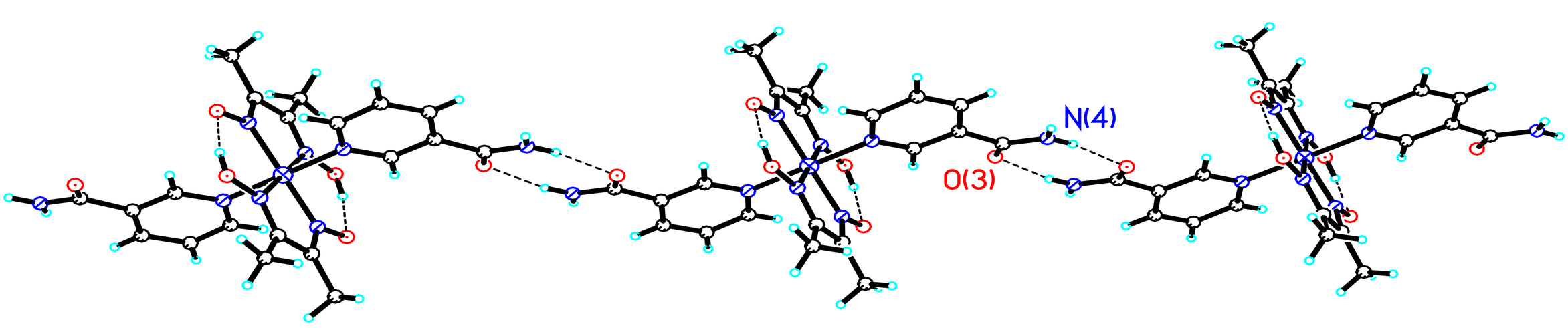
Authors: ȘTEFÎRȚĂ A., BULHAC I., BOTNARI V., MELENCIUC M., BUCEACEIA S., BOLOGA O., CIOBĂNICĂ O., COROPCEANU E.

Institute of Chemistry of Moldova State University;
"Ion Creanga" State Pedagogical University of Chisinau, Republic of Moldova

G

To supplement the microelement needs of red beetroot, investigations were conducted on the effect of the preparation Composit on the growth and development of plants of the Egyptian Flat and Cylindrical varieties. The Composite represents a mixture of substances, which are based on some of the most important microelements and vitamins: iron (4%), cobalt (4%), zinc (4%), magnesium (4%), boron (0.72%), nicotinamide (vitamin PP, 16%), as well as nitrate anion (19.6%). Iron and cobalt were included in the form of coordination compounds of these metals, $[Fe^{III}_3O(CH_3COO)_6\ (H_2O)_3]NO_3 \cdot 3H_2O$ and, respectively, $[Co(DH)_2(PP)_2][BF_4] \cdot 2H_2O$, and zinc and magnesium – in the form of nitrates (in a ratio of 4:9:4:9).

Pre-treating seeds with such solutions ensures the intensification of plant growth processes both compared to the growth of control plants and compared to plants from seeds treated with solutions, which contain the corresponding elements in the form of mineral salts. The Composite is physiologically active in the concentration range of 0.00005 - 0.01%, with the major effect being obtained at a concentration of 0.0001%. Pre-treating seeds with a 0.0001% Composite solution increases seed germination energy by 38.1% compared to the control and by 26.1% compared to the germination of seeds treated with a solution of mineral salts of the same elements. The growth processes of seedlings at the initial stage of ontogenesis are significantly intensified under the influence of the coordinative compound: by 74.60% compared to the growth of seedlings in the control variant and by 14.27% compared to the growth of seedlings from seeds treated with the mineral salt solution.



Formation of hydrogen bonds and of the unidimensional pseudo chain in $[Co(DH)_2(PP)_2][BF_4] \cdot 2H_2O$

coropceanu.eduard@upsc.md

PRACTICAL LABORATORY OF INTELLIGENT, EFFICIENT, AND LONGEVOUS TECHNOLOGIES IN HORTICULTURE (ACRONYM: LINTEL)

Patent/project number: ***CNFIS-FDI-2025-F-0328***

Author/s:Șchiopu Emil - Cătălin, Grofu Florin, Pecingină Irina, Cazalbașu Ramona, Ghimiși Letiția

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PURPOSE/OBJECTIVES OF THE PROJECT

LINTEL represents a strategic investment in the modernization of higher education through the integration of intelligent agricultural technologies into the academic and research environment.

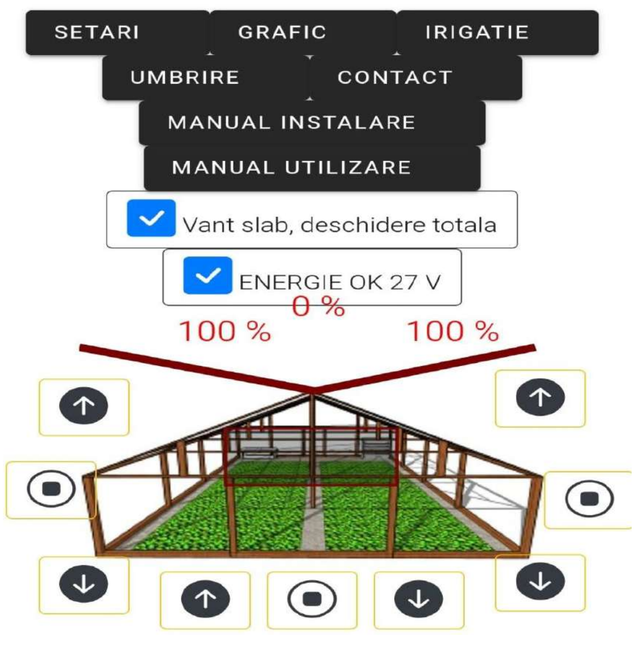
With a total budget of 206.536,000 LEI, the project establishes a state-of-the-art practical laboratory dedicated to training future specialists in precision agriculture, horticulture, and sustainable resource management.

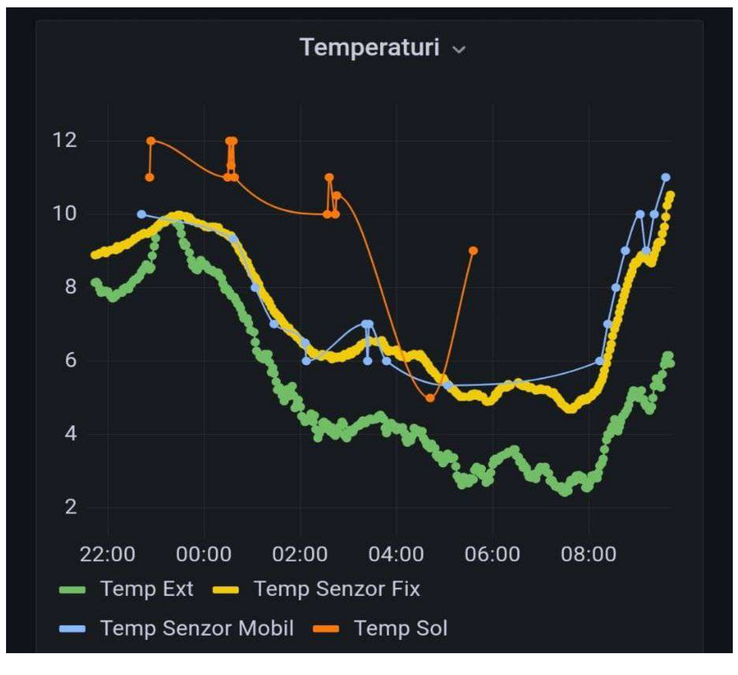
The initiative strengthens the university's capacity for innovation, applied research, and collaboration with the regional agribusiness sector.

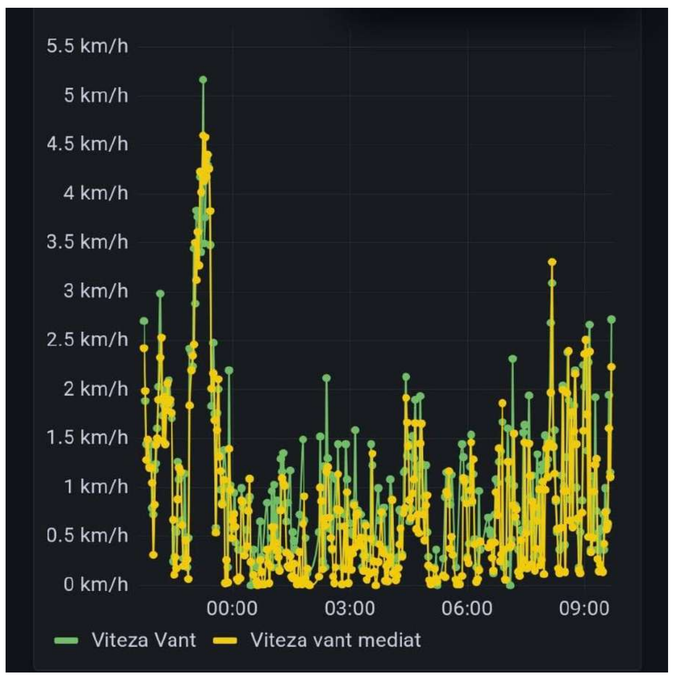
The laboratory includes: Two Smart Greenhouse Units (45 sqm each), equipped with: Automated ventilation, shading, and climate regulation systems, Intelligent irrigation and fertigation systems with remote control, Soil monitoring sensors (moisture, pH, electrical conductivity), Solar radiation and temperature sensors for evapotranspiration analysis, Integrated weather station connected to centralized data processing, Wi-Fi cameras for real-time crop monitoring, LED phyto-lighting systems with adjustable light spectrum, Air stratification control systems.

NOVELTY / BENEFITS: LINTEL contributes to: Reduced water and fertilizer consumption through precision technologies, Increased agricultural efficiency and crop quality, Sustainable resource management and environmental protection, Attraction of motivated and talented students, Strengthened partnerships with local entrepreneurs and agricultural producers and Consolidation of the university's role as a regional center for innovation

Through LINTEL, the "Constantin Brâncuși" University of Târgu Jiu reaffirms its commitment to educational excellence, technological innovation, and sustainable development in the agricultural sector.







Contact: ctt.ucb@gmail.com

GRAPE CULTIVAR “BEGA”

Authors:ALEXANDROV EUGENIU, DOBREI ALIN, BOTNARI VASILE, DOBREI ALINA, GĂINĂ BORIS

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University of Life Sciences "King Mihai I" from Timișoara, Romania

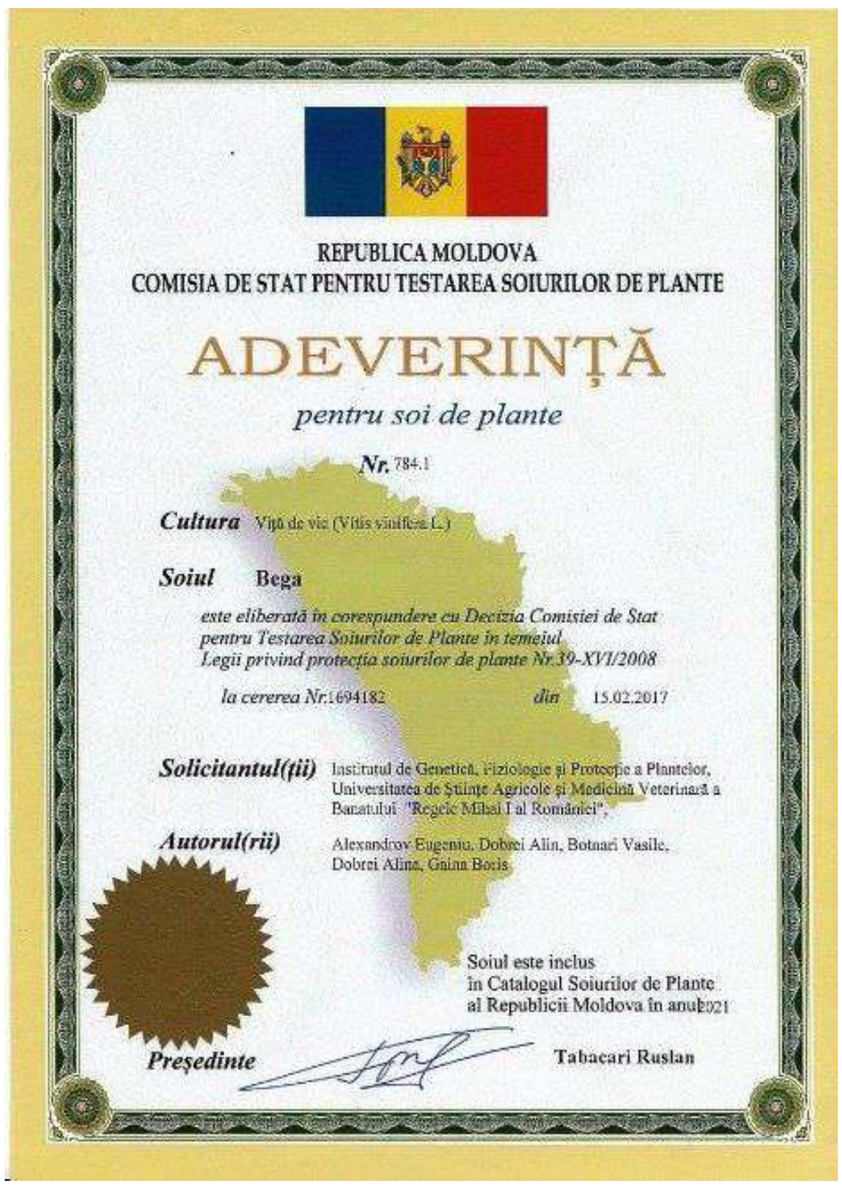
G

Description

The new genotype represents a grape cultivar developed for industrial processing, suitable for both wine and juice production.

Ampelographic description

The mature leaves are palmate-lobed and green in colour. The leaf blade has a revolute profile, with pronounced teeth along the leaf edges. The petiole sinus is wide open, a characteristic that aids in cultivar identification. The clusters are medium to large, cylindrical conical in shape, uniaxial, single-winged, and loosely structured, which allows for better aeration of the berries. Typically, there are two clusters per shoot, ensuring consistent yields.



REPUBLICA MOLDOVA
COMISIA DE STAT PENTRU TESTAREA SOIURILOR DE PLANTE

ADEVERINȚĂ

pentru soi de plante

Nr. 784.1

Cultura Viță de vie (Vitis vinifera L.)

Soiul **Bega**

este eliberată în corespundere cu Decizia Comisiei de Stat pentru Testarea Soiurilor de Plante în temeiul Legii privind protecția soiurilor de plante Nr.39-XVI/2008

*la cererea Nr.*1694182 *din* 15.02.2017

Solicitantul(ții) Institutul de Genetică, Fiziologie și Protecție a Plantelor, Universitatea de Științe Agricole și Medicină Veterinară a Banatului "Regele Mihai I al României".

Autorul(rii) Alexandrov Eugeniu, Dobrei Alin, Botnari Vasile, Dobrei Alina, Gaina Boris

Soiul este inclus în Catalogul Soiurilor de Plante al Republicii Moldova în anul 2021

Președinte Tabacari Ruslan

Ampelographic description

The clusters are resistant to handling and can be transported and stored fresh without significant quality loss. The berries are medium-sized (averaging about 60 mg), elongated, evenly distributed within the cluster, and display an attractive blue-violet skin colour. The pulp is colourless, juicy, and firm, with a pleasantly neutral taste, and separates easily from the 1–2 seeds despite adherence to the skin.

Ripening period: Medium, allowing flexibility in harvest timing.
Resistance: The cultivar is drought-tolerant and resistant to low winter temperatures.
Yield: Depending on cultivation practices, ‘Bega’ produces 5–7 kg per vine, equivalent to 14–16 tons per hectare.

Contact: alindobrei@usvt.ro *University of Life Sciences "King Mihai I" from Timișoara, Romania*
alexandrov.eugeniu@gmail.com *Institute of Genetics, Physiology and Plant Genetics in Chisinău, Republic*

MOLECULAR RESEARCH REGARDING THE IDENTIFICATION OF *TRICHINELLA* NEW SPECIES IN WILD CARNIVORES FROM ROMANIA AND EVALUATION OF THE HUMAN INFECTION RISK

Ana-Maria Marin[1], Dan-Cornel Popovici[2], Gianluca Marucci[3], Simona Cherchi[3], Maria Monica Florina Moraru[1] and Narcisa Mederle[1]

1 Department of Parasitology and Parasitic Diseases, University of Life Sciences "King Mihai I" from Timisoara, 300645 Timisoara, Romania
2 Forestry Faculty, Transilvania University Brasov, Sirul Beethoven, 500123 Brasov, Romania
3 Department of Infectious Diseases, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161 Rome, Italy

Project carried out in the frame of preparation and defense of the Ph.D. thesis entitled "**Epidemiological study regarding the *Trichinella britovi, T. pseudospiralis*, and *T. spiralis* species circulating in Romanian wild fauna**"

Ph.D. student: Ana-Maria Marin

Scientific Coordinator: Prof. Dr. Narcisa Mederle

***Trichinella* spp. are etiological agents of a zoonosis affecting humans, caused by consuming raw or undercooked meat from animals infested with the larvae of these zoonotic nematodes. The European reservoir for *Trichinella* species is wildlife, with wild animals being the most important source of infection for domestic pigs, which are the main source of infection for other animals (e.g. horses), especially for humans. In Romania, there are no reports that support the possible consumption of meat from wild carnivores, but they appear as invasive species and suitable hosts for *Trichinella* species.**

The present project aimed to identify *Trichinella* spp. larvae in muscle from 10 wild carnivores in Romania by artificial digestion and to characterize the molecular isolates obtained.

***There are same species of the genus Trichinella* which present zoonotic potential. Some of them could be identified by PCR. In our project, *Trichinella spiralis* in wild boar, *Trichinella britovi* in eight wild hosts, and *Trichinella pseudospiralis* in jackal have been identified.**

- ✓ **The present study reports the first identification of *T. pseudospiralis* in Romania.**
- ✓ **Infection with *T. britovi* in the raccoon dog and European pine marten was reported for the first time in Romania.**

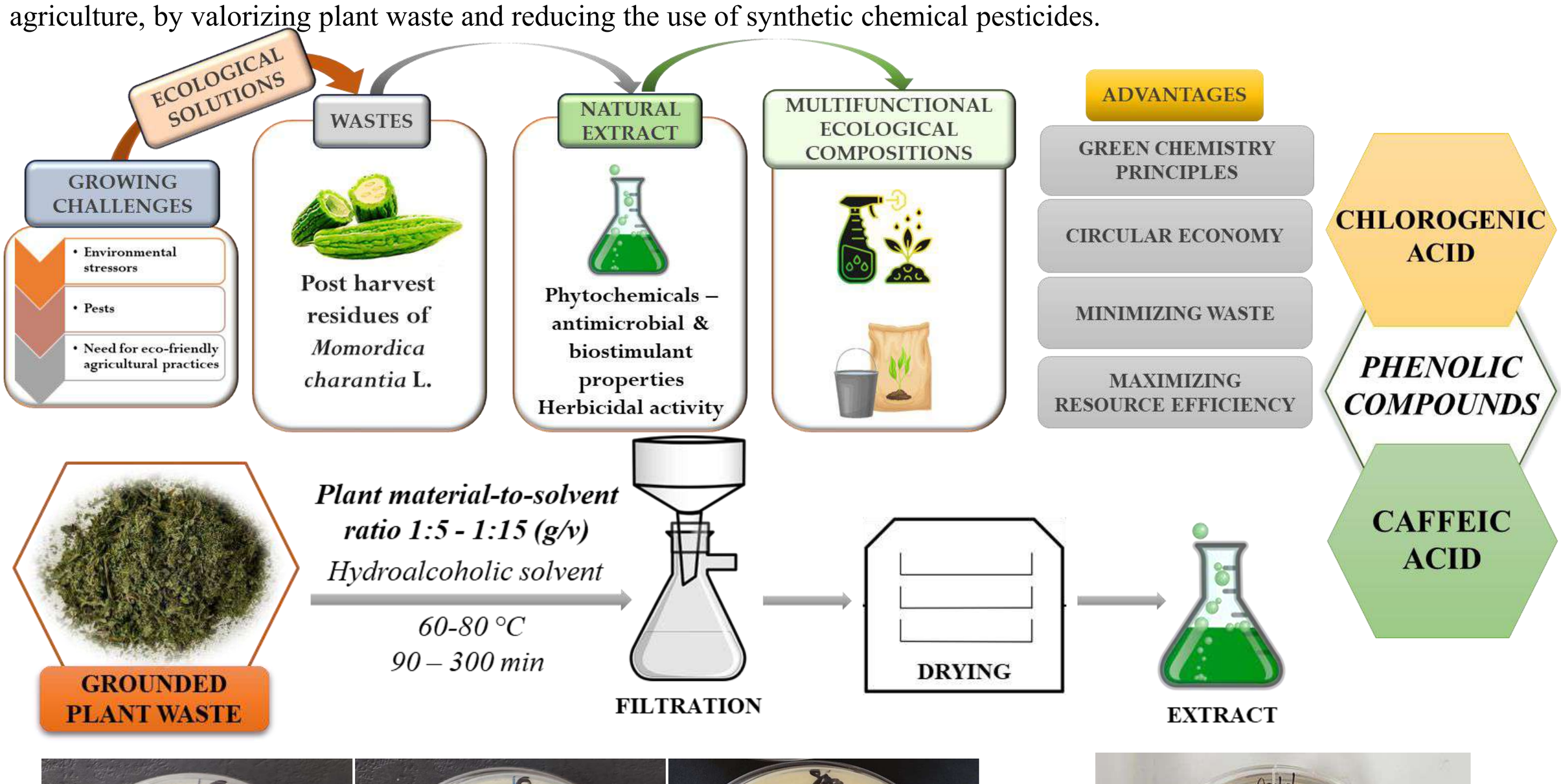
ECOLOGICAL COMPOSITION BASED ON *MOMORDICA CHARANTIA* L. PLANT WASTE, WITH ANTIMICROBIAL PROPERTIES, BIOSTIMULANT EFFECT FOR *MOMORDICA CHARANTIA* L. CROPS AND HERBICIDE ACTIVITY AND METHOD FOR OBTAINING IT

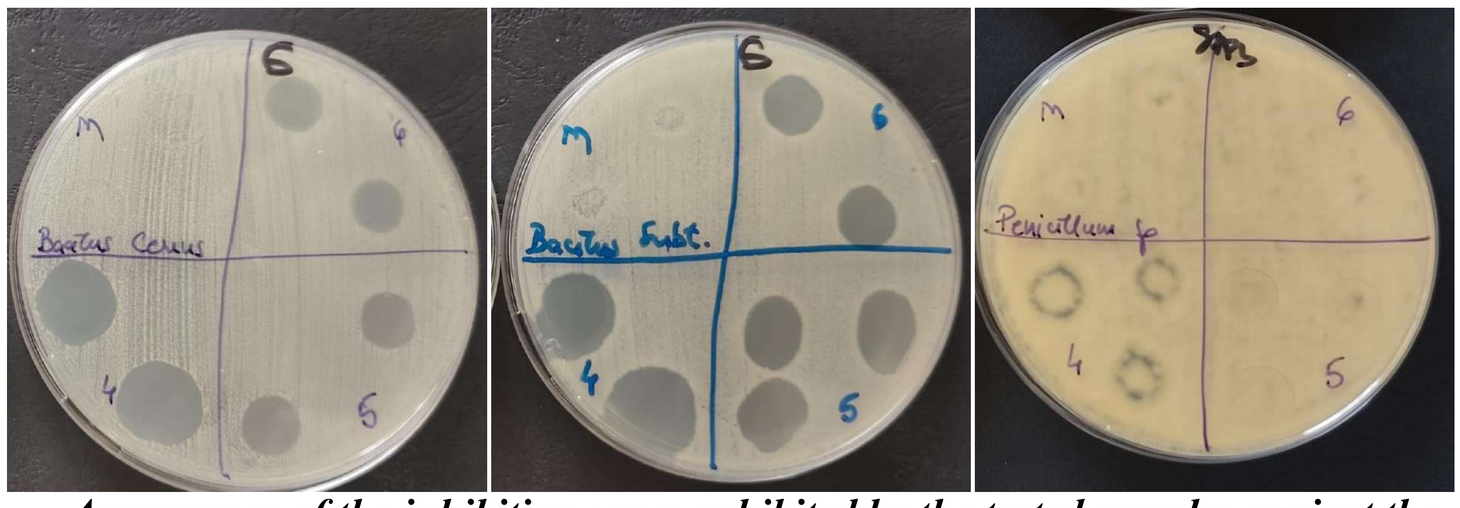
G

Patent application No. A00149/2026

Radu Claudiu FIERASCU, Irina FIERASCU, Toma FISTOS, Anda Maria BAROI, Roxana Ioana MATEI, Ioana Silvia HOSU, Irina Elena CHICAN, Daniela IONESCU, Justinian-Andrei TOMESCU, Cristina-Mihaela LUNTRARU, Alexandra ENE-MANEA

The present invention relates to an ecological composition based on a plant extract obtained from plant wastes of *Momordica charantia* L., with antimicrobial properties, biostimulant effects on *Momordica charantia* crops, and selective herbicidal activity, as well as to its obtaining method. The composition is obtained by extracting bioactive compounds from *Momordica charantia* plant wastes using a hydroalcoholic water–ethanol solvent, at temperatures ranging between 60 and 80°C, followed by filtration of the resulting extract. The extract contains plant secondary metabolites with biological activity, particularly phenolic compounds, among which chlorogenic acid and caffeic acid are predominant. Microbiological tests demonstrated antimicrobial activity against the strains *Bacillus subtilis*, *Bacillus cereus*, and *Aspergillus niger*, as well as the ability to inhibit bacterial biofilm formation. Biological tests also demonstrated a biostimulanting effect on the germination and development of *Momordica charantia* plants, as well as selective herbicidal activity against the species *Trifolium pratense* L. and *Lolium perenne* L. The invention provides an ecological, efficient, and economically viable solution for sustainable agriculture, by valorizing plant waste and reducing the use of synthetic chemical pesticides.





Appearance of the inhibition zones exhibited by the tested samples against the three bacterial and fungic strains.

Evaluation of the biostimulant effect and the selective herbicidal potential

Contact: PhD Habil Radu Claudiu Fierascu - fierascu.radu@icechim.ro

Acknowledgements: This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research, National Authority for Research), CCCDI—UEFISCDI, project number PN-IV-P7-7.1-PED-2024-0318, contract 85PED/2025, within PNCDI IV.

An Innovative Interactive Canine Muscular Anatomy Model

Pawana Chuesiri, Phakdee Sutthanom*, Jantima Intarapanya*, Gridtayoch Chuesiri***

*Faculty of Veterinary Sciences, Chulalongkorn University & **Cosci, Srinakarinwiroj University

Background and Problem

Veterinary anatomy education traditionally relies on cadaver-based dissection and 2-D teaching materials such as textbooks and diagrams. While these methods provide foundational knowledge, they present several limitations.

- **Limited availability of canine cadavers, resulting in unequal learning opportunities**
- **Inconsistent specimen quality, affecting anatomical clarity and accuracy**
- **2-Dimensional learning tools that cannot effectively represent the spatial complexity of muscular structures**
- **Limited demonstration of biomechanical movement, making it difficult for students to understand how muscles function during locomotion**
- **These challenges often result in passive learning and incomplete functional understanding of musculoskeletal anatomy.**
- **To address these limitations, we developed an Innovative Interactive Canine Muscular Anatomy Model, designed to transform anatomy education through interactive visualization, biomechanical simulation, and sustainable educational design.**

Key Features & Highlights

- **Interactive Anatomical Learning System**
- **The innovation integrates 2 complementary anatomical models designed to enhance both structural and functional understanding.**

Model A – Interactive Muscular Identification

- **Life-sized Chihuahua anatomical model**
- **Integrated 43-point LED guidance system**
- **Color-coded functional muscle groups**
  - **Flexor muscles – 27 points (Red)**
  - **Extensor muscles – 11 points (Black)**
  - **Abductor muscles – 5 points (Green)**
- **Interactive control system enabling hands-on exploration**
- **Integrated MP3 audio guidance explaining muscle location and function**
- **Supports active learning and self-directed study**

Model B – Biomechanical Movement Simulation

- **Designed to demonstrate dynamic musculoskeletal function & biomechanical movement by simulating anatomical joint motion of both forelimbs & hindlimbs.**
- **The forelimb simulation includes the shoulder, elbow & carpal joints, while the hindlimb simulation includes the hip, stifle & tarsal joints. This allows real-time observation of muscle contraction & relaxation during joint movement such as: Elbow joint range: 36° – 166° & Stifle joint range: 41° – 162°**
- **Visual demonstration of muscle contraction and relaxation during movement**
- **Enables real-time observation of functional anatomy and biomechanics**

Benefits & Applications

This innovation transforms traditional anatomy learning into an immersive and interactive educational experience.

Educational Impact

- **Student knowledge scores improved from 37% to 93%**
- **Student satisfaction rating: 4.85 / 5.0**

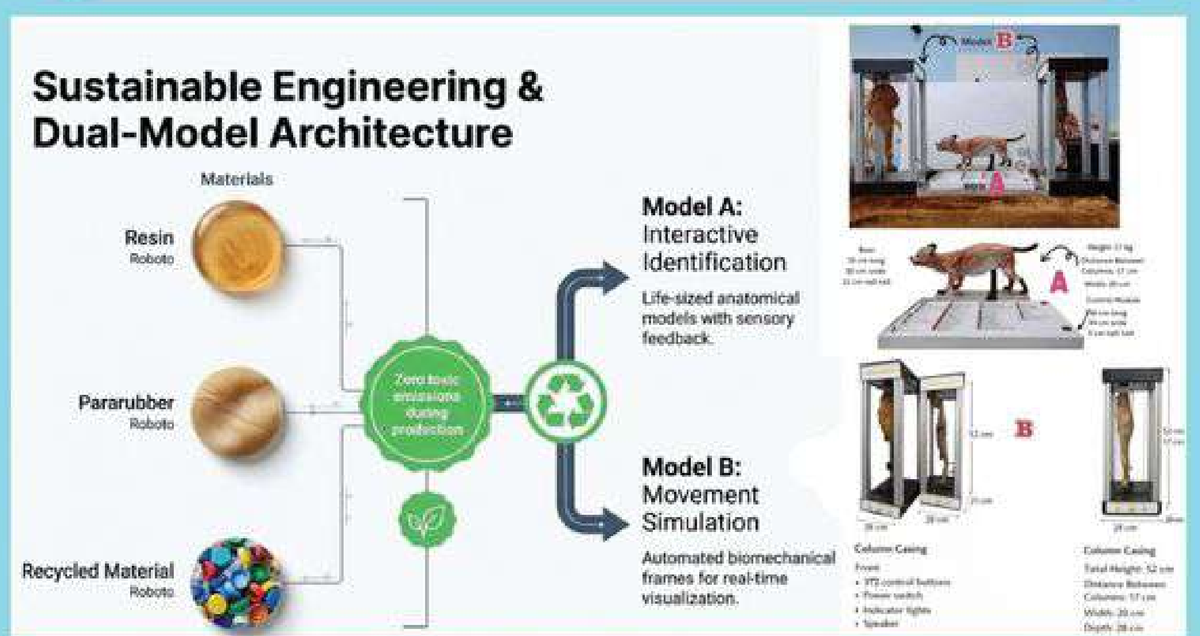
Key Advantages

- **Enhances three-dimensional spatial understanding of muscular anatomy**
- **Demonstrates real functional biomechanics**
- **Reduces reliance on animal cadavers**
- **Supports ethical and sustainable veterinary education**
- **Increases student engagement and clinical confidence**

Potential Applications

- **Veterinary medical schools**
- **Anatomy laboratories**
- **Clinical training programs**
- **Veterinary education exhibitions and demonstrations**
- **Simulation-based veterinary training centers**

With ongoing patent development and future commercialization, this innovation has the potential to establish a new global standard for interactive veterinary anatomy education.



VDO Presentation

Contact Information: Assist. Prof. Pawana Chuesiri Tel: +66 2 2189658, Mobile: +66 85 920 5338, E-mail: Pawana.U@chula.ac.th

SoilMSQ

Patent/project number: None

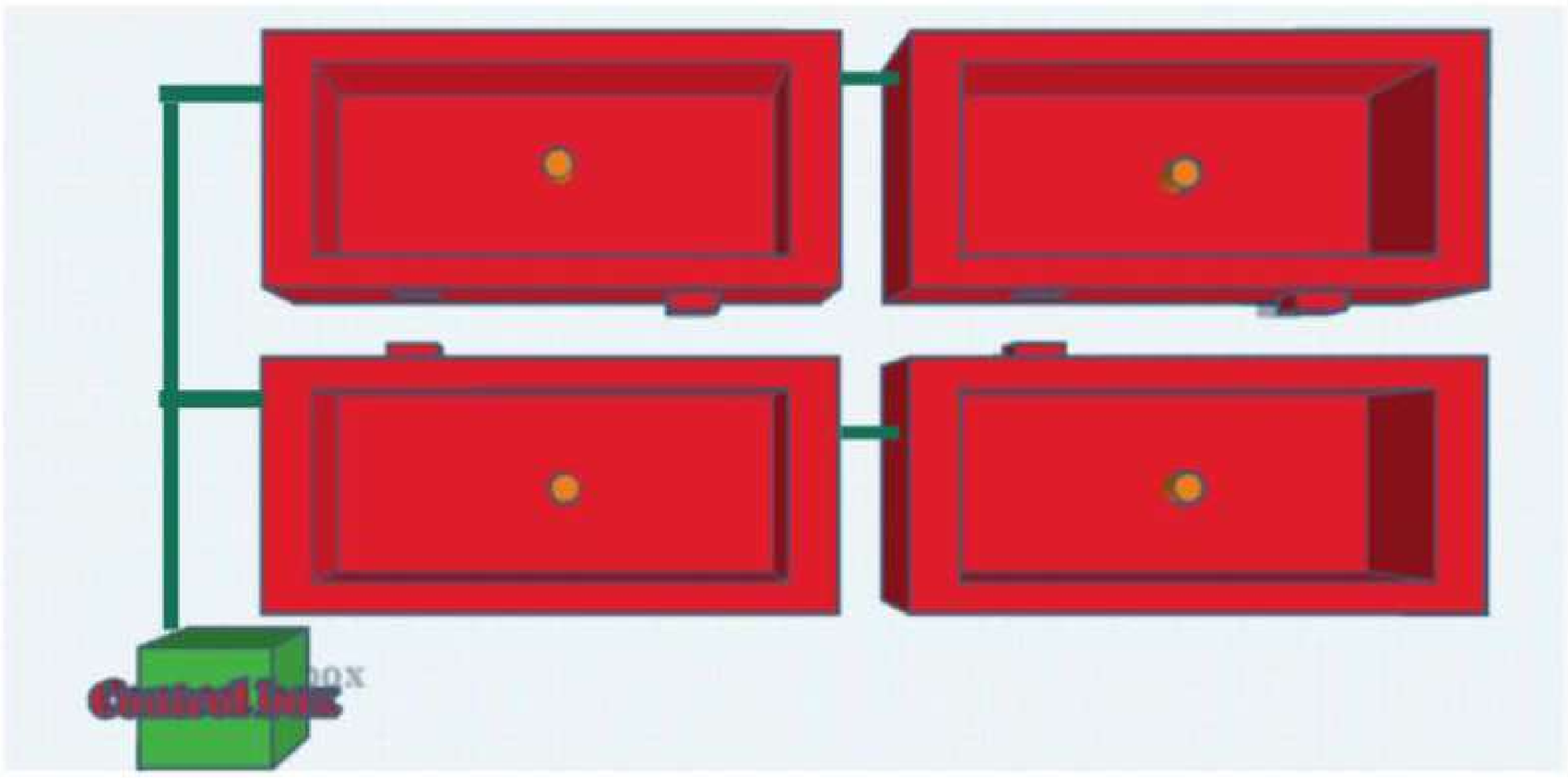
Author/s: Hồ Lê Nam

G

My project name is SoilMSQ. It is about a solution to both global hunger and the soil quality. It is a combination between the traditional farming with include techniques like intercropping and crop rotation while also having soil sensor (moisture, NPK, PH) which will automatically trigger water sprinkler, report to an app to tell farmer: " These plant in plot 2 need more nitrate. In Plot 6, the PH is too high, etc". I would need a dataset about the optimum soil quality for what type of plant. (e.g: a farmer type "cabbage" into the app then the optimum soil quality should change and the system shall follow it.

Problem and effect:

Soil quality significantly influences crop health and yield. Healthy soil enhances nutrient availability, water retention, and microbial activity, leading to robust plant growth. Poor soil conditions can result in reduced fertility, increased pests, and ultimately lower agricultural productivity and economic loss.



In each 30m² section, the following components are drawn and labeled:

Soil Sensor Probe: A single probe is shown inserted into the soil. An arrow points to it with the label "Integrated Sensor (Moisture, NPK, pH)."

Sprinkler Head: A sprinkler head is depicted in the center of the section, with lines indicating a spray of water. It is labeled "Automated Water Sprinkler."

Control Box: A small, weatherproof box is shown near the edge of the section, connected to the sensor and the sprinkler by wires. This is labeled "Local Control Unit."

The prototype enhances yield and quality by utilizing integrated sensors for real-time monitoring of soil conditions, ensuring optimal moisture and nutrient levels tailored to specific crops. Automated irrigation maintains ideal moisture levels, while cloud-based analysis provides actionable insights. In contrast, traditional farming lacks such precision, often leading to inconsistent yields and quality due to reactive rather than proactive management.

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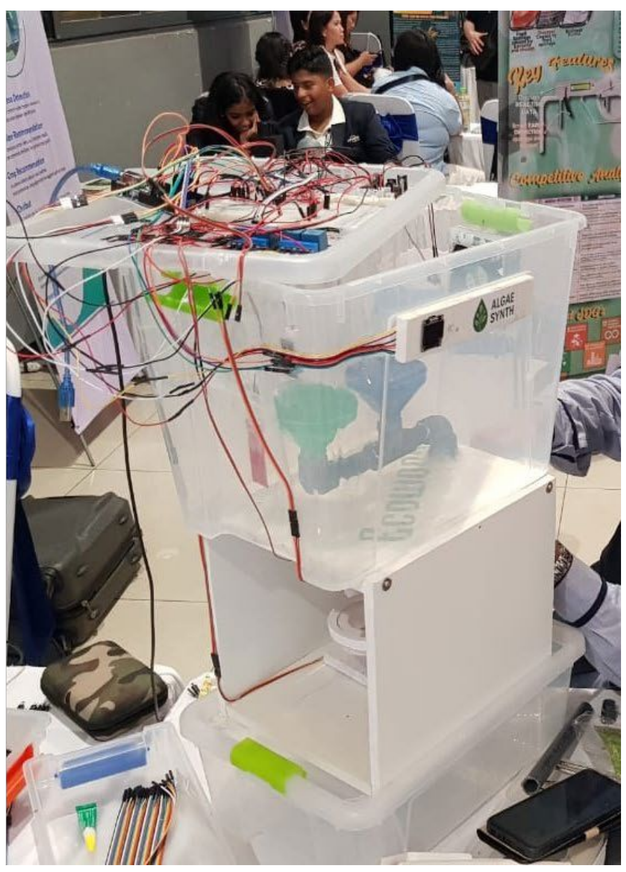
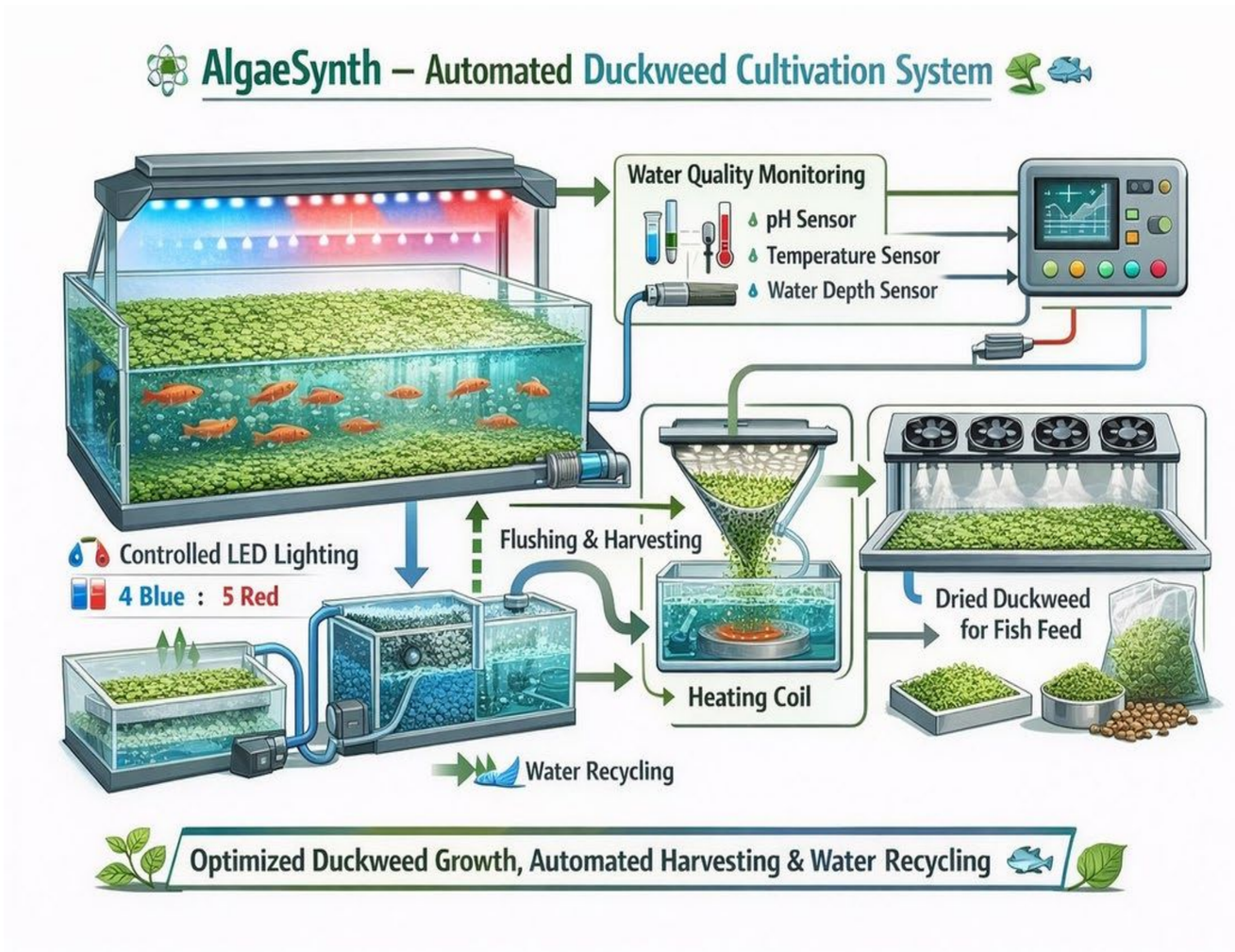
AlgeaSynth

Hussain Shabbir

AlgaeSynth is a smart cultivation system designed to increase the production speed and efficiency of duckweed, a low-cost and highly nutritious fish feed. The project creates a controlled environment that optimizes the conditions required for rapid duckweed growth. The system uses a custom LED lighting setup with a 4:5 ratio of blue to red light, which research suggests is the most effective spectrum for duckweed growth. This controlled lighting allows the plants to grow faster compared to natural conditions. To maintain ideal environmental conditions, the system continuously monitors water pH, temperature, and water depth using dedicated sensors. A heating coil is also installed to maintain warm water, as duckweed thrives in higher temperatures. When the duckweed reaches a suitable density, the system allows it to be flushed through a funnel-based sieve mechanism for harvesting.

The harvested duckweed is then naturally dried with the help of multiple exhaust fans, preparing it for use as fish feed. To make the system more sustainable and resource- efficient, the flushed water is filtered and recycled back into the cultivation tank. By combining controlled lighting, automated monitoring, efficient harvesting, and water recycling, AlgaeSynth creates a complete duckweed production system that helps farmers produce fish feed more quickly, sustainably, and at a lower cost.





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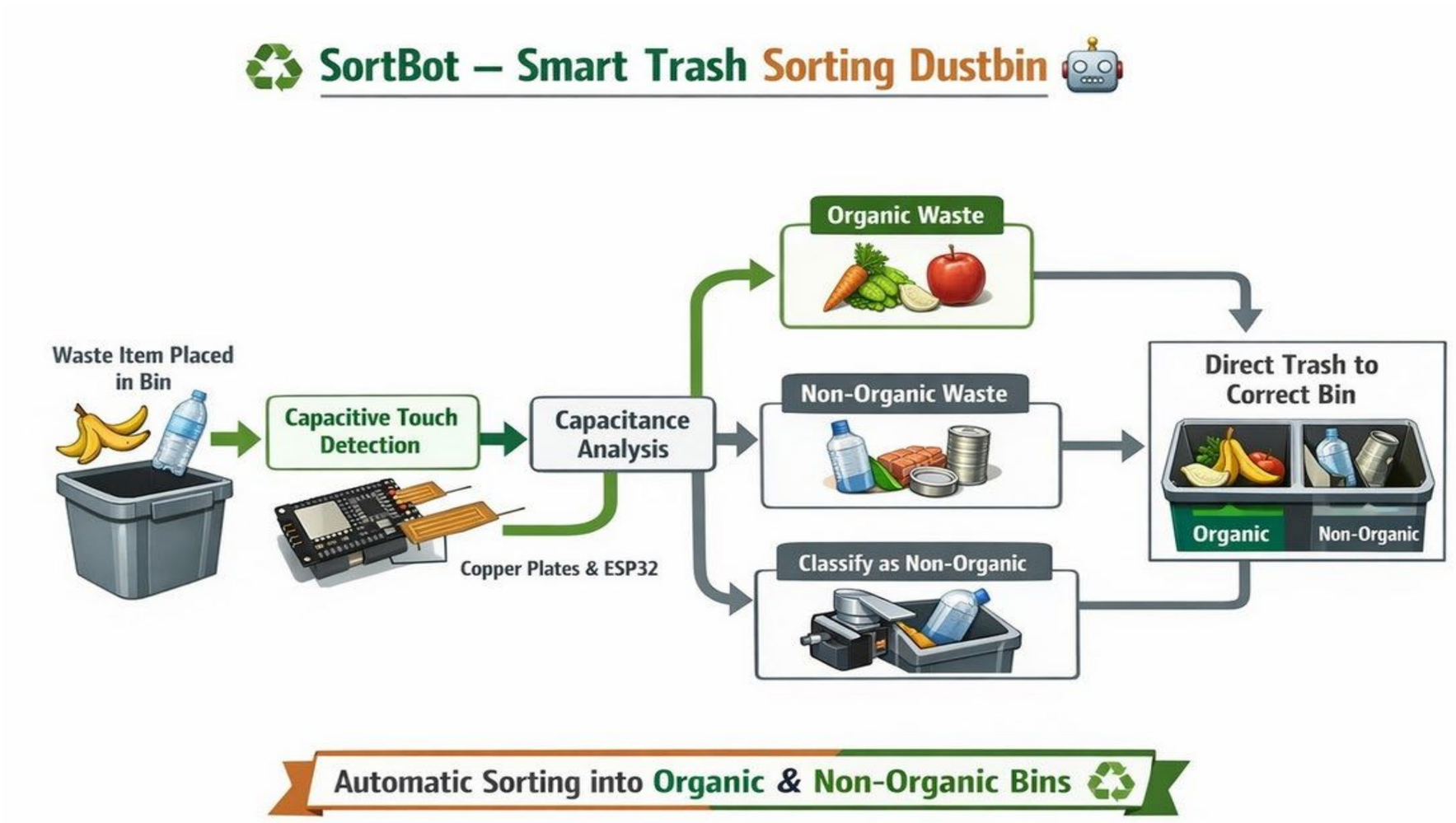
SortBot

Burhanudin Abdeali, BurhanuddinHuzefa, Burhanuddin Hussain:

SortBot is an intelligent dustbin designed to automatically separate waste into organic and non-organic categories. The system uses copper plates connected to the capacitive touch pins of an ESP32 to detect the capacitance of the item placed in the bin. Different materials produce different capacitance values, allowing the system to identify the type of waste.

Once the waste is detected and classified, a servo motor inside the dustbin rotates a divider to direct the trash into the correct compartment. By automating the sorting process, SortBot helps improve waste management, recycling efficiency, and environmental sustainability while making trash disposal simple and convenient.



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RESEARCH AND DEVELOPMENT STATION FOR POTATO TARGU SECUIESC

ROMANIAN POTATO VARIETY:

COVASEC

Patent APPLICATION: **No. 00752 / 12.11.2024**

Authors: Anca – Mihaela BACIU, Luiza MIKE

G

Potato variety obtained by sexual hybridization between Collete x Laura, followed by individual clonal selection.

The plant is tall, with intermediate foliage structure and semi-erect habit. Leaf color is medium green. The presence of secondary leaflets is strong.

The inflorescence is small in size. The flower corolla is medium in size and shows absent or low intensity of anthocyanin coloration on the inner surface.

The tubercle is oval-elongate in shape with medium eye depth. The skin color is light beige and the flesh color is light yellow. The tubercle has medium pulp gloss and the eye base color is white.

Physiological characteristics. The Covasec potato variety belongs to the group of semi-mature varieties.

Quality characteristics. The culinary quality of the variety is good, falling into quality group B.

Production capacity. The Covasec variety has a good production capacity, yielding on average 36.0 t/ha during the test period.

The Covasec variety can be cultivated in favorable potato-growing areas throughout the country.

MINISTERUL AGRICULTURII ŞI DEZVOLTĂRII RURALE
INSTITUTUL DE STAT PENTRU TESTAREA ŞI ÎNREGISTRAREA SOIURILOR

Nr. 5699 / 09.07.2023

CERTIFICAT

privind înregistrarea soiului de cartof
COVASEC,

creat de: Staţiunea de Cercetare-Dezvoltare pentru Cartof Târgu Secuiesc
autori: Anca Mihaela Baciu, Luiza Mike

În reţeaua Institutului de Stat pentru Testarea şi Înregistrarea Soiurilor, s-a efectuat examinarea tehnică a soiului de cartof TS 11-1467-1633, în perioada 2021-2023 .
La încheierea ciclului experimental acest soi a fost înregistrat, în Catalogul oficial al soiurilor de plante de cultură din România, sub denumirea de COVASEC.
Soiul se poate cultiva în zonele favorabile culturilor de cartof, începând cu anul 2024.

Director General,
Mihai POPESCU

F-7.5-06 Rev. 0

Contact: www.scdctargusecuiesc.ro;
e-mail: anca.mihab@gmail.com
Address: 15 Orban Balazs Street
Post code: 525400, Targu Secuiesc / Covasna / Romania

RESEARCH AND DEVELOPMENT STATION FOR POTATO TARGU SECUIESC

ROMANIAN POTATO VARIETY:

TRANSEC

Patent APPLICATION: **No. 00753 / 12.11.2024**

Authors: Anca – Mihaela BACIU, Luiza MIKE

G

Potato variety obtained by sexual hybridization between ALMERA x Laura, followed by individual clonal selection.

The plant has medium height, intermediate foliage structure and erect habit. Leaf color is light green. The presence of secondary leaflets is medium.

The inflorescence is small in size. The flower corolla is small in size and shows a faint intensity of anthocyanin coloration on the inner surface.

The tubercle has an oval shape and shallow eye depth. The skin color is yellow and the flesh color is cream. The tubercle has a smooth pulp gloss and the eye base color is yellow.

Physiological characteristics. The Transec potato variety is classified in the group of semi-hardy varieties.

Quality characteristics. The eating quality of the variety is good, falling into quality group B.

Production capacity. The Transec variety has a good yield capacity, averaging 42.51 t/ha during the test period.

The Transec variety can be grown in favorable potato growing areas throughout the country.

MINISTERUL AGRICULTURII ŞI DEZVOLTĂRII RURALE
INSTITUTUL DE STAT PENTRU TESTAREA ŞI ÎNREGISTRAREA SOIURILOR

Nr. 5700 / 09.07.2023

CERTIFICAT

privind înregistrarea soiului de cartof
TRANSEC,

creat de: Staţiunea de Cercetare-Dezvoltare pentru Cartof Târgu Seculesc
autori: Anca Mihaela Baciu, Luiza Mike

În reţeaua Institutului de Stat pentru Testarea şi Înregistrarea Soiurilor, s-a efectuat examinarea tehnică a soiului de cartof TS 12-1497-1573, în perioada 2021-2023 .
La încheierea ciclului experimental acest soi a fost înregistrat, în Catalogul oficial al soiurilor de plante de cultură din România, sub denumirea de TRANSEC.
Soiul se poate cultiva în zonele favorabile culturilor de cartof, începând cu anul 2024.

Director General,
Mihai POPESCU

F-7.5-06 Rev. 0

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Address: 15 Orban Balazs Street
Post code: 525400, Targu Secuiesc / Covasna / Romania

PRACTICAL LABORATORY – DIGITAL TECHNOLOGIES IN FRUIT CULTURE: SMARTREE

Patent/project number: **CNFIS-FDI-2020-0580**

***Author/s*:Pecingină Irina, Grofu Florin, Călinoiu Ion, Cosmin Zah, Gîlcă Gheorge**

G

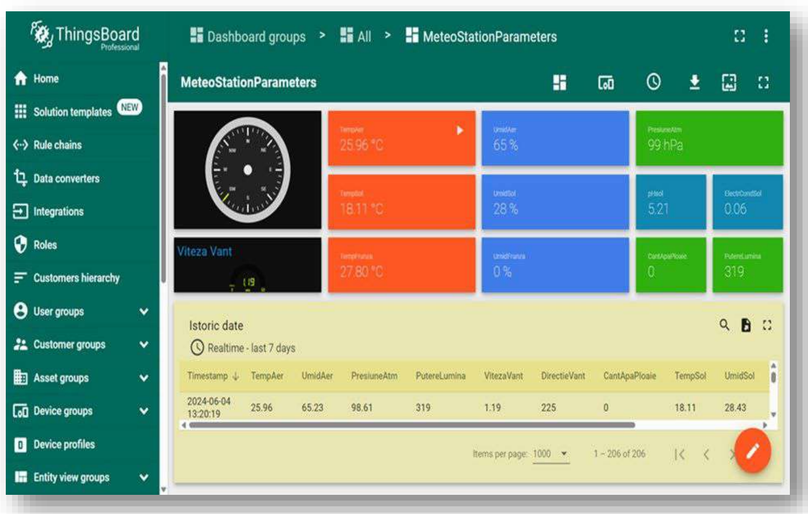
PURPOSE/OBJECTIVES OF THE PROJECT

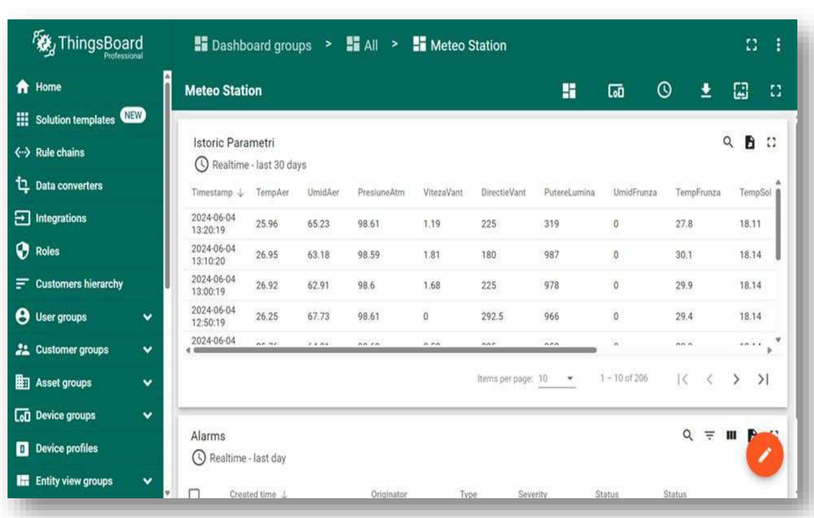
- **accommodation with modern technologies in the horticultural sector to ensure the monitoring and optimization of the plant growth and development process by: getting real-time data on climate change and how it directly affects the horticultural sector; early warning about the conditions that favor the occurrence of diseases in plants; real-time measurement of the degree of development of trees, leaves and fruits and alerting if the parameters expected at various development thresholds are not compliant.**
- **the use of the measurement and analysis capabilities of the practical laboratory in the field of intelligent agriculture in fruit growing - the implementation of didactic activities, research activities, internships in the field, specialty and for the development of students' diploma projects, within the undergraduate study program Engineering and Management in Public Food and Agritourism**
- **increasing UCB's capacity for research, innovation and technology transfer, as well as expanding the partnership with relevant economic operators**

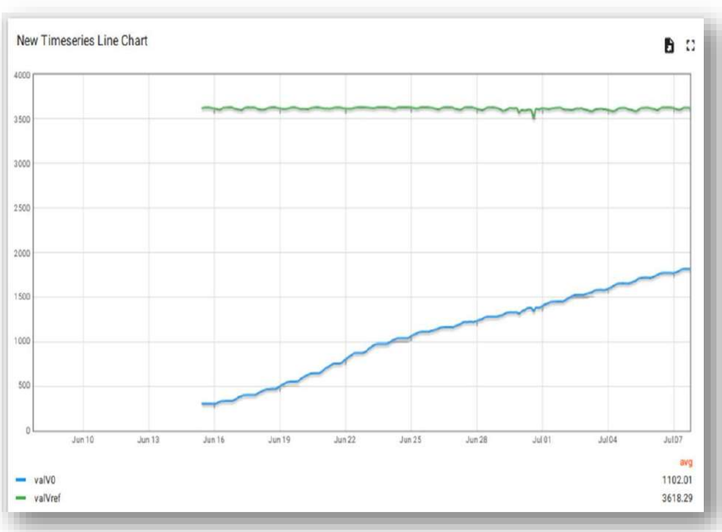
NOVELTY / BENEFITS: Adaptation and connection with the weather station; Remote control and monitoring of water resources, pH, temperature, fertilizer level, etc.; Solar radiation/temperature sensors: reduce evapotranspiration rate and potential soil water loss rate to anticipate water stress for plants; it gives a good estimate of plant development and therefore an estimate of the time of harvest; Temperature and humidity sensors: generate data on microclimate conditions that improve pest and disease analysis through algorithmic risk assessment, which informs spray composition, schedule and volume.

Weather station in the orchard

Radial dendrometers







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Hand Seeder for Sowing Pelleted Seeds

Patent/project number: MP 0006/2025
Author/s: PhD Vojin Cvijanović, PhD Marija Bajagić

G

A manual seeder for pelleted seeds enables precise seed application without hand contact in containers designed for sowing. The use of this seeding tool reduces the risk of potential disease transmission during sowing while ensuring faster, more efficient, safe, and precise sowing in containers. This facilitates good, uniform, and high-quality germination of vegetable crops.

Previous solutions for sowing pelleted seeds have primarily relied on mechanical methods (such as seeding lines) or, in the absence of machinery, on manual sowing. Pelleted seeds are often sown without an adequate seeder that would facilitate the process.

In modern agricultural production, there are no similar manual seeders specialized for sowing pelleted seeds. This type of manual seeder is suitable for sowing pelleted seeds of various sizes, providing a fast, simple, efficient, and safe sowing method.

Also, one of the advantages of pelleted seeds is that the coating around the seed contains nutrients, fungicides, and insecticides, which improves germination and protects the seed from diseases and pests.

The material for manufacturing the manual seeder for sowing pelleted seeds is available on our market and can be produced and processed using existing machining techniques, as its production is simple.

The manual seeder for pelleted seeds comprises a reservoir with a funnel on one side for easy seed pouring, featuring a closure for controlled dispensing. The funnel is designed to enhance ease of use and operation. Inside the reservoir, an opening accommodates the seed ejection mechanism. The lower part of the reservoir includes a tapered extension that narrows upward, ending in an opening to maintain the mechanism's functionality. On the opposite end of the reservoir, a button is connected to the mechanism, enabling seed release.

Picture 1. Sowing by hand in containers

Picture 2. Difference Between Pelleted and Non-Pelleted Seeds

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AGRICULTURAL BIOTECHNOLOGIES BASED ON COORDINATION COMPOUNDS OF BIOMETALS

Patents: MD 510, MD 511, MD BSD 813

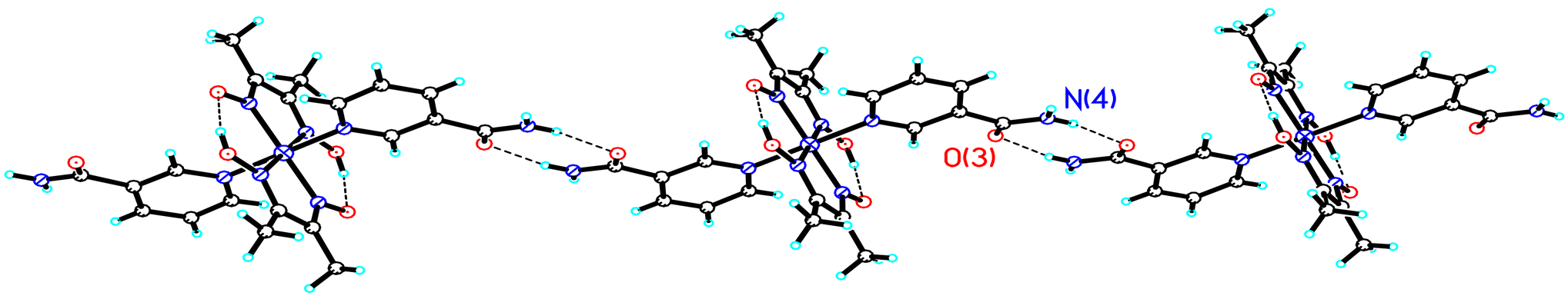
Authors: Eduard Coropceanu, Anastasia Ștefârță, Ion Bulhac

G

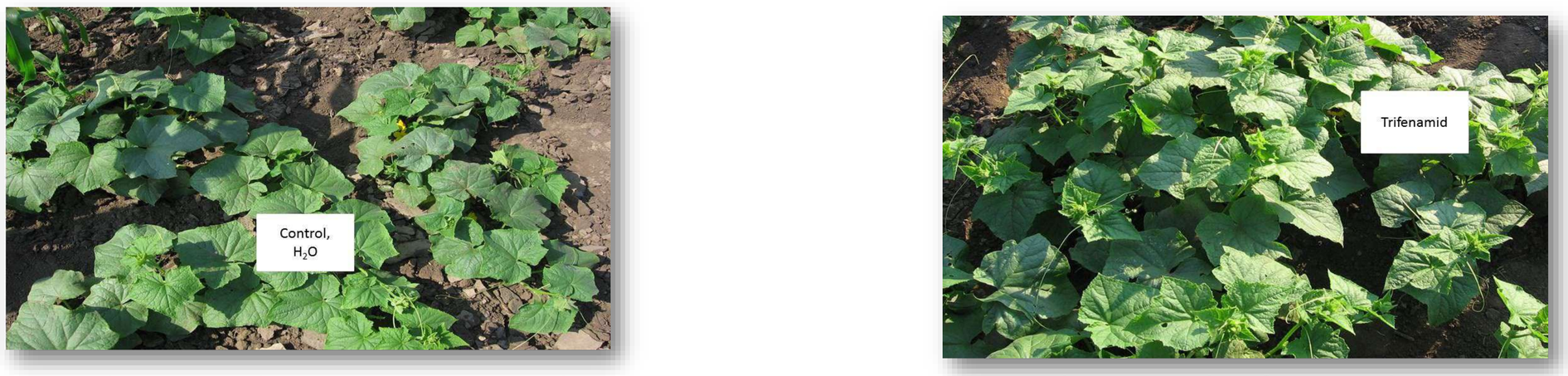
The coordination compounds of transition metals with oxime ligands possess properties of bioactive substances with a positive impact on plant growth, development, resistance and productivity. Treating the seeds for sowing and the leaf apparatus during the growing season, with aqueous solutions of Difecoden, Difemanden, Coditiaz, Conimid, Cobamid conditions the optimization of the functional state, growth and development of corn, soybean, sugar beet, cucumber, tomato, beetroot, peanut plants , both in favorable humidity conditions and in a moderate water deficit. The coordinative compounds used have the property of activating vital processes already at the initial stages of individual plant development, stimulate the growth of the root system, ensure the homeostasis of the water status in conditions of suboptimal water regime, increase plant productivity, strengthen the body's protective functions, increasing tolerance to suboptimal factors.

In conditions of low humidity, Difecoden, Cobamid, Conimid and Coditiaz have an influence of reducing the effect of drought on the formation of the assimilative apparatus, the accumulation of biomass and the harvest of plants. The use of coordinative compounds in combination with water-soluble polymers (PVP, coVP) ensures the reduction of water consumption in the transpiration process without negative consequences on the accumulation of plant biomass.

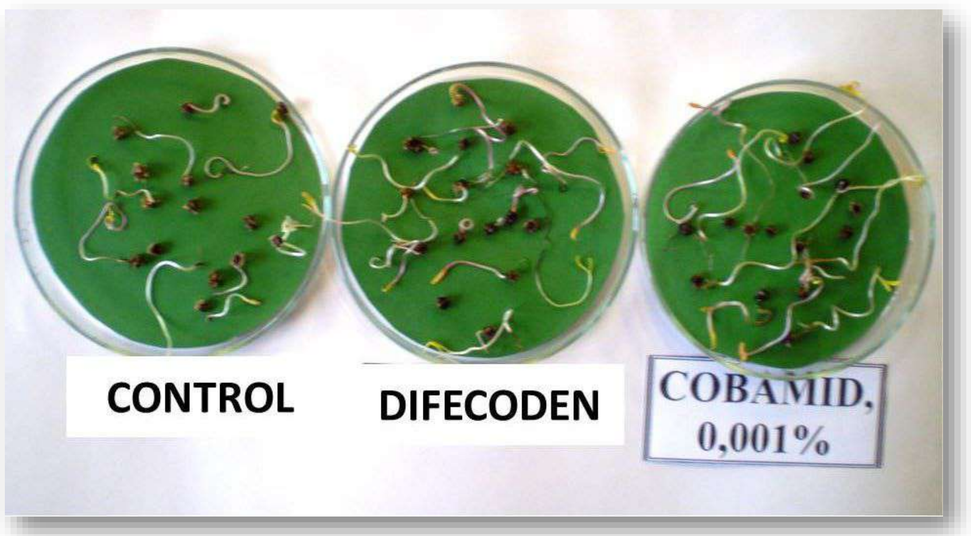
The coordinative compounds Difecoden, Conimid and Fludisec, possess antioxidant properties that are manifested in increasing the antioxidant protection capacity of the treated plant organs as a consequence of the intensification of antioxidant enzyme activity in them with a positive impact on plant productivity.



Formation of hydrogen bonds and of the unidimensional pseudo chain in $[Co(DH)_2(Nia)_2][BF_4]\cdot 2H_2O$



The influence of sowing seed and foliar apparatus treatment on the growth of cucumber plants



The effect of sugar beet treatment with physiologically active substances on seedlings growth and development at the initial stage of ontogenesis (9 days after treatment)

coropceanu.eduard@upsc.md

ASSESSMENT OF SOME TRADITIONAL APPLE (*Malus domestica* Borkh.) VARIETIES TO ENCOURAGE THEIR INTRODUCTION INTO CULTIVATION

TAMARA EDINA GAL, IONUȚ DASCĂLU, OLIMPIA ALINA IORDĂNESCU

G

Description

The value of old apple varieties is given by their remarkable taste, productivity, longevity and resistance to extreme environmental circumstances. Although they possess the listed qualities, these varieties come with a series of deficiencies regarding the variability of their characters, high growth vigor, fruit appearance, or particular sensitivity to diseases and pests. However, many researchers believe that these deficiencies can be mitigated and, for this reason, the existing apple germplasm deserves increased attention and detailed study.

In the same time, apple is a rustic species with high ecological plasticity, which in superior agrotechnical conditions gives significantly higher crop than the other fruit species.

With the purpose of studying and preserving the local germoplasm, a small apple orchard was established at Pohalma Nursery in Lugoj, Timiș county, in 2017.

The aims of the research were: measuring the length of the annual growths, the growth vigour of the trees and the trunk's diameter, as well as establishing the production potential of each tree by counting the flowers and the fruits after the physiological fall, then analyzing the large and small diameter, height and mass of the fruits, their dry matter and sugar content, as well as their pH value.

The analyzed varieties are the following: *'Măr Țigănesc', 'Măr Domnesc', 'Pietros', 'Curcubătoase', 'Poinic', 'Carigate', 'Mustoase', 'Florănești', 'Botu Oii Alb', 'Măr mare', 'Pătul', 'Vițate', 'Jonathan de munte', 'Măr de Jupani', 'Mari de Berini', 'Măr dulce amar', 'Măr dulce', 'Măr plăcintă Berini', 'Șovare', 'Caslere', 'Jonathan', 'Pogace', 'Aore', 'Crețesc', 'Botu Oii de Caraș', 'Pătul de Vârciorova', 'Parmen auriu'.* The trees are all grafted on the M106 rootstock.

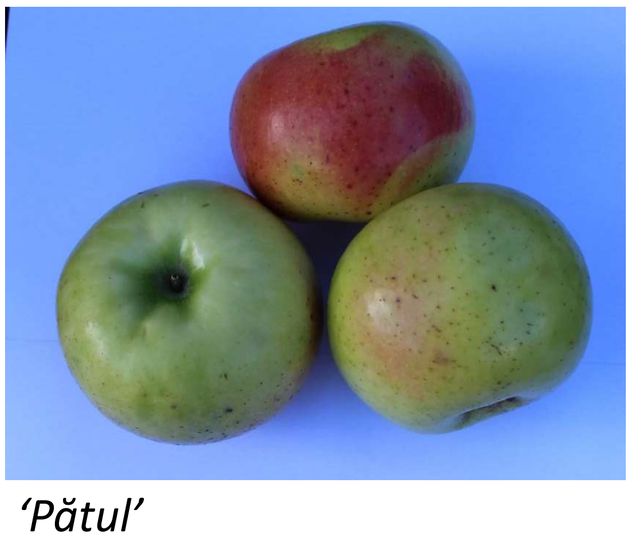
The data have been statistically processed and interpreted, then compared between the varieties.

'Botu Oii de Caraș', 'Pătul de Vârciorova' ,'Parmen auriu' and *'Măr dulce amar'* varieties stood out by production capacity. The biggest fruits were produced by *'Curcubătoase', 'Caslere', 'Jonathan'* and *'Pătul'* varieties. The highest sugar content was registered in case of *'Măr Domnesc', 'Parmen auriu'* and *'Vițate'* varieties and the most acidic fruits were obtained in case of *'Măr Țigănesc'* variety.

Further studies are ongoing in order to be able to strongly recommend a few varieties that have the maximum commercial potential, besides the well-used cosmopolitan varieties.

'Botu Oii de Caraș'

'Caslere'



'Pătul'

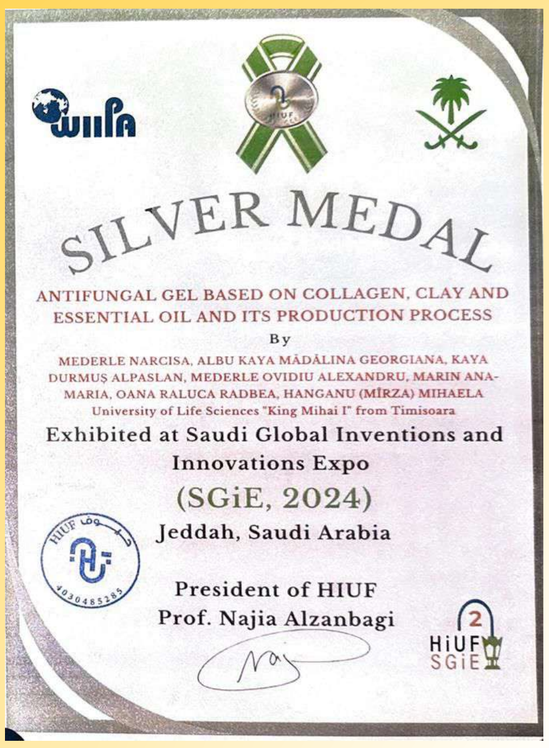
'Jonathan'

Contact: Tamara-Edina.Gal.FITA@usvt.ro

ANTIFUNGAL GEL BASED ON COLLAGEN, CLAY AND ESSENTIAL OIL AND ITS PRODUCTION PROCESS

A/00776/2024

Category G

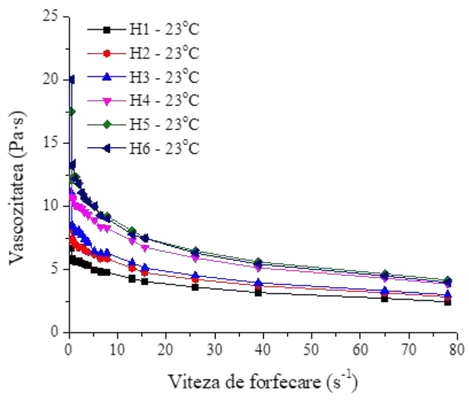


MEDERLE NARCISA, ALBU KAYA MĂDĂLINA GEORGIANA, KAYA DURMUȘ ALPASLAN, MEDERLE OVIDIU ALEXANDRU, MORARIU SORIN, MARIN ANA-MARIA, OANA RALUCA RADBEA, HANGANU (MÎRZA) MIHAELA

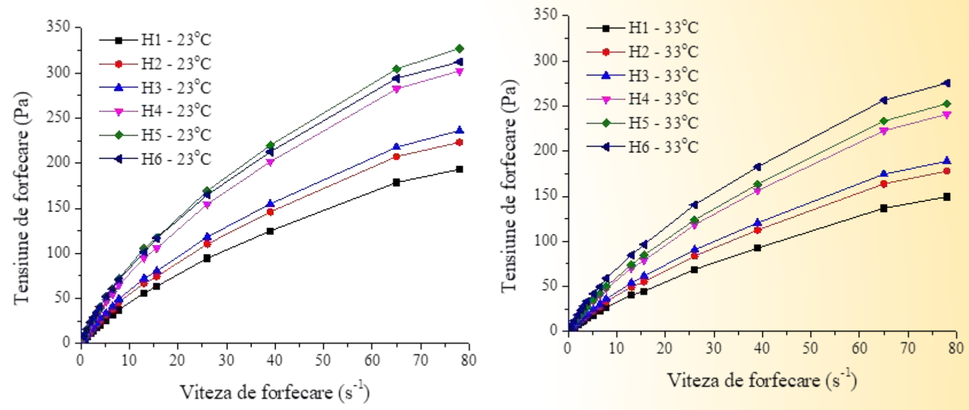
Technical field, novelty and applications

The hydrogel based on collagen hydrolyzate, methyl cellulose, yellow clay and *Thymbra spicata* essential oil with appropriate rheological properties was made as a treatment for skin affected by *Trychophyton verrucosum*, especially for calf. The hydrogel has antifungal property protecting or regenerating the skin and is recommended for veterinary use.

Physical-chemical and pharmaceutical characteristics



Viscosity rheological profiles as a function of shear rate for hydrogels analyzed at 23°C

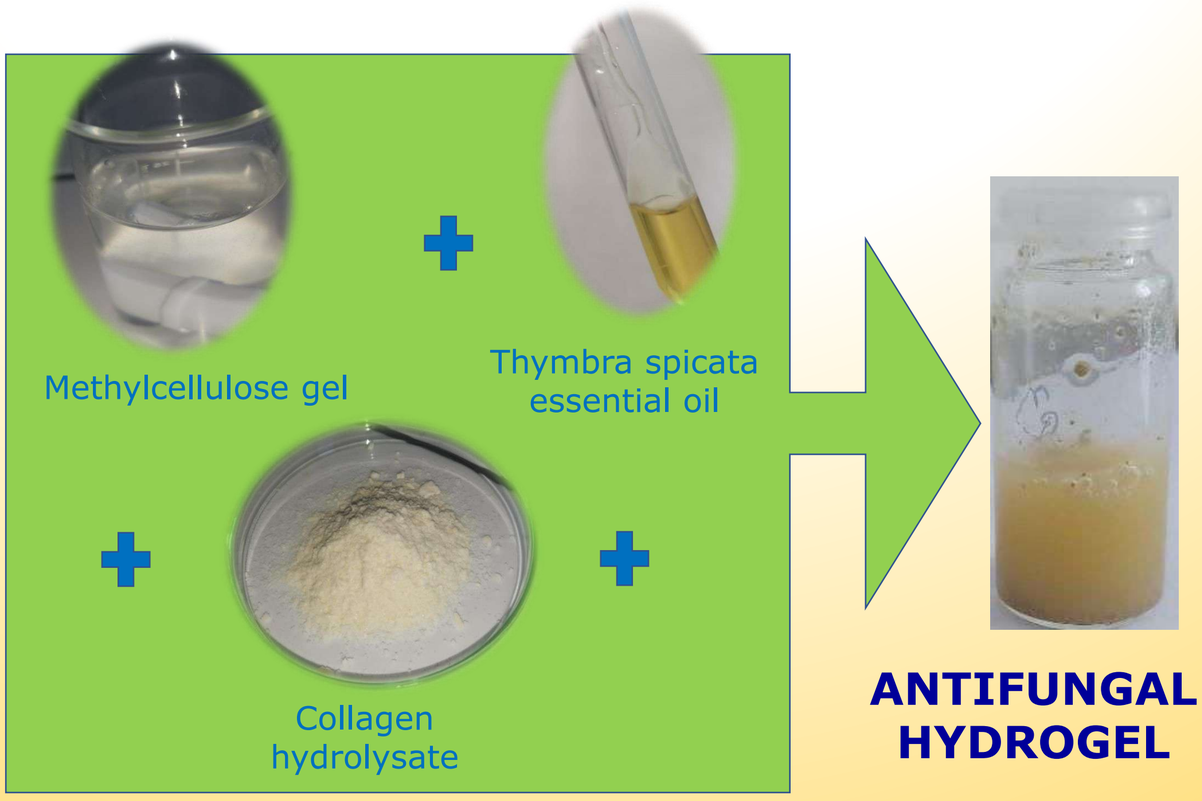


Shear stress function of shear rate H1-H6 hydrogels tested at 23 and 33°C

Composition and preparation of hydrogel

The hydrogel according to the invention is consisting in a natural polymer, 1...3% collagen hydrolysate in solution form, 3.0 ...3.5 % methylcellulose in gel form, 0.5 ...1.5% yellow clay and 0.1 ... % *Thymbra spicata* essential oil and up to 100% distilled water. The process, according to the invention, consists in mixing and homogenizing the components until a viscous hydrogel is obtained. They are rheologically tested and flow parameters are determined.

The gel has adequate rheological properties for easy application to the affected area due to its controlled viscosity; also, the essential oil with antifungal properties released from the yellow clay has the property to destroy the pathogenic fungus *Trychopyton verrucosum*, and the collagen to regenerate damaged skin and is recommended for veterinary use.



ANTIFUNGAL HYDROGEL

Advantages compared with similar products / treatments:

- ✓ **the achievement of a treatment with local/topical application for for bovine trichophytosis, a contagious skin condition caused by dermatophyte fungi or other types of animal skin infections;**
- ✓ **the use of a system in the form of a hydrogel allows it to be easily spread over the entire surface of the skin, and does not require adjuvant oral treatment;**
- ✓ **the hydrogels with collagen hydrolysates provide a proper environment for tissue regeneration, are biocompatible and have antiparasitic action.**

Contact: narcisamederle@usvt.ro

International Exhibition
INVENTCOR

RESEARCH ON THE IDENTIFICATION OF INTESTINAL HELMINTHS IN JACKALS (*CANIS AUREUS*) AND FOXES (*VULPES VULPES*) IN TIMIS COUNTY, ROMANIA

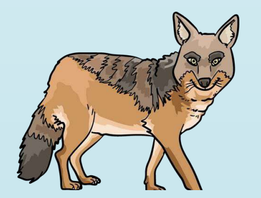
MORARU MARIA MONICA FLORINA, MARIN ANA-MARIA, POPOVICI DAN CORNEL, MEDERLE NARCISA

Category G

The Golden Jackal (*Canis aureus*) and the Red Fox (*Vulpes vulpes*) are widespread throughout the world, and in Central Europe, they are the most representative wild species of the family Canidae. The epidemiological importance attributed to these species is relevant as *C. aureus* and *V. vulpes* play a definitive host role for intestinal parasites, including zoonotic helminths. *C. aureus* and *V. vulpes* cestode infections have been recorded throughout the distribution range of these canid species, with a relatively high species diversity.

The present project aimed to identify the parasitic fauna of *C. aureus* and *V. vulpes* in the hunting grounds of Timis County.

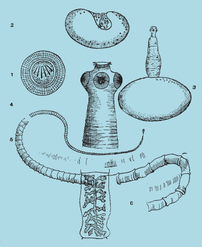
In this project, 41 intestines of *C. aureus* and 47 intestines of *V. vulpes* were analyzed.



The results of necropsy examination of the intestines of *C. aureus* showed the presence of:

- *Taenia* spp. - 1/30 (3.33%)
- *Ancylostoma/ Uncinaria* - 18/30 (60%)
- Tapeworms and roundworms - 2/30 (6.66%)
- Tapeworms and *Ancylostoma/ Uncinaria* - 7/30 (23.33%)
- Tapeworms, roundworms and *Trichocephalus* spp. - 2/30 (6.66%)

The results of necropsy examination of the intestines of *V. vulpes* showed the presence of:



- *Taenia* spp. - 4/35 (11,42 %),
- Roundworms - 4/35 (11,42 %),
- *Ancylostoma/ Uncinaria* - 3/35 (8,57 %),
- Tapeworms and roundworms - 5/35 (14,28 %),
- Roundworms and *Trichocephalus* spp. 4/35 (11,42 %),
- Tapeworms and *Ancylostoma/ Uncinaria* - 5/35 (14,28 %),
  Roundworms and *Ancylostoma/ Uncinaria* - 10/35 (28,57 %)

The co-infections of cestodes with that of roundworms and other nematodes highlight the complexity of parasitic infections in these animals.

This study provides new information on the intestinal parasitic fauna of *C. aureus* and *V. vulpes* in Timis County and warns of the risk of human contamination with zoonotic species.

Contact: mariamoraru@usvt.ro

Liposomal Carrier Encapsulating *Lavandula angustifolia* Oil and Eugenol for Antifungal, Antibiofilm, and Anti-Inflammatory Activity Against *Candida albicans*

Patent/project number:LAV-EUG-LIPO-24-01
Author/s: OBIȘTIOIU MONICA DIANA, HULEA ANCA SOFIANA, BREZOVAN DIANA, FLOAREȘ (OARGA) DORIS, POPESCU IULIANA, IMBREA ILINCA MERIMA, HULEA CĂLIN, POPESCU COSMIN ALIN, IMBREA FLORIN

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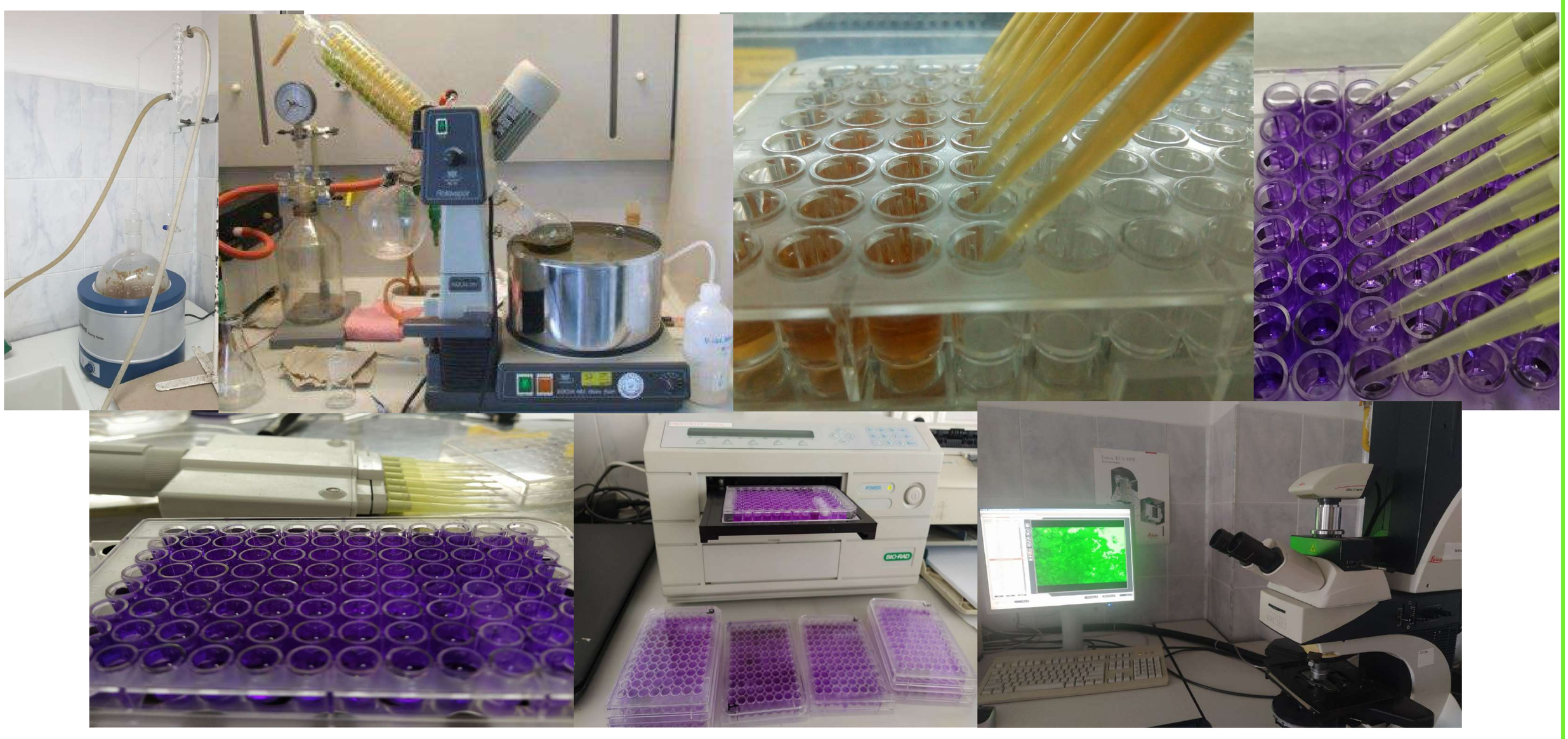
UNIVERSITY OF LIFE SCIENCES ”KING MIHAI I” FROM TIMISOARA

This research project focuses on developing a liposomal delivery system incorporating *Lavandula angustifolia* (Lavender) essential oil and eugenol as a natural antifungal, antibiofilm and anti-inflammatory formulation. The study aims to assess the efficacy of liposome-encapsulated bioactives against *Candida albicans* biofilm, particularly in the oral cavity, and its potential for reducing inflammation associated with fungal infections. Liposomes as drug carriers enhance stability, bioavailability, and control the release of active compounds. Their role is also to improve penetration in fungal biofilms, increasing antifungal efficiency. *Lavandula angustifolia* essential oil, also obtained in our laboratory, contains linalool and linalyl acetate, which are known for their antifungal, anti-inflammatory, and soothing properties. The presence in the liposome system, besides the antifungal effect, helps reduce irritation and discomfort caused by fungal infections. Eugenol (as a standard bioactive component) is a potent antifungal compound disrupting *Candida albicans* cell membranes. The bioactive standard synergises with lavender oil to enhance antifungal and anti-inflammatory activity. The system ensures controlled release, improved penetration, and prolonged antifungal activity. The Lipid Phase (Phospholipid Membrane) included 1% *Lavandula augustifolia* essential oil and 0.5% bioactive standard. Considering the enhanced efficacy observed with liposomal encapsulation, the MIC ranging from 125 µg/mL to 250 µg/mL proved to be lower than the MIC demonstrated by the free components (eugenol 800 µg/mL and *Lavandula* essential oil at 380 µg/mL).



Contact: dianaobistioiu@usvt.ro

SUPERVISED AND UNSUPERVISED CLASSIFICATION BASED ON REMOTE SENSING FOR STUDY OF AN AREA

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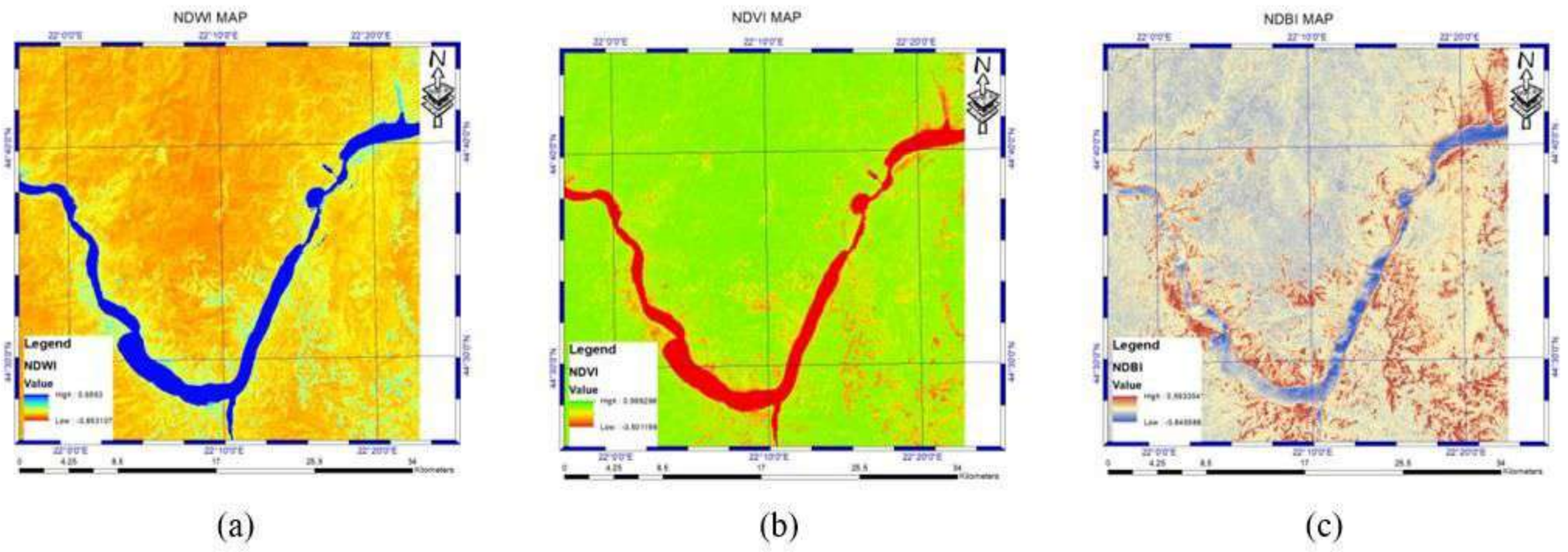
Author/s: *Cosmin Alin Popescu, Adina Horablaga, Mihai Valentin Herbei*
Radu Bertici, Daniel Dicu, Florin Sala

Overview

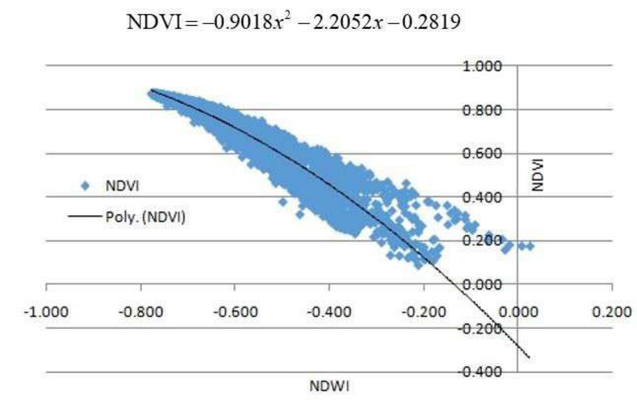
Supervised and unsupervised classification, based on remote sensing, was used to study a territorial perimeter. NDWI, NDVI and NDBI indices were calculated based on satellite imagery. The NDVI variation relative to NDWI was described by a polynomial equation of degree 2, in statistical safety conditions (R2 = 0.910, p <0.001). Unsupervised classification (U-class), based on the Iso Cluster algorithm (iterative process, which assigns each cell to a cluster based on Euclidean distances) and supervised classification (S-class), based on the Maximum likelihood algorithm (allocate each pixel to a class based on of maximum probability), led to the detection of three categories in the studied territory, with close values; water, vegetation, constructions (p <0.001 (95%). Remote sensing provides useful spectral information for the analysis of an area, and the operator can decide on one method or another of classification in relation to the additional information held in the territory under consideration.



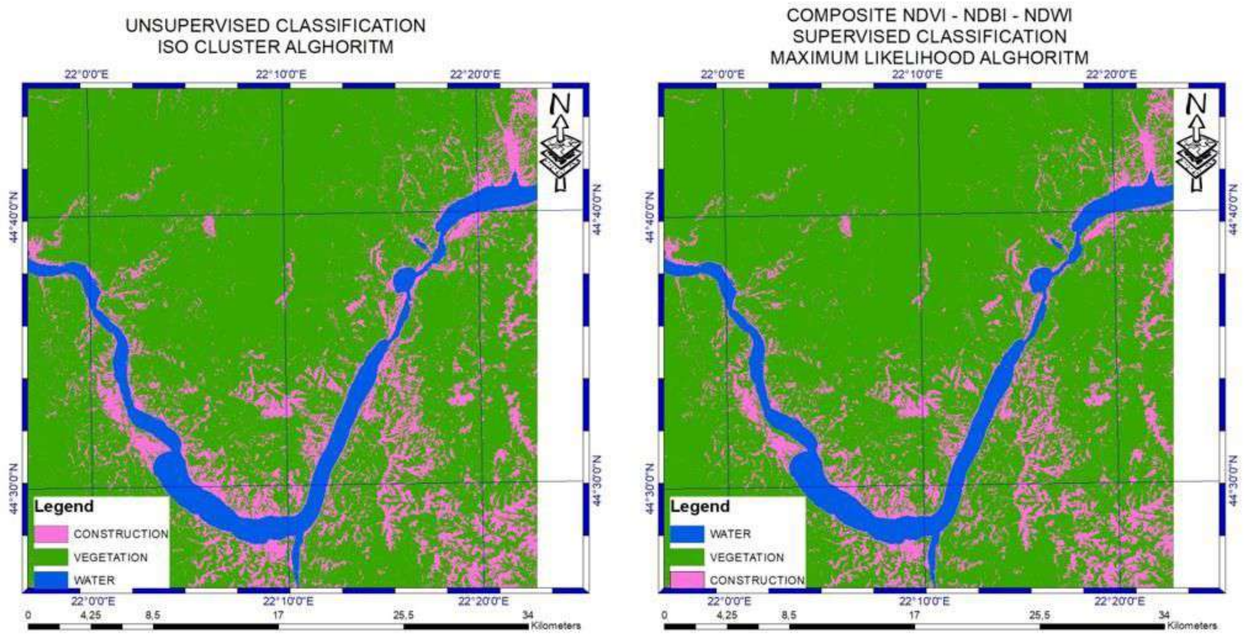
(a) (b) (c)

Graphical representation of the studied territory based on the maps of the NDWI (a), NDVI (b) and NDBI (c) indices

$$NDWI = (Band3 - Band8)/(Band3 + Band8)$$
$$NDVI = (Band8 - Band4)/(Band8 + Band4)$$
$$NDBI = (Band11 - Band8)/(Band11 + Band8)$$



Graphic distribution of NDVI values in relation to NDWI, in the conditions of the studied territory



(a) (b)

Comparative presentation of classes obtained by unsupervised classification, U-class (a) and supervised classification, S-class (b) for the studied territory

Supervised classification involves the user knowing the territory, the categories of elements in the territory that are considered for classification, and the conscious assignment of a reference element in each class, following that the software considers all elements (pixels) with the same properties in the same class. In case of unsupervised classification, the software uses databases with predefined elements, so updating them is important. Given that the beneficiary / operator know the reality of the studied territory, the supervised classification is easier.

Contact: : *cosmin_popescu@usvt.ro*

MANUFACTURING PROCESS AND ROOTING PRODUCT BASED ON WILLOW EXTRACT (SALIX GENUS)

Patent number: RO131178 (B1) — 2019-01-30

G

POŞTA DANIELA SABINA, HĂDĂRUGĂ NICOLETA GABRIELA, PEŢ ELENA, POŞTA GHEORGHE MARINEL, PEŢ IOAN, CAMEN DUMITRU, HĂDĂRUGĂ DANIEL IOAN

Description

The aim of this procedure was the development of a manufacturing process and a rooting product based on liquid willow extract, which has an effective biostimulant activity on the root system, with applications in horticulture, forestry, and agriculture…
For the purpose of root system biostimulation (rooting), the bioactive compounds from willow (especially salicin and auxin) are easily assimilated and promote the development of a very strong root system. This provides horticultural, forestry, and agricultural species with healthy growth and increased drought resistance. The most effective concentrations were obtained from willow extract at a mass ratio of 40-60% (relative to the plant material).

The manufacturing process and rooting product based on willow extract, according to the invention, offer the following advantages:
•Reduced rooting period (by approximately 25-30 days);
•A well-developed, vigorous root system, which ensures proper plant growth, with longer, denser, and stronger roots;
•The process and materials used in obtaining the product result in a low-cost rooting product;
•The application time of the product (by immersion) is only 2-3 seconds, significantly shorter than other products;
•A strong root system allows for faster and more efficient nutrient absorption, increasing drought resistance by storing essential nutrients in the root;
•Resistance against various pathogens;
•Absolutely no handling risks.

Roots of Tuja occidentalis L.

Control

Use of the rooting product (Variant II) – liquid form, with a plant material-to-water ratio of 40-60%. The root length is approximately six times larger and more branched

Roots of Ligustrum vulgare L.

Control

Use of the rooting product (Variant II) – liquid form, with a plant material-to-water ratio of 40-60%.

Contact: danielaposta@usvt.ro

6th International Exhibition INVENTCOR
3-5 April 2025 – Deva, Romania

MINERAL PREMIX USED FOR LAYING HENS REARED IN ECOLOGICAL SYSTEM

Patent No. RO 132411 B1/29.01.2021

ŞTEF LAVINIA, JULEAN CĂLIN, SIMIZ ELIZA, PEŢ IOAN
University of Life Sciences "King Mihai I" from Timisoara

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Description

Organic poultry production in the EU is regulated by consolidated text Council Regulation (EC) No 834/2007 and Commission Regulation (EC) No 889/2008. These outline a number of general principles and they also detail various technical restrictions. The terms “organic poultry” are commonly used among both consumers and producers of eggs and poultry meat. In order to comply with the mineral requirements, it is necessary to use some microelements sources agreed by the specific legislation.

The invention refers to the design and testing of a mineral premix structure dedicated for laying hens reared in ecological systems, producing eggs for human consumption, applicable in the zoo-veterinary field.

The original formulation of structure of mineral premix specific for laying hens, according to this patent is based on:

-establishing through laboratory analyzes the content of microelements of main feeds used in the feed of laying hens maintained in an ecological system. The micromineral content values of the basic feed were established at 60 ppm Fe, 20 ppm Mn, 28 ppm Zn, 7 ppm Cu, 0.12 ppm Co, 0.06 ppm I and 0.26 ppm Se, which indicates a satisfaction of the mineral requirements in a proportion of 70-100% and the need to supplement them through premixes.

-through direct experiments, a mathematical equation was established with a high coefficient of multiple determination for each of the 7 microelements studied, resulting in the following values of micromineral supplementation: 10 ppm Fe, 20 ppm Mn, 20 ppm Zn, 1.5 ppm Cu, 0.125 ppm Co, 0.2 ppm I and 0.10 ppm Se.

-the structure of the specific mineral premix for laying hens maintained in an ecological system was developed, consisting of: 22.398% iron carbonate, 44.795% manganese carbonate, 26.451% zinc oxide heptahydrate, 5.567% basic copper carbonate, monohydrate 0.235% basic cobalt carbonate, monohydrate, 0.331% calcium iodate, anhydrous and 0.224% sodium selenate which is incorporated into a calcium carbonate support. The premix is introduced in a proportion of 0.5% in the structure of the concentrate mixture that is administered to this category of poultry.

It provides an optimum source of microelements preventing the deficiency states and the improvement of the bioproductive performances.

The inorganic salt mineral premix was testing on laying hens with successful preliminary results.

ROMÂNIA

DUPLICAT
ELIBERAT INVENTATORULUI
în baza Art.34 alin.(2),
din Legea nr.64/1991 republicată

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

BREVET DE INVENŢIE

Nr. 132411

Acordat în temeiul Legii nr.64/1991 privind brevetele de invenţie, republicată în Monitorul Oficial al României, Partea I, nr.613, din 19 august 2014.

Titular: UNIVERSITATEA DE ŞTIINŢE AGRICOLE ŞI MEDICINĂ VETERINARĂ A BANATULUI "REGELE MIHAI I AL ROMÂNIEI DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: PREMIX MINERAL DESTINAT GĂINILOR OUĂTOARE CRESCUTE ÎN SISTEM ECOLOGIC

Inventatori: ŞTEF LAVINIA, TIMIŞOARA, TM, RO; JULEAN CĂLIN, ARAD, AR, RO; SIMIZ ELIZA, TIMIŞOARA, TM, RO; PEŢ IOAN, COMUNA DUMBRAVIŢA, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 27/09/2016, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea şi aplicarea sigiliului
Director General

București, Data eliberării 29/01/2021

Contact: laviniastef@usvt.ro calinjulean@usvt.ro

Technology for identifying biotypes of *Lycium chinense* resistant to the attack of the gall mite on goji plants

G

Patent number: 138158 A2

Authors: Roxana Ciceoi, Oana Venat, Cătălina Nicolae, Mihaela Iordăchescu, Minodora Gutue, Adrian Asanică, Florin Stănică, Ana Butcaru, Vasilica Luchian, Mala-Maria Stavrescu-Bedivan, Dan Popescu

Description: This invention presents an advanced molecular-assisted selection procedure aimed at identifying resistant biotypes of goji (Lycium chinense) against the gall mite (Aceria kuko). The methodology integrates molecular marker analysis into breeding programs, providing a precise and efficient tool for selecting resistant plants. The process is applied to in vitro-derived plant tissues obtained from seeds following hybridization or selection processes, facilitating the development of new and valuable goji biotypes. In its final phase, the procedure employs ISSR and SSR molecular markers, enabling direct testing of planting materials and existing plantations to confirm resistance traits, thus enhancing the resilience and productivity of goji cultivation.

The invention description

The preliminary selection procedure, assisted by molecular markers, on explants obtained in vitro, to identify goji biotypes resistant to gall mite (*Aceria kuko*) infestation consists of a sequence of steps including:

1. Seed preparation
   - Harvesting goji berries from selected plants.
   - Extracting and decontaminating the seeds by immersing them in a 0.5% systemic fungicide solution for 20 minutes, followed by repeated rinsing to remove the fungicide.
   - Disinfecting the seeds using sodium hypochlorite at concentrations of 10– 15%.
1. Culture media preparation and inoculation
   - Preparing Gamborg B5(-) culture medium without growth hormones. Inoculating seeds on the prepared medium.
1. Growth monitoring and marker analysis
   - Monitoring the growth of callus/explants and seedlings.
   - Performing analyses using two ISSR-type molecular markers and one SSR- type molecular marker.
   - Selecting plant material for a full analysis sequence using SSR and ISSR molecular markers to rapidly identify biotypes resistant to gall mite infestation.

The resistant biotypes can be differentiated from the susceptible ones using 10 bands, of which 6 indicate positive resistance characteristics, while 4 are specific to sensitive biotypes only.

Primers	Bands sizes in sensitive plants (bp – base pairs)	Band sizes in resistant plants (bp – base pairs)
ISSR Primers		
Ai2	-	1670
	-	1380
	-	1280
	376	-
Ai8	600	-
	-	360
SSR Primers		
P3-P4	-	1360
	440	-
	260	-
	-	230

The benefit

The invention leverages the advantages of in vitro propagation, ensuring genetically stable and virus-free plant material, essential for breeding programs. By integrating molecular marker analysis, it offers a rapid, efficient, and precise method for identifying resistant biotypes, supporting sustainable cultivation and advancing organic production systems

CS II dr. ing. Roxana Ciceoi, Email: roxana.ciceoi@qlab.usamv.ro, Mobile: +40 721 81 61 94

New Romanian kiwiberry cultivars - ARIANA and ANDROS

G

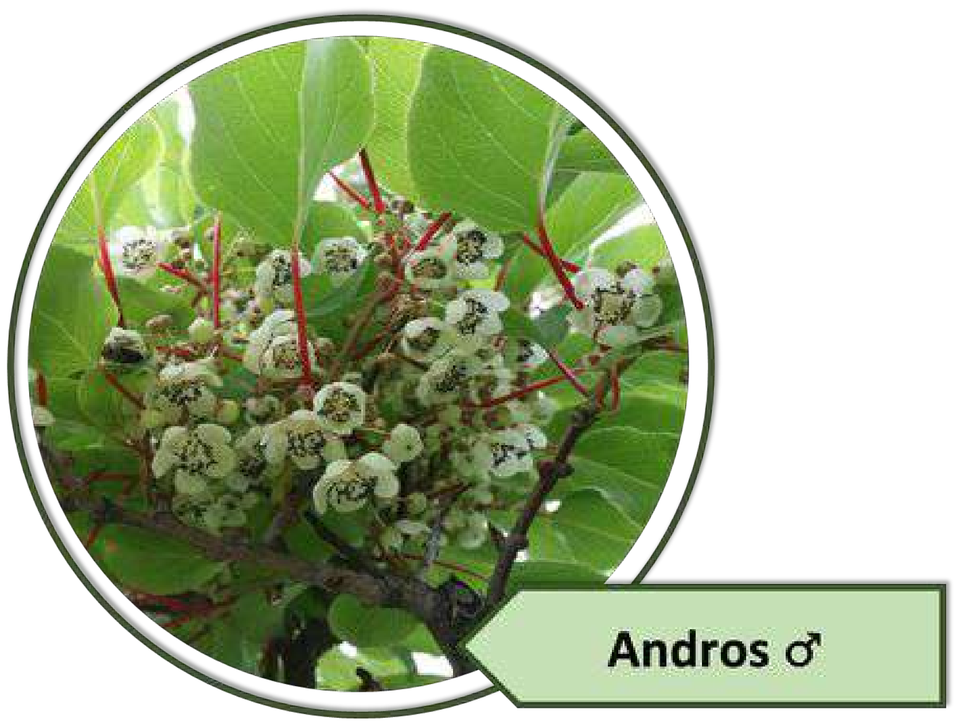
Patent/project number: 6407/31.07.2023; 6408/31.07.2023

Authors: Lavinia Mihaela UDREA (ILIESCU) [1, 4], Giuseppe ZUCCHERELLI [5], Constantin PĂUN [1], Marian Nicolae VELCEA [3], Liliana Aurelia BĂDULESCU [1, 2], Florin STĂNICĂ [1, 2]

[1] Faculty of Horticulture; [2] Research Center for Studies of Food Quality and Agricultural Products; [3] CTT-AGROBIOLIFE
University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
[4] Research Institute for Fruit Growing Pitești – Mărăcineni, Romania
[5] Vitroplant Italia, Cesena, Italy

Some results of the Romanian breeding program after more than 25 years of research on *Actinidia* spp.

- medium-large fruit:
  - weight 12-14 g, length 40 mm,
  - diameter 60.97 mm;
- fruit composition at consumption maturity:
  - 13.71% soluble solids,
  - 70.15 mg ascorbic acid/100 gfw;
- 2-3 months storage capacity, in controlled atmosphere;



- abundant flowering;
- good pollen viability and germinability;
- long flowering period, which coincides with the female selections;

Contact: iliescu_lavinia@yahoo.com; flstanica@yahoo.co.uk; ctt-agrobiolife@usamv.ro; +40741181736

Universitatea de Științe Agronomice și Medicină Veterinară – București

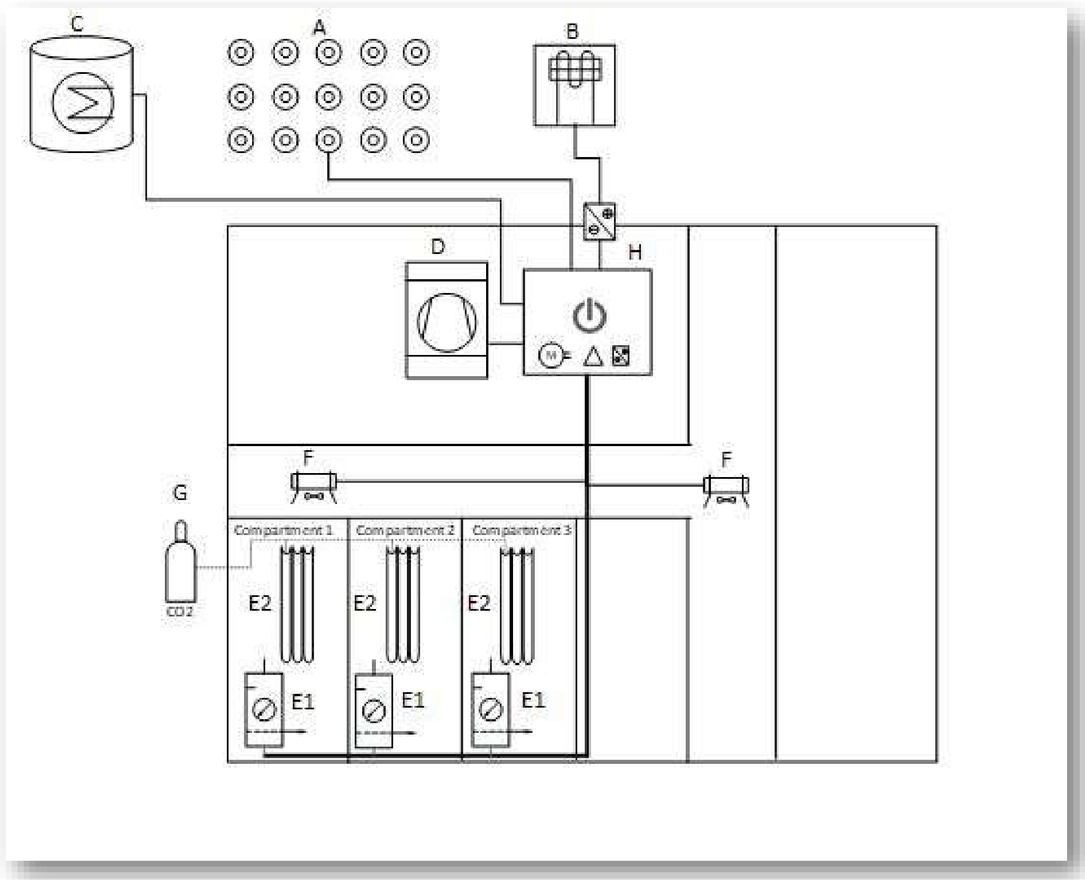
CLIMATE CONTROL ENERGY SYSTEM IN ORDER TO REDUCE ENERGY CONSUMPTION IN GREENHOUSES

G

Patent OSIM -U/0006/2025 Project nr:COD:RO-NO-2019-042
Author/s: Ionuţ Ovidiu Jerca, Liliana Aurelia Bădulescu, Sorin Mihai Cîmpeanu, Răzvan Ionuț Teodorescu, Mariana Postamentel, Sigurd Sanaan, Gether Harald

The energy system for controlling climatic factors in order to reduce energy consumption in greenhouses is intended to ensure superior energy efficiency of continuous tomato production in controlled spaces located in the temperate-continental climate zone, characterized by excessive heat in the summer.The system is based on the energy supplied by 3 water-water heat pumps that exchange heat with a ground-water heat exchanger consisting of 30 100 m deep wells and a water-air dry cooler.This heating/cooling heat supply unit allows energy modulation depending on the required needs according to an experimentation plan. The cooling capacity can have any value in the range of 25-150 kW.

The dry cooler is connected to the heat pump condenser and releases heat to the ambient space. The heat agent used is water with glycol additives.The cooling/heating agent produced by the heat pumps is transported through insulated pipes in each of the greenhouse compartments to the local distribution units - 2 in each compartment, consisting of water-to-air air heaters. These units distribute the air evenly through tubes located under the culture troughs and at the same time dehumidify the air in the greenhouse compartments.A suitable microclimate for plant growth requires an additional supply of CO2; this is ensured by a dedicated circuit supplied from cylinders.The uninterrupted operation of the entire installation is controlled by a computer, through procedures developed for summer day/night operation, winter day/night operation and spring/autumn day/night operation.



Energy system for controlling climate factorsto reduce energy consumption in greenhouses

ACKNOWLEDGMENTS:
„The researchleading to these results has received fundingfrom the NO Grants 2014-2021, under Project contractno. 40/2021”

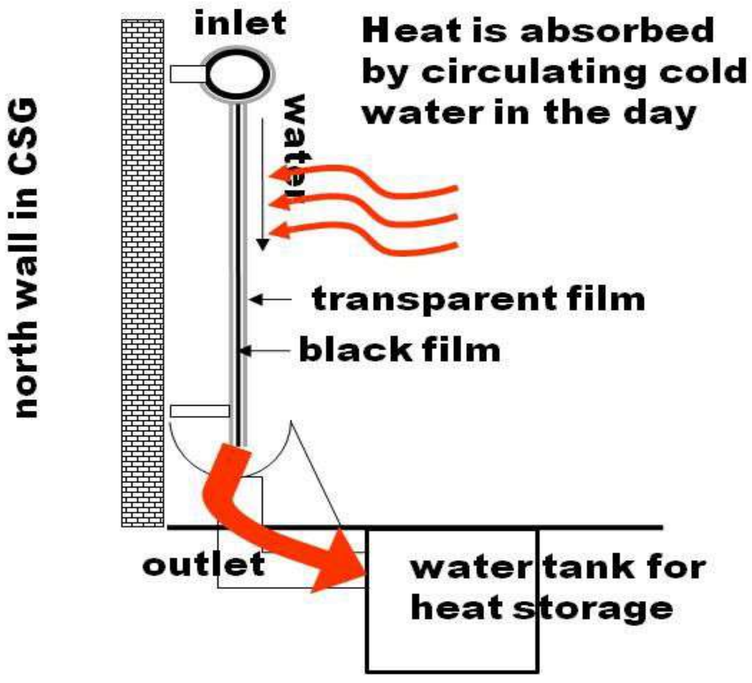
Contact: ovidiu.jerca@usamv.ro **+40756136304**

Energy input for the Personal Walipini smart greenhous

Project

Authors:

Members of Associations Justin Capra and SOS Tara Fagarasului

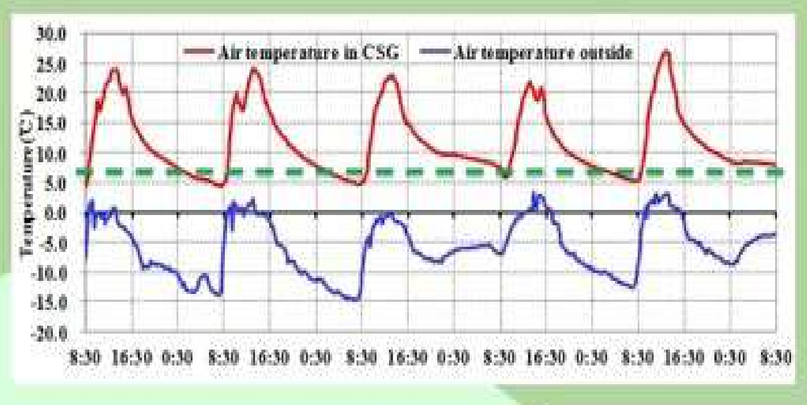


sustainable communities

Energy input for the Walipini smart greenhous

A smart Walipini greenhouse

The Chinese solarium within the Faculty of Horticulture Bucharest



A good control of temperature, humidity and light

www.usamv.ro

www.sustainablecommunities.eu

Contact: Marian VELCEA e-mail: marian.nicolae.velcea@gmail.com

Ministry of Education and Research

Innovative solar

Scientific Research Project

Authors: Student Gogoloș Daniel, Student Nicorescu Ștefan, Student Lupu Nicoleta , Student Spinciu Ilariana
Coordinator: Professor Aurel Mihail ȚÎȚU

DESCRIPTION:

An **innovative greenhouse** is a modern agricultural structure equipped with advanced technologies to optimize plant growth conditions. It may include **smart climate control systems, humidity and temperature sensors, automated irrigation,** and **solar panels** for energy efficiency. Its structure can be made of **durable and thermally efficient materials**, such as polycarbonate or specialized film, to maximize heat retention and minimize energy consumption. By integrating **IoT technologies**, farmers can monitor and control parameters remotely, ensuring **increased productivity** and **reduced resource consumption**.

ADVANTAGES:

🌱 **Increased Production Efficiency**
•Enables year-round plant growth, regardless of weather conditions.
•Optimizes temperature, humidity, and light to ensure an ideal environment for crops.

💧 **Water and Resource Conservation**
•Uses automated irrigation systems and humidity sensors, reducing water consumption.
•Can include rainwater collection and reuse, minimizing waste.

🔋 **Energy Efficiency and Lower Costs**
•Integration of solar panels reduces electricity consumption.
•Thermal insulation systems maintain optimal temperature, reducing heating needs.

📲 **Smart Control and Remote Monitoring**
•Sensors and IoT devices allow real-time monitoring of greenhouse conditions.
•Farmers can adjust temperature, humidity, and irrigation directly from their phone or computer.

🦠 **Better Protection Against Pests and Diseases**
•Automated microclimate control prevents mold and other plant diseases.
•Can include air filtration systems or special nets for insect protection.

🍀 **Sustainability and Reduced Environmental Impact**
•Reduces pesticide use by maintaining a controlled environment.
•Lowers carbon footprint through efficient energy and water consumption.

DISADVANTAGE

💰 **High Initial Costs**
•The initial investment can be high due to advanced technologies (sensors, automation, solar panels, etc.).
•High-quality materials and control systems increase installation costs.

🔋 **Energy Dependence**
•Although solar panels can be used, a smart greenhouse requires electricity for sensors, ventilation, and automation systems.
•In case of a power outage, some functions may be affected (unless there is a backup power source).

⚙️ **Maintenance and Technical Knowledge Required**
•Smart systems require regular monitoring and maintenance to function optimally.
•Farmers need to be familiar with using technology, which may require training.

🏗️ **More Complex Installation**
•Compared to a traditional greenhouse, installing an innovative greenhouse can be more complicated and take longer.
•Specialists are needed to install sensors, irrigation systems, and climate control systems.

🌩️ **Sensitivity to Extreme Weather Conditions**
•Although durable, innovative greenhouses can suffer damage from extreme weather events (strong storms, hail, heavy snowfall).
•Repairing or replacing advanced components can be expensive.

RESULTS AND DISCUSSIONS:

🔍 **An innovative greenhouse is a modern and efficient solution for sustainable agriculture, offering advanced microclimate control, resource savings, and increased productivity.** Thanks to smart technologies, farmers can monitor and automatically adjust temperature, humidity, and irrigation, ensuring optimal conditions for crops throughout the year.
However, there are also challenges, such as high initial costs, maintenance requirements, and electricity dependence. Implementing such a system requires a significant investment and technical knowledge, but in the long run, the economic and ecological benefits can outweigh these disadvantages.
In the end, innovative greenhouses are an excellent option for farmers looking to improve production efficiency, reduce resource waste, and adopt a more sustainable approach to agriculture. 🌿🌞

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President of Romanian Association for Alternative Technologies Sibiu (A.R.T.A. Sibiu);
Vice-President of Romanian Association for Nonconventional Technologies Romania;
Editor-in-Chief Nonconventional Technologies Review;
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Internal

PROCESS FOR RAISING YOUNG QUAILS

Patent application s2024 0093

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The research was carried out within the projects 24.80012.5107.SE Diversification of feed aditives in poultry farming funded by NARD

Authors: Caraman Mariana, Chiselița Natalia, Chiselița Oleg

The invention relates to animal husbandry, in particular to the process for raising young quails for decrease morbidity rate, mortality and increase body mass by using the complex biologically active microbial preparation, obtained from yeast biomass from winemaking waste and biomass of spirulina in the proportion of 0.5 kg per 100 kg of feed (0.5%) as the part of the daily ration of quails during the period 1-30 days.

The procedure ensures 100% chick viability in the experimental group compared to 91% in the control group, a decrease of specific feed consumption in the experimental group by 10.13%, a decrease in the titer of conditionally pathogenic bacteria E. coli by 8.64% and Clostridium spp. by 3.08%, an increase in the titer of beneficial microorganisms Lactobacillus spp. by 9.07%, Bifidobacterium spp. by 5.83% and Bacillus spp. by 3.86% in the gastrointestinal tract of the chicks, an increase in the body mass of the chicks by 13.46% compared to the control and obtaining an additional profit of 4.34 lei/quail.

Young quails

Complex biologically active microbial preparation

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Technical University of Moldova

UNIVERSITATEA TEHNICĂ A MOLDOVEI

QUAILS RAISING PROCESS

Patent application s2024 0092

The research was carried out within the projects 24.80012.5107.SE Diversification of feed aditives in poultry farming funded by NARD

G

***Authors:**, Chiseliță Natalia, Chiseliță Oleg, Caraman Mariana*

The invention relates to animal husbandry, in particular to the process of raising quails for increase productivity and meat quality by using the complex biologically active microbial preparation, obtained from yeast biomass from winemaking waste and spirulina biomass, as the part of the daily ration of quails, in the ratio of 0.5% of the ration during the period of 1-44 days and 0.25% during the period of 45-60 days. The process ensures the viability of chickens of 98% in the experimental group compared to 83% in the control group, the decrease of the titer of conditionally pathogenic bacteria E. coli by 4.96%, the increase of the titer of beneficial microorganisms Lactobacillus spp. by 18.40%, Bifidobacterium spp. by 11.61% and Bacillus spp. by 4.56% in the gastrointestinal tract of the chickens, increasing the body mass of the chickens by 13.46% compared to the control, obtaining quail meat with the higher protein content by 3.92% and lower fat content by 3.02% compared to the control group and obtaining economic efficiency of 4.47 lei/quail.

Experimental Group

Control Group

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Technical University of Moldova

UNIVERSITATEA TEHNICĂ A MOLDOVEI

PROCESS FOR INCREASING OF EGG PRODUCTIVITY OF QUAILS

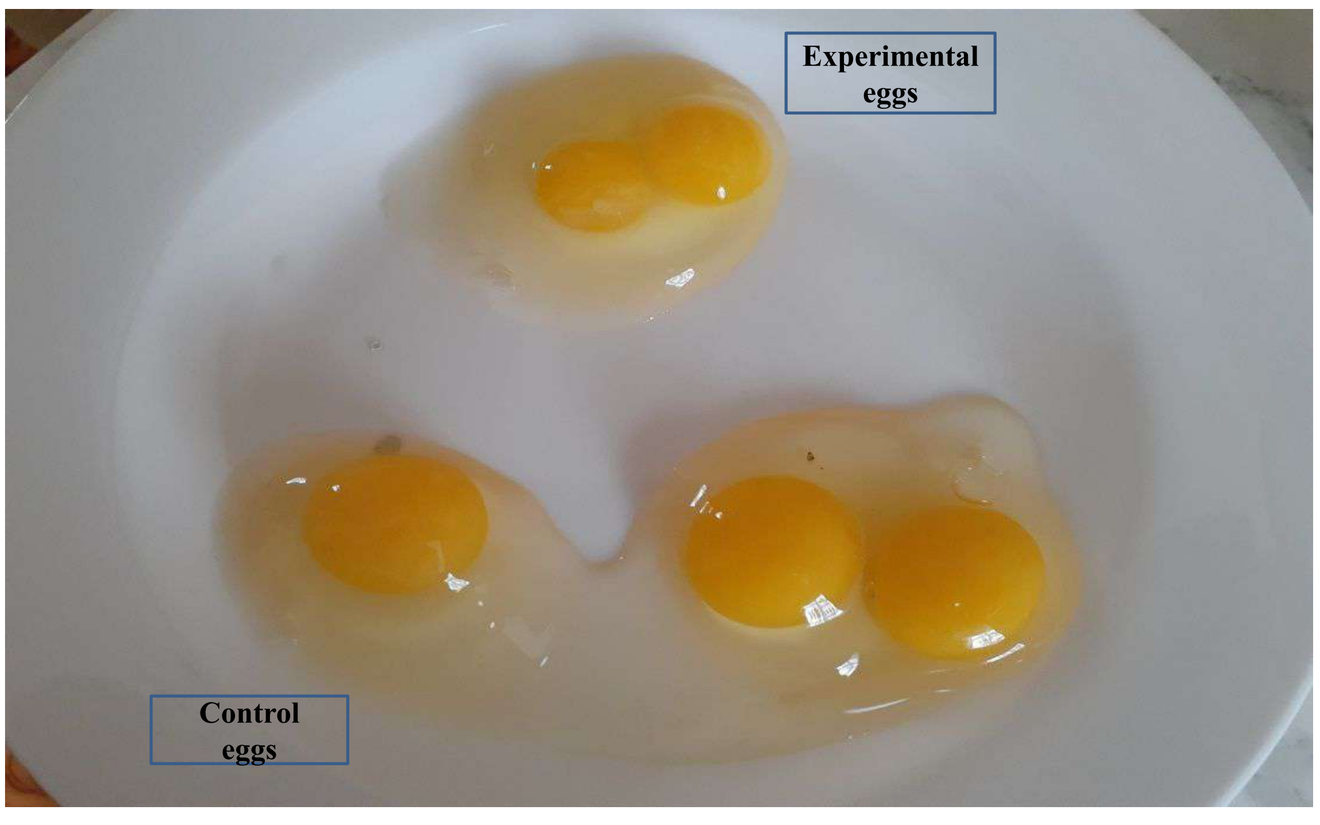
Patent application s2024 0094

The research was carried out within the projects 24.80012.5107.SE Diversification of feed aditives in poultry farming funded by NARD

G

Authors: *Chiselița Oleg, Caraman Mariana, Chiselița Natalia*

The invention relates to biotechnologies in animal husbandry, in particular to the process for increasing of egg productivity of quails by using the complex biologically active microbial preparation, obtained from yeast biomass from winemaking waste and spirulina biomass, in the composition of the daily ration of quails, in the ratio of 0.5% of the ration during the period of 1-44 days and 0.25% of the ration during the period of 45-60 days and the distribution of one month old quails of 30 heads in batteries, of which 22 females and 8 males. The process contributes to increasing the egg laying intensity of quails at the age of 60 days by 29.54%, increasing the weight, longitudinal and transverse diameter of eggs by 25.79%, 21.84% and 14.38% respectively, and obtaining of daily income of 0.53 lei/head of laying quail from egg production.



Contact: oleg.chiselita@imb.utm.md

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Breathing the Future: How the Climate Change Changes Malaysia's Air

INTRODUCTION

- Climate change is reshaping Malaysia's environment, with significant impacts on air quality.
  - Rising temperatures
  - Deforestation
  - Haze events
- Explores innovative approaches to understanding and mitigating air pollution.
- Emphasizes the role of advanced modeling and predictive tools in combating air quality issues.
- Aims to inspire solutions for cleaner air in Malaysia.

PROBLEM STATEMENT

Worsening Air Quality

- Intensified air pollution in Malaysia

Haze Events and Transboundary Pollution

- Challenges for mitigation and policy making.

Health and Environmental Impacts

- Respiratory diseases, reduced life expectancy, and long-term environmental degradation.

Lack of Accurate Predictive Tools

- Need for Innovative Solutions.

Facing climate change, floods and extreme weather patterns

WATER SHORTAGE

Climate change threatens our food security

DR SHAMSHUDDIN JUSOH

Understanding the climate-weather connection

WEATHER OR CLIMATE?

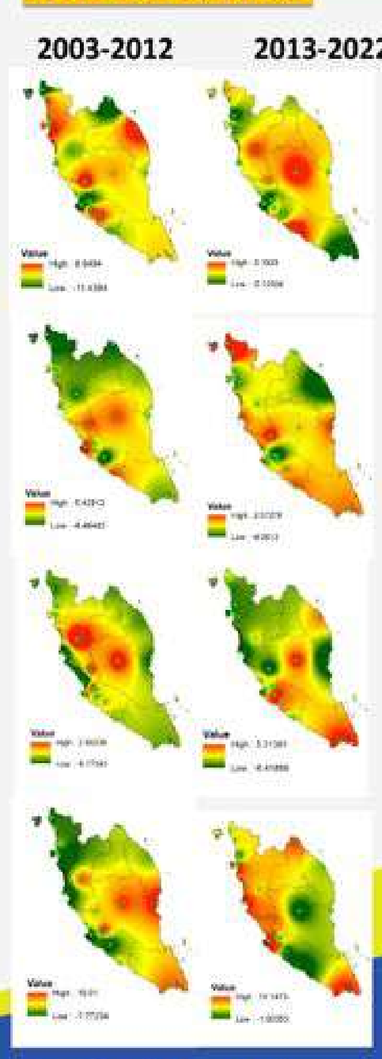
Country	Extreme weather events
Indonesia	**December 26, 2004**: A 9.1-magnitude earthquake off the coast of Sumatra triggered a massive tsunami, resulting in over 220,000 deaths across multiple countries. Indonesia was the hardest hit, with approximately 167,540 fatalities.
	January 1–3, 2020: Severe flooding in Greater Jakarta caused by heavy rainfall led to at least 30 deaths and the evacuation of more than 31,000 residents.
	November 2024: Heavy rainfall led to floods and landslides across nine villages in Central Java's Pekalongan regency, resulting in 21 fatalities, including a 5-month-old baby. The disasters destroyed 25 houses, a dam, and three main bridges, displacing nearly 300 residents.
Malaysia	**December 2006–January 2007**: Floods in Peninsular Malaysia, Sabah, and Sumatra were considered the worst in a century, leading to the evacuation of over 100,000 people in Johor at the peak.
	December 2014–January 2015: Severe flooding affected multiple states, including Kelantan, Terengganu, Pahang, and Perak, displacing over 200,000 people and causing significant property damage.
	November–December 2024: Prolonged heavy rainfall caused severe flooding in northeastern Malaysia, particularly in Kelantan and Terengganu states. Over 122,000 people were evacuated, and four fatalities were reported. The floods submerged numerous areas, forcing residents to leave their homes and disrupting transportation networks.
Thailand	**July 2011–January 2012**: Widespread flooding affected 65 provinces, resulting in 815 deaths and impacting 13.6 million people. Over 20,000 square kilometers of farmland were damaged, and seven industrial estates were temporarily shut down, causing over US$45.7 billion in overall damage.
	March 31–April 24, 2023: A heatwave affected regions in Malaysia and Thailand, with a mean temperature anomaly of 1.1°C and a maximum temperature anomaly of 2.9°C, impacting an area of 125,563 km².

OBJECTIVES

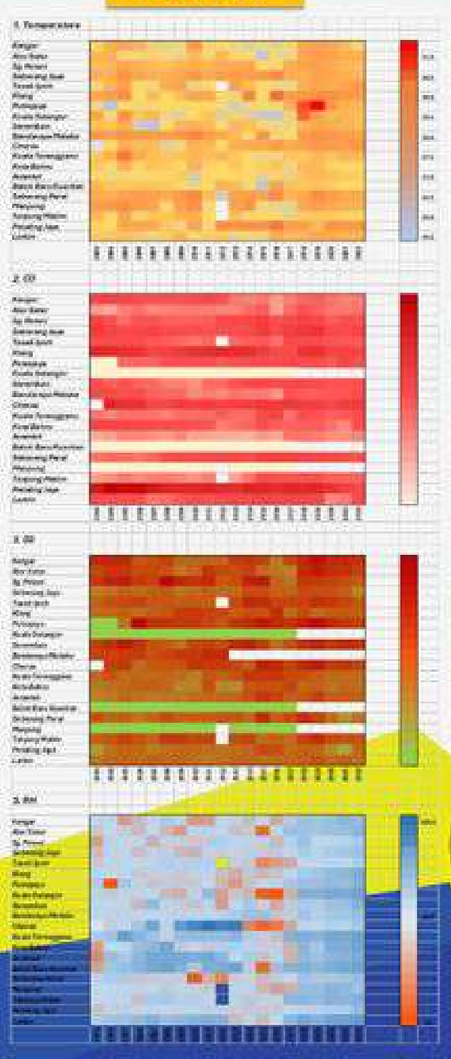
- To identify key contributors to air quality degradation and prioritize areas for targeted mitigation.
- To develop actionable strategies and policies for mitigating climate change impacts on air quality in Malaysia.
- To propose adaptation measures that enhance public health resilience and environmental sustainability in response to air quality challenges.

RESULTS

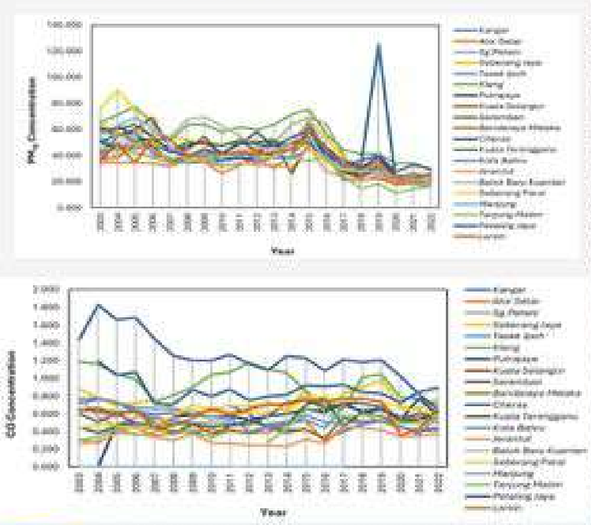
HOTSPOT ANALYSIS



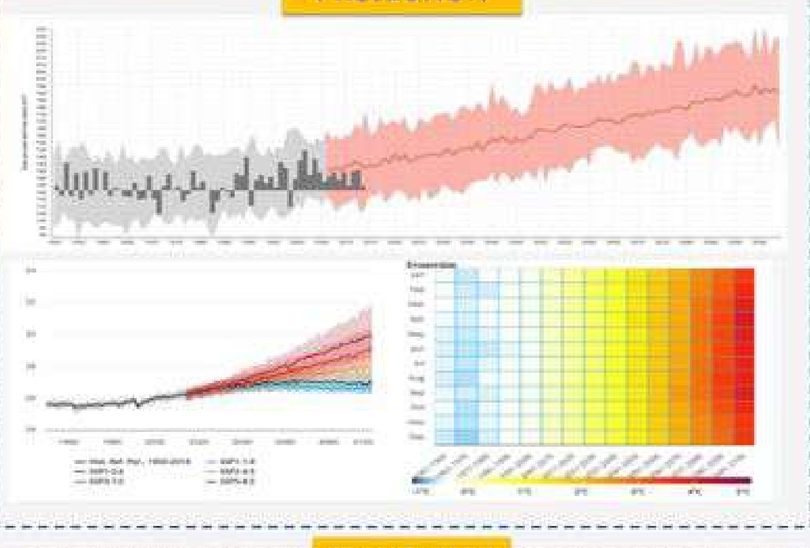
HEATMAP



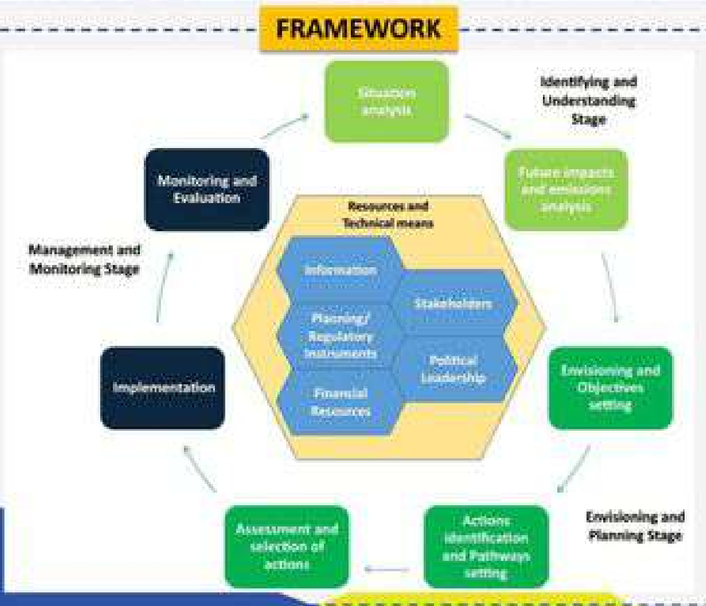
ANNUAL TREND ANALYSIS



PROJECTION



FRAMEWORK



PUBLICATION

- Jafri, I. A. M., Noor, N. M., Rahim, N. A. A. A., Ul-Saufie, A. Z., Hassan, Z., & Deak, G. (2023). Spatial and Temporal Analysis of Particulate Matter (PM 10) in Urban-Industrial Environment during Episodic Haze Events in Malaysia. *EnvironmentAsia*, *16*(1).
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- Jafri, I. M., Noor, N. M., Rahim, N. A. A. A., Baidruthisham, S. E., Ramli, N., Ul-Saufie, A. Z., & Deak, G. (2023, July). Modified linear regression for predicting ambient particulate pollutants (PM10) during High Particulate Event. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1216, No. 1, p. 012002). IOP Publishing.

IPITEX 2025

A Method for Biogas Generation using *Azadirachta indica*-derived Fe_3O_4-NPs on the Anaerobic Digestion Environment, utilizing *Zea mays L.* and Bovine Manure

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INTRODUCTION

The integration of iron oxide nanoparticles (IONPs) into anaerobic digestion (AD) methodologies has demonstrated considerable promise in augmenting biogas production from agricultural residues.

The application of iron oxide nanoparticles has been posited as a viable strategy for enhancing energy yield via anaerobic digestion, particularly through the acceleration of methane generation (Alkhrissat, Kassab, and Abdel-Jaber 2023).

Anaerobic digestion (AD) is recognized as an efficacious technique for the transformation of organic matter contained within biological wastes into renewable biogas in the absence of oxygen (Wang et al. 2023).

Lignocellulosic biomasses, including straw, comprise three primary organic polymers—cellulose, hemicellulose, and lignin—intertwined in a manner that renders them recalcitrant and impedes sugar liberation.

PROBLEM STATEMENT

The structural matrix of lignocellulose is characterized by a sophisticated network, wherein cellulose is enveloped by a monolayer of hemicellulose and subsequently integrated into the core matrix of lignin and hemicellulose.

Numerous methodologies, including mechanical, chemical, and biological treatments, have been employed to facilitate lignin extraction.

Importantly, two primary categories, namely sulphur and sulphur-free processes, have been implemented.

The choice of extraction method is contingent upon the precursor and its compositional attributes, with yield, purity, and final structural characteristics influenced by the extraction technique, solvent, temperature, and duration.

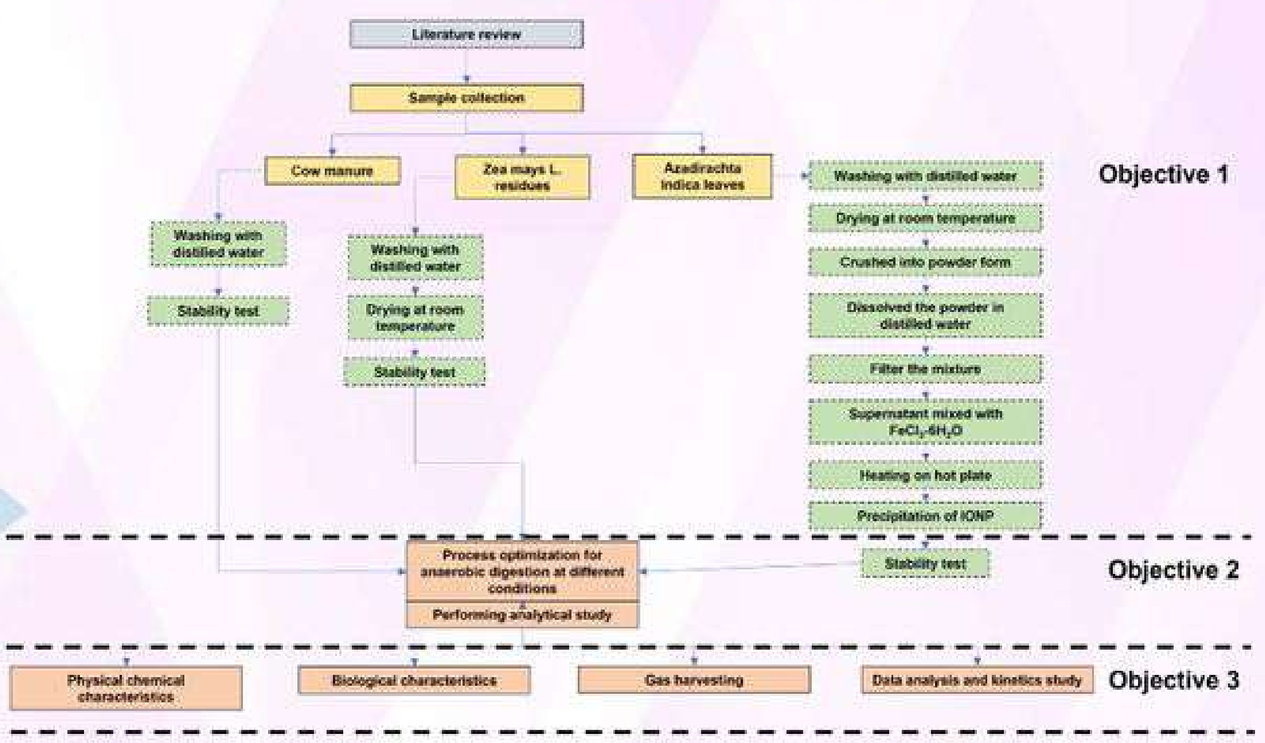
RESEARCH OBJECTIVES

This study investigates the influence of varying concentrations of IONPs synthesized from *Azadirachta indica* extract on anaerobic digestion of *Zea mays (L)* straw and cow manure, focusing on the impact of IONPs on the conditions of anaerobic digestion environment.

Azadirachta indica leafs

Azadirachta indica extract

METHODOLOGY



RESULTS AND DISCUSSIONS

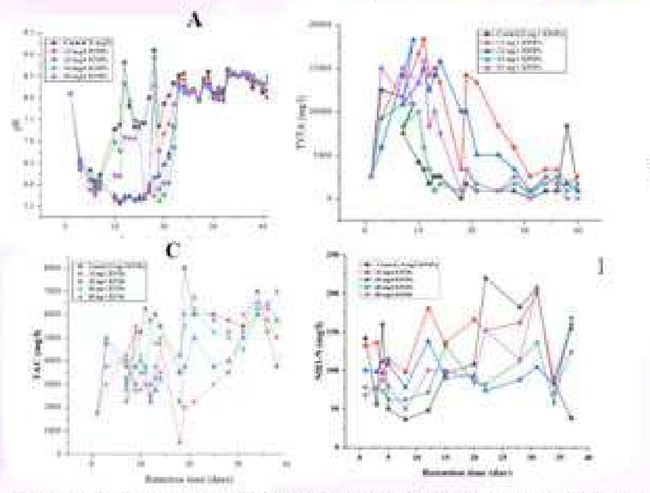


Fig. 1: The effect of the addition of synthesis iron oxide nanoparticles extracted

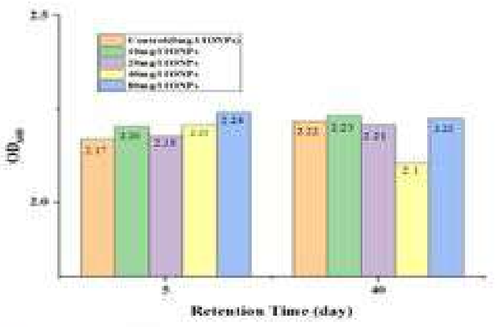


Fig. 4: of Varying Concentrations of IONPs on Microbial Biomass (OD_{600}) at Different Retention Times

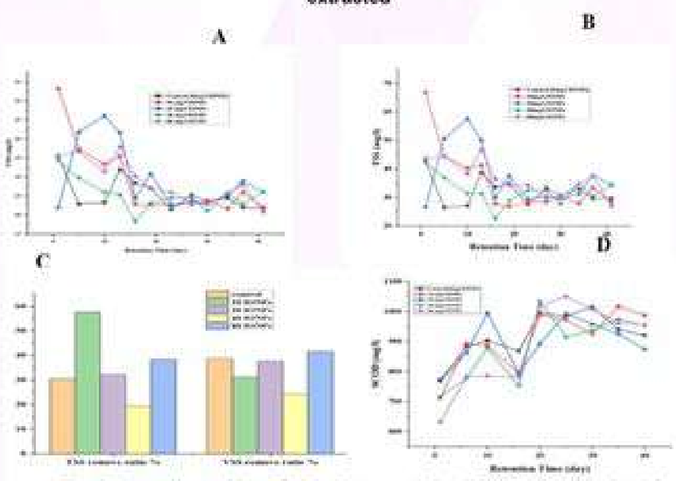


Fig. 2: The effect of Iron Oxide Nanoparticles (IONPs) Synthesized from *Azadirachta indica* on Soluble Solids Reduction and Soluble Chemical Oxygen Demand (SCOD)

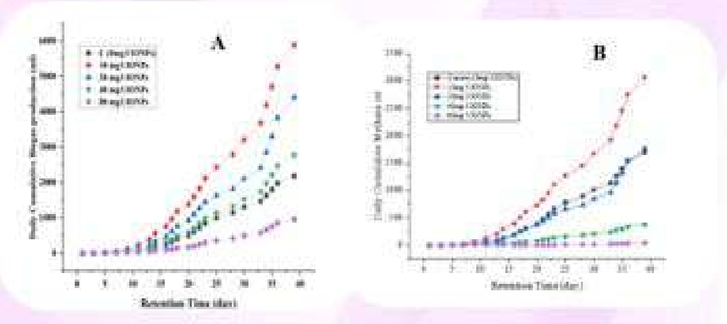


Fig. 3: Daily Cumulative Biogas and Methane production

CONCLUSIONS

In this study, different concentrations of iron oxide synthesized from ***Azadirachta indica*** extract were used to improve the anaerobic digestion environment of ***Zea mays L.*** and cow manure for methane production.

The concentrations used in five reactors (0, 10, 20, 40 and 80 ml/l) were used. It was found that a concentration of 10 ml of iron oxide gave the highest biogas accumulation during the 40-day experiment (5800 ml) and 52.14% methane.

It also improved bacterial activity and increased volatile solids removal by 57.67% compared to the control reactor (30.52%).

COMMERCIALIZATION POTENTIAL

This study demonstrates significant commercial opportunities in enhancing anaerobic digestion (AD) efficiency for biogas production, particularly in waste-to-energy sectors. Key commercial potentials include:

- Optimized Biogas Production
- Waste Management Solutions
- Sustainable Additive Technology
- Patentable synthesis method using neem extract, appealing to ESG-focused investors and regulators.

The local cultivar ‘MIHAI’

of Jerusalem artichoke, *Helianthus tuberosus* L.

„Alexandru Ciubotaru” National Botanical Garden (Institute) of Moldova State University, Republic of Moldova

Patent MD 0024/2024.11.19.

Author: Dr. Victor ŢÎŢEI

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The local cultivar ‘MIHAI’ of Jerusalem artichoke, *Helianthus tuberosus* L has been created by individual breeding of local and introduced plant taxa of Jerusalem artichoke, can be used for several purposes: aerial parts as forage and energy biomass, tubers as feed and by-products of inulin extraction, also as ornamental and melliferous plant. The forage productivity of the local cultivar ‘MIHAI’ 68-70 t/ha green mass with 18-24% dry matter and 35-40% leaves content. The tubers productivity varied from 35 to 39 t/ha fresh mass.

The biochemical composition and the nutritive value of green mass 10.8-13.5% CP, 9.9-12.1% ash, 33.2-37.7%ADF, 45.4-52.2 % NDF, 5.0-5.5% ADL, 28.2-32.0%Cel, 12.2-14.5 %HC, 595-629 g/kg DDM, RFV=106-122, 11.78-12.39 MJ/kg DE, 9.67-10.18 MJ/kg ME and 5.69-6.21 MJ/kg NEl.

The ensiled mass was characterized by agreeable color with specific smell, pH 3.76, 12.36 % CP, 31.83 % CF, 2.24% EE, 39.22% NFE, 0.29% TSS, 1.47 % starch, 14.34%ash,1.47% Ca, 0.21% P, 12mg/kg carotene.

The harvested dry stems biomass at the end of autumn- winter period had 18.5 MJ/kg gross calorific value, and 2.1% ash and can be processed into briquettes and pellets as renewable energy.

The tubers contain 177g/kg dry matter with 9.71 % CP, 0.61% EE, 5.112% CF, 7.23 % ash, 0.20% Ca, 0.30% P, 77.34%NFE, 63.00% inulin and other carbohydrates, eligible for feed, forage and raw material, for the pharmaceutical and food industry.

The local cultivar ‘MIHAI’ of Jerusalem artichoke it suitable to be cultivated on marginal lands.

Financial support from Ministry of Education and Research, subprogram no. 01.01.02 *“Identification of valuable forms of plant resources with multiple uses for the circular economy".*

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The local cultivar ‘GIGANT’

of giant knotweed *Polygonum sachalinense* F. Schmidt

„Alexandru Ciubotaru” National Botanical Garden (Institute)
of Moldova State University, Republic of Moldova

Patent MD 207/ 2016.05.31

Author: Dr. Victor ŢÎŢEI

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The local cultivar ‘GIGANT’ of giant knotweed *Polygonum sachalinense* F. Schmidt ex Maxim, family *Polygonaceae* was created based on the activities of identification and mobilization of new giant knotweed taxa, individual selection and breeding of introduced plant taxa, registered in the Catalogue of Plant Varieties (no. 2492625/2012). Can be used as forage and energy biomass, tardive source of pollen and nectar for bees (August-September)- 30-60 kg/ha of honey.

For the founding of the plantation are necessary 20-28 thousand plants/ha; the established plantations are maintained for 15-20 years. The green mass yield after cutting the plants 2-3 times is 124-148 t/ha, may be use as forage for husbandry animals (natural fodder, silage, vitaminized flour), the potential fodder production – 14-18 t/ ha nutritive units and 1800-2000 kg/ha digestible protein.

Silage quality: pH= 3.80-4.10, 80-85 % lactic acid, 13.5-18.0 % CP, 2.3–2.6 % EE, 8.9-14 % ash, 54-58 % NDF, 34-45% ADF, 5.0-7.8 % ADL, 4.7-5.5 g/kg Ca and 2.3-2.5 g/kg P.

The green mass and silage also, may be used as feedstock in biogas plants with biomethane potential 4050-4300 m^3/ha/year.

The harvested dry stems biomass at the end of autumn- winter period had 19.3 MJ/kg gross calorific value, and 1.5% ash and can be processed into briquettes and pellets as renewable energy, potential of energy production 435 GJ/ha equivalent 16 t coal or 11 t conventional oil.

The dry stems biomass can be utilized as a substrate to obtain cellulosic ethanol with a potential 550-570 L/t organic matter.

The local cultivar ‘GIGANT’ of giant knotweed is useful in phyto-amelioration of eroded land and phytoremediation of contaminated land, it suitable to be cultivated on marginal lands.

Financial support from Ministry of Education and Research, subprogram no. 01.01.02 *“Identification of valuable forms of plant resources with multiple uses for the circular economy".*

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The Innovative Technology for Cultivation and Use of Some Non-Traditional Forage Crops

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Patents MD 400 / 2023.02.28; MD 344 / 2020.04.30; MD 0013 / 2022.05.05.

Author: Dr. Victor ŢÎŢEI

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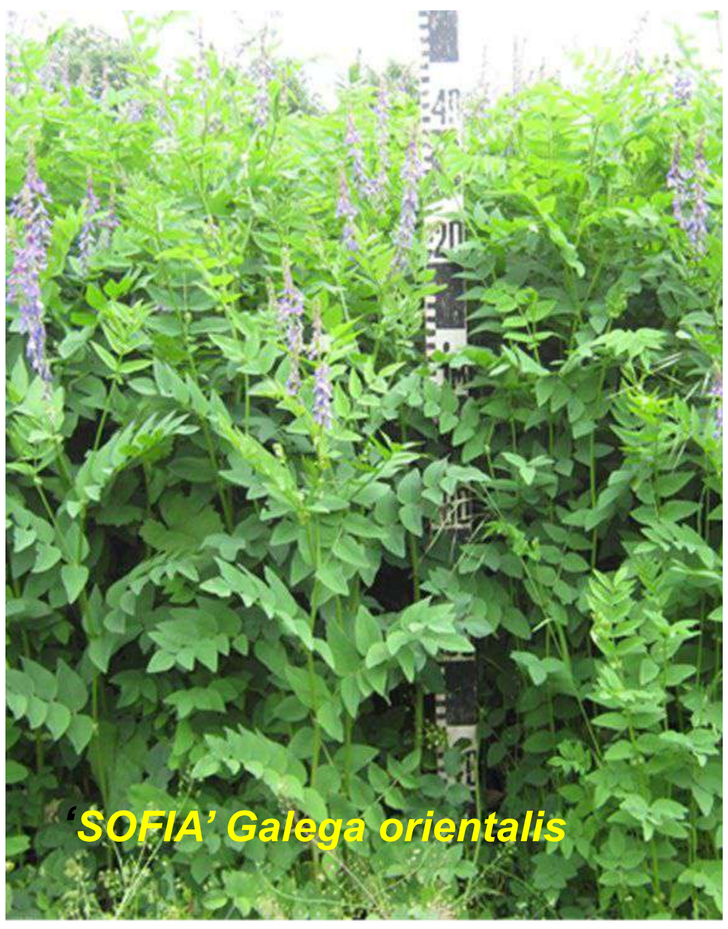
Revitalization and development of the national livestock sector requires diversification and increased production of local vegetal feed, balanced in terms of quantity and quality throughout the year, according to the physiological needs of animals and their productivity indices. The foundation of plantations and the production of fresh and persevered feed (hay, silage, haylage) using cultivars of new and non-traditional forage plants created in the National Botanical Garden (Institute) of Moldova State University and registered in the Catalogue of Plant Varieties: *'SOFIA'* of fodder galega *Galega orientalis* Lam. (no.0475063/2024), *'ARGENTINA'* of perennial sorghum *Sorghum almum* Parodi (no. 2584624/2021), *'VIGOR'* of milkvetch *Astragalus galegiformis* L. (no. 2574504 /2021) will ensure an annual productivity of 9-22 t/ha nutritive units and 970-2800 kg/ha digestible protein, during 8-15 years.



The productivity from 3-4 cuts / season is 85-104 t/ha green mass or 18-21 t/ha dry matter.

The productivity from 2-3 cuts per season is 55-70 t/ha green mass with 49-57% leaves.

The productivity from three cuts reached 61 t/ha green mass or 14 t/ha dry matter.

The implementation of these innovative technology will help maintain the animal welfare, ensure national food security and sustainability in terms of reducing the import of food, improving the environmental situation, making use of degraded and eroded soils and unused land in traditional agriculture.

Financial support from Ministry of Education and Research,

subprogram no. 01.01.02 *"Identification of valuable forms of plant resources with multiple uses for the circular economy".*

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The Technology for Founding Biomass Energy Plantations

„Alexandru Ciubotaru" National Botanical Garden (Institute) of Moldova State University, Republic of Moldova

MD 402 / 2023.02.28; MD 348 / 2020.04.30; MD 205/ 2016.05.31

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The local cultivars of new crops created in the National Botanical Garden (Institute) of Moldova State University and registered in the Catalogue of Plant Varieties*: 'MARIA' of* Jerusalem artichoke, *Helianthus tuberosus (no. 0734840/2023); 'TITAN'* of giant miscanthus, *Miscanthus × giganteus* (no. 0394505/2021) and 'MIHAELA' of plume poppy *Macleaya cordata* (no.0745066/3024), are intended for the foundation of biomass energy plantations and the restoration of degraded, eroded and polluted lands that cannot be profitably cultivated with traditional crops. The local cultivars 'MARIA' and 'TITAN' achieved annual productivity 60-100 t/ha of green mass with biomethane potential 260 -355 l/kg organic dry matter or estimated biomethane production varied from 4100 to 7000 m3/ha/ year. The yield of stem biomass harvested in winter period of cultivars *'MARIA',* 'MIHAELA' and *'TITAN'* varied from 13.0 to 28.0 t/ha dry matter with gross calorific value 18.8-19.9 MJ/kg and 1.5-2.5% ash, can be processed into solid biofuels (bales, biomass chips, pellets and briquettes), as well as utilized as a substrate to obtain cellulosic ethanol with a potential of 533-610 l/t organic matter.

The productivity from 1-2cuts / season is 60-100 t/ha of green mass or 16.2-28.0 t/ha dry matter.

The productivity 35-47 t/ha green stem

The productivity from three cuts reached 68- 75t/ha green mass

The implementation of these innovative technology will ensure the production of energy biomass for obtaining different types of biofuels, reducing illegal logging and preserving forests, creating new job opportunities in the rural area and ensuring the country's energy security.

Financial support from Ministry of Education and Research, subprogram no. 01.01.02 *"Identification of valuable forms of plant resources with multiple uses for the circular economy".*

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Potato variety AMURAL

Patent: 500/30.01.2025

Author: Hermeziu Radu

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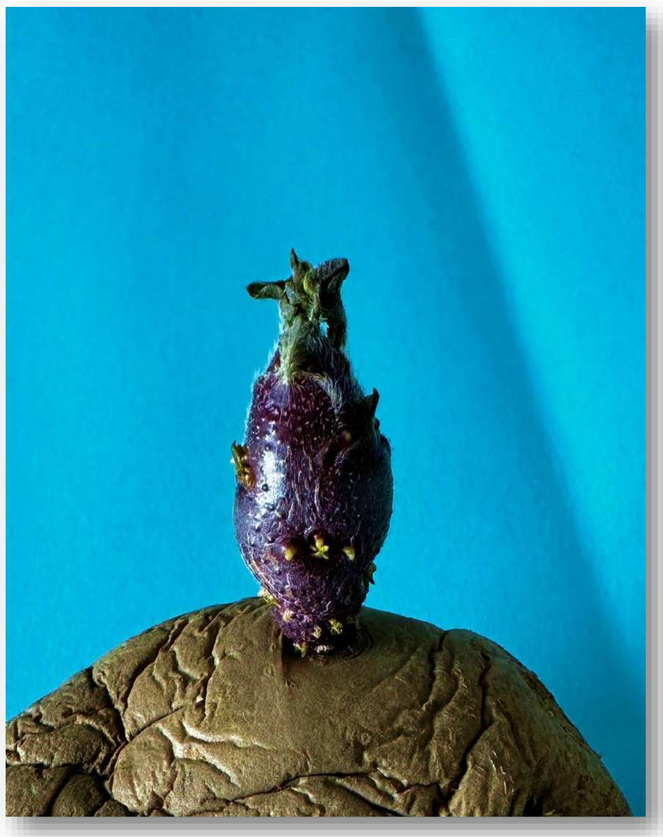
Potato variety obtained by sexual hybridization between varieties Sarpo Mira x Charlotte, followed by individual clonal selection in the hybrid population. It is maintained through vegetative propagation, which ensures its homogeneity and stability.

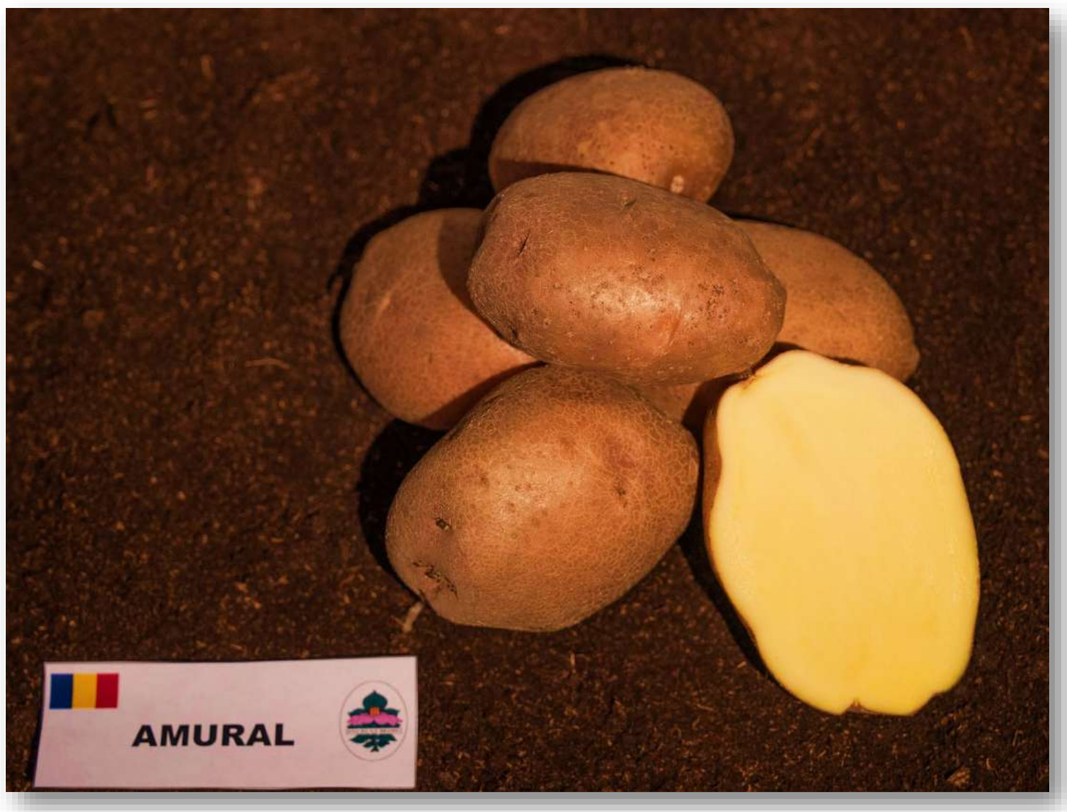
Plant description:

- The plant is tall, with up-right habit and high number of stems.
- The leaf is small-sized, green in color, and has a medium number of leaflets.
- The flowers have a large corolla opening, are purple red in color, and bloom is low.
- The tubers are oval in shape, with a medium depth of eyes. The skin is medium red, while the flesh is light yellow.

Resistance to diseases and pests:

- Medium resistant to potato Y virus (PVY) and to potato leaf roll virus (PLRV)
- Relatively resistant to late blight (*Phytophthora infestans*) on leaves and tubers
- Resistant to wart disease (*Synchitrium endobioticum*), biotype 1





Vegetation period: The variety belongs to the mid-early group, with a vegetation period of 90-100 days.

Dry substance content: 25,6%

Quality class: B. The Amural variety is suitable for autumn - winter consumption, for salads and various culinary dishes, industrial processing (chips, French fries)

Production capacity: High, with an average yield of 50 t/ha.

Economic efficiency: High productivity, ecological plasticity, and production stability.

Field of applicability: Agriculture, food industry.

Potential beneficiaries: Farmers, seed potato and consumption producers, consumers, and the entire commercial chain

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Potato variety ERVANT

Patent: 00535/28.02.2019

Author: Hermeziu Radu

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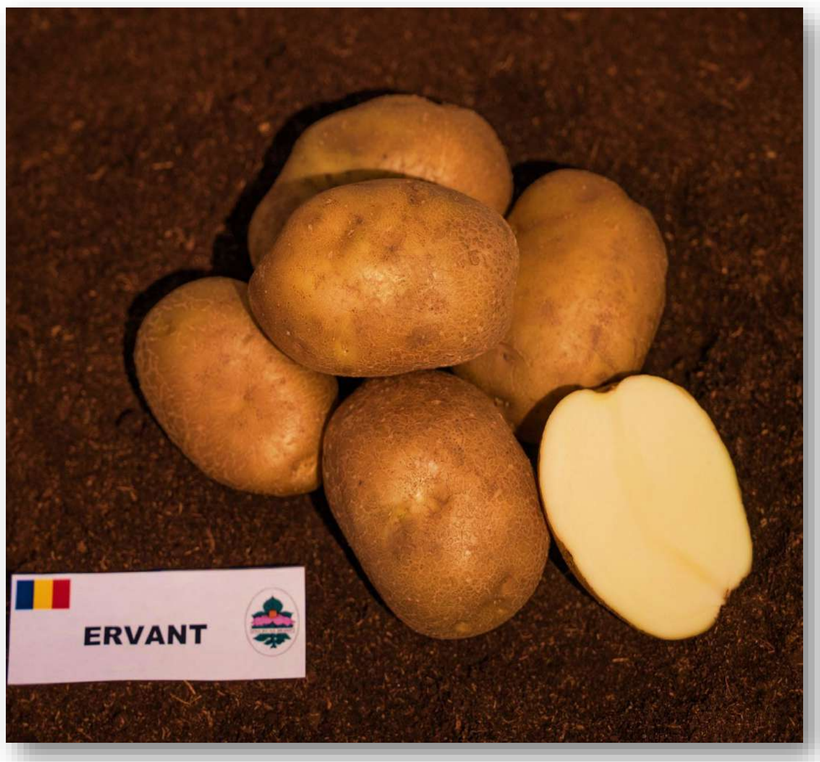
The ERVANT potato variety was obtained through sexual hybridization between the Bellarosa and Laura varieties, followed by individual clonal selection in the hybrid population. It is maintained through vegetative propagation, which ensures its homogeneity and stability.

Plant description:

- The plant has a medium height, leaf type and a semi-upright habit.
- The leaf is medium-sized, green in color, and has a moderate number of leaflets.
- The flowers have a large corolla opening, are light pink in color, and bloom is low.
- The sprouts grown in light are small, ovoid in shape, with a medium intensity of anthocyanin coloration at the base and strong pubescence.
- The tubers are short-oval in shape, with shallow eyes. The skin is yellow, while the flesh is cream-colored.

Resistance to diseases and pests:

- Resistant to potato Y virus (PVY) and resistant to potato leaf roll virus (PLRV)
- Moderately resistant to late blight (*Phytophthora infestans*) on leaves and relatively resistant to late blight on tubers
- Resistant to wart disease (*Synchitrium endobioticum*), biotype 1



Vegetation period: The variety belongs to the mid-early group, with a vegetation period of 90-100 days.
Starch content: 13.00%
Quality class: A/B. The Ervant variety is suitable for a wide range of culinary uses, including chips and French fries.

Production capacity: High, with an average yield of 60 t/ha.

Economic efficiency: High productivity, ecological plasticity, and production stability.

Field of applicability: Agriculture, food industry.

Potential beneficiaries: Farmers, seed potato and consumption producers, consumers, and the entire commercial chain.

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INNOVATIVE EQUIPMENT FOR CUTTING TREE ROOTS

Patent Application No. A-00251 / 2024

ZAICA Ana, CIUPERCĂ Radu, ȘTEFAN Vasilica
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ABSTRACT:

The invention refers to an innovative equipment for cutting the tree roots, provided with a system for monitoring and regulating the cutting resistance force.

DESCRIPTION:

Worldwide, there are various companies manufacturing different equipment for cutting tree roots which, in general, have similar constructions, these partially or fully performing the horizontal extension, tilting of the knife, adjusting the working depth of the cutting knife device, but not having control over the cutting resistance of the roots.

The main **disadvantages** of these pieces of equipment are:

- ❑ there is no control of the cutting resistance force, which can vary within quite wide limits due to the inhomogeneity of the terrain and the stage of development of the tree roots, with major implications for the failure of the tractor + equipment system within the limits of the tractor's optimal traction force work and the admissible resistance to damage of the equipment;
- ❑ if the equipment blade encounters areas of terrain with high cutting resistance, uncontrolled use may result in bending or breaking of the blade or other equipment components;
- ❑ as a result of the previously mentioned disadvantages, the work of cutting tree roots is not always carried out at optimal energy indices, fuel consumption and financial expenses can often be unreasonably high.

The technical problem that the proposed solution solves consists in creating an innovative equipment for cutting the roots of trees provided with a system for monitoring and regulating the force of resistance to cutting the roots.

COMPONENTS:

The equipment consists of a welded frame (**1**) composed mainly of pipes and resistance plates and a three-point system for coupling to the tractor, an arm (**2**) made of welded profiles, equipped with a joint, for coupling to the welded frame (**1**), a sliding pipe (**3**), equipped with elements for holding the cutting knife and a drive cylinder, an assembled cross member (**4**), made of welded profiles, which slides in the frame (**1**), a hydraulic installation (**5**), consisting of a distributor with three working sections with solenoid valves, three hydraulic cylinders for operating the arm (**2**), sliding pipe (**3**) and assembled crossbar (**4**), nipples, valves and connecting hoses, a bolt (**6**), for coupling the central tie rod from the tractor equipped with a safety element, a cutting knife (**7**), made of Hardox 500 manganese steel, which is fixed to the sliding pipe (**3**) by means of Grower screws, nuts and washers, not positioned, three support legs (**8**), for supporting the equipment at a stationary moment, mounted on the welded frame (**1**) by means of handle bolts (**9**), ballast plates (**10**), to achieve the necessary force to press the knife in the soil, a system for monitoring and regulating the resistance to cutting roots, consisting of a force transducer (**11**), mounted on the knife (**7**), a force amplifier (**12**), a PLC micro-controller (**13**), an operating terminal (**14**), the tractor's accumulator battery (**15**), a bipolar fuse (**16**) - positions (**12-16**) being mounted on the tractor from the aggregate - and electrical connecting cables (**17**).

ADVANTAGES:

- ❑ knowing in real time the values of the force of resistance to cutting tree roots and adjusting it within the limits imposed by the breaking resistance of the cutting knife and the traction force of the tractor;
- ❑ protecting the functional elements of the equipment against possible accidental degradation;
- ❑ achieving optimal fuel consumption and avoiding additional financial expenses for the repair of the equipment, in case of its accidental damage.

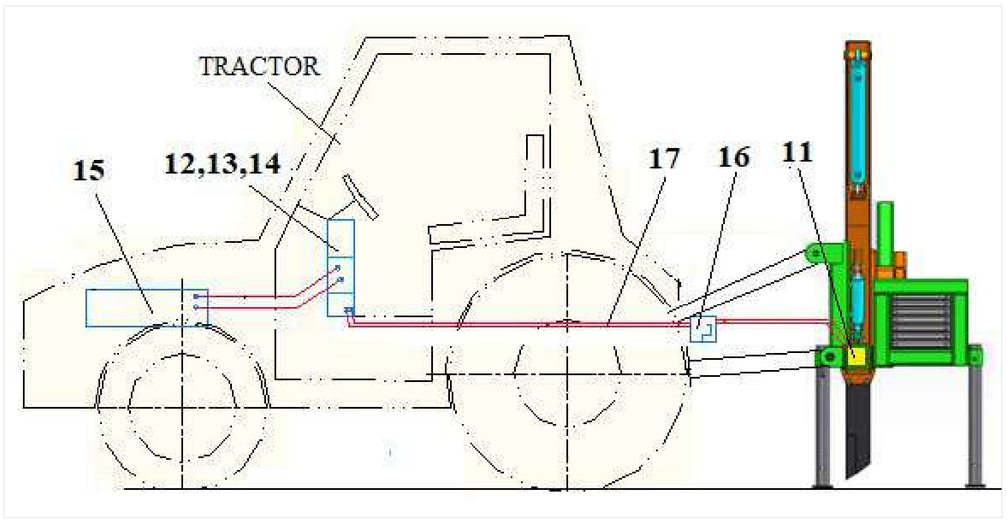

Fig.1. – *Innovative equipment for cutting tree roots – front view*

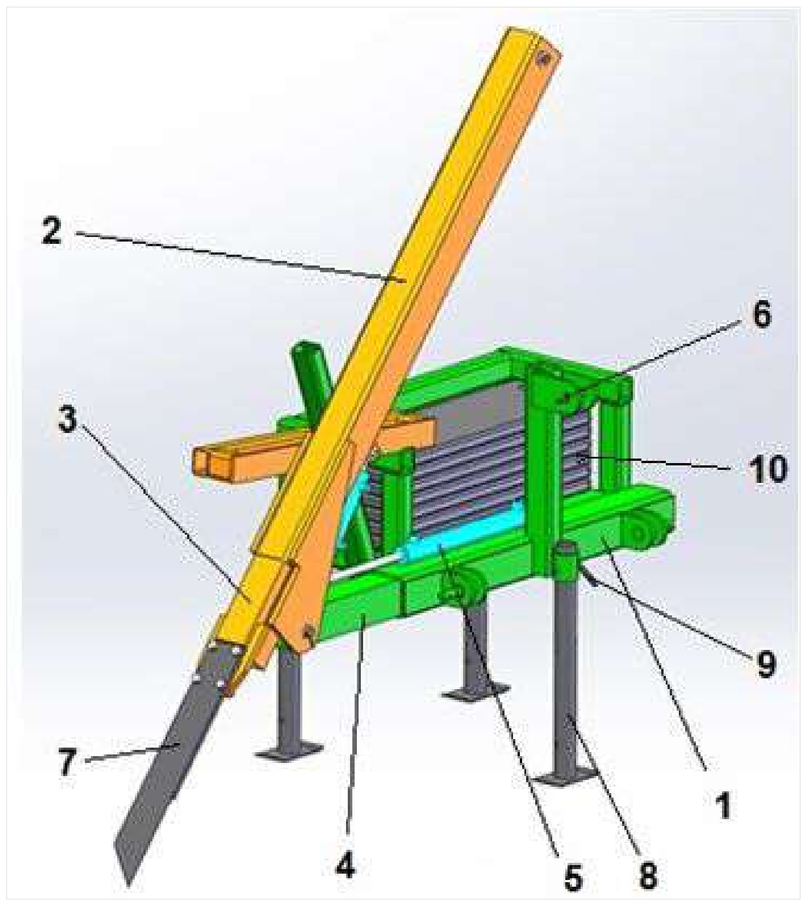

Fig.2. – *Innovative equipment for cutting tree roots – perspective view*

ACKNOWLEDGEMENT:

This work was financed by the Ministry of Research, Innovation and Digitalization, Financing Contract of *Nucleu* Program #9N/01.01.2023 (#451623/30.12.2022) "*Multidisciplinary research in digital agriculture for economic competitiveness and sustainable development in the context of climate change*". (SUSTAIN-DIGI-AGRI code PN 23 04) – Project #: PN 23 04 01 05 -"INNOVATIVE TECHNOLOGY FOR THE MAINTENANCE OF FRUIT PLANTATIONS"

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PLANT GROWTH SIMULATION SYSTEM

Patent Application No. A-00252 / 2024

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ABSTRACT:

The invention relates to a plant growth simulation system, intended to simulate the growth of crop plants (vegetables, leafy plants, bulbous vegetables) under different conditions, from optimal to extreme, in order to open up new ways of crop management and growth of plants in the current and predicted climate conditions for the near future, taking into account the increase in the resilience of agriculture to climate change.

DESCRIPTION:

The plant growth simulation process involves creating and maintaining/modifying set growth conditions and monitoring and evaluating plant germination and development under the given conditions.

Worldwide, there is a series of patented equipment and methods used to simulate plant growth. However, a **major disadvantage of the existing equipment** on the market is both their lack of versatility to be used to simulate complex environmental conditions, as well as the lack of adequate control of all the factors that affect the growth of crop plants.

Another major disadvantage of the presented equipment/methods is that they do not offer the possibility of supervision throughout the simulation process, and in the simulation and control systems there is no total control over the entire process, from germination to maturity plants.

The technical problem, solved by the invention, consists in creating a system for simulating the growth of plants through which to simulate and vary the climatic conditions at predetermined values, under the conditions of an adequate control of the growth parameters and a continuous monitoring and supervision of the entire process - of at sowing / planting, germination, development and until maturity of the plants.

The growth simulation system is divided into **3 distinct sections (chambers)** as follows: the **aerial parts chamber,** where the plants develop, the **root chamber,** where the growth vessels are placed which are filled with growth substrate and where the plant roots develop connected to the aerial parts chamber through the plant development openings and the **collection chamber,** where the water / mixture of water and nutrients / plant protection that is not consumed by the plant is collected and washed from the soil into the collection tray under which the control part is located and system control, tanks and irrigation pump.

OPERATION:

The plant growth simulation system works as follows:

The growth vessels in the root chamber (**6**) are filled with substrate; the characteristics of the used substrate are determined; the characteristics of the water / water-nutrient mixture used are determined; the water tank in the irrigation system (**3**) is filled with water, the nutrient tank (**4**) is filled with nutrient solution / plant protection; the crops to be studied are sown / planted; the parameters for irrigation / fertigation, humidity, temperature, ventilation, lighting are set; the time-lapse camera is set; the simulation process is started; parameters and plant evolution are monitored daily; data during monitoring is recorded and analysed.

COMPONENTS:

The system consists of the following main components: support frame (**1**), wheels for easy movement (**2**), water basin for irrigation (**3**), tank for nutrients/plant protection substances (**4**), pump for irrigation / fertigation (**5**), growth vessels (**6**), opened at the top to allow the plant to grow in the chamber of the aerial parts and having small openings at the bottom to evaluate the interaction between water / water-nutrient-substance mixture plant protection, soil temperature sensor (**7**), humidity sensors (**8**), air temperature sensor (**9**), opening for plant development (**10**), air sensor support (**11**), heating assembly (**12**), fan (**13**), irrigation / fertigation system (**14**), lighting system for simulating plant germination and growth in different periods and light intensities (**15**), control and monitoring system (**16**), collection tray (**17**), time-lapse camera (**18**).

ADVANTAGES:

- ❑ the possibility of simulating the entire process from germination to plant maturity;
- ❑ simulation and monitoring of both aerial parts and plant roots and the interaction between the plant and the substrate used;
- ❑ easy mobility and high versatility, being able to simulate the growth of several types of plants, using several types of substrates;
- ❑ reduced electricity consumption.

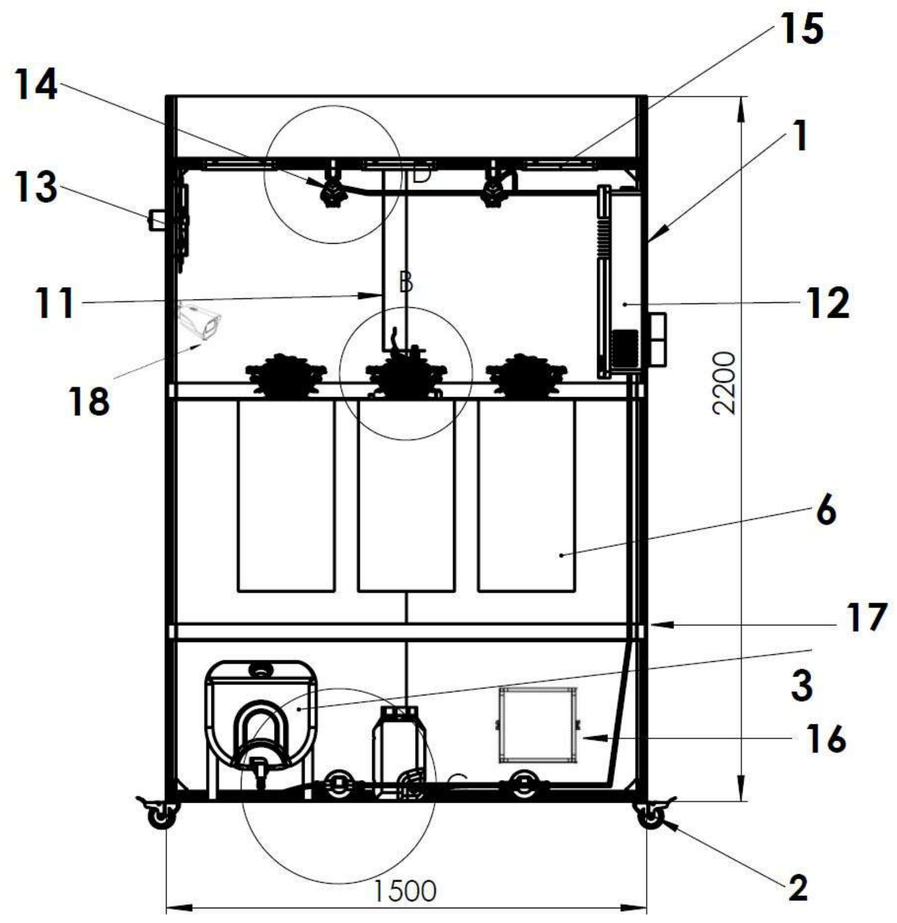

Fig.1. – *Plant Growth Simulation System – main view*

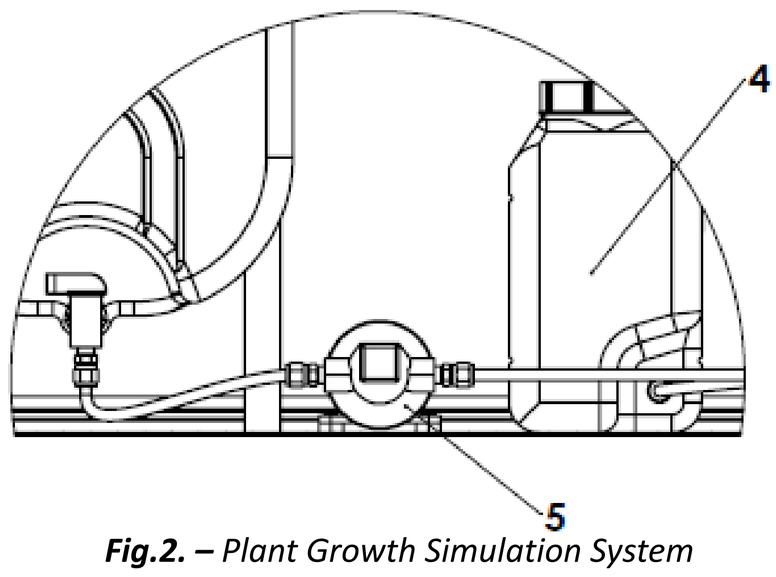

Fig.2. – *Plant Growth Simulation System - fertigation system detail*

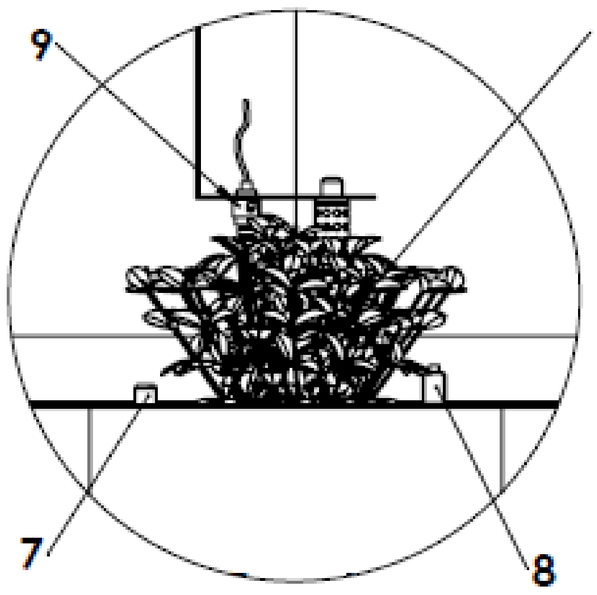

Fig.3. – *Plant Growth Simulation System - plant growth pot detail*

ACKNOWLEDGEMENT:

This project was supported by the Romanian Ministry of Research Innovation and Digitalization, through the project: *"Intelligent plant growth systems under controlled environmental conditions"* – PN 23 04 01 04– Ctr. 9N/01.01.2023 and through Program 1 - Development of the national research-development system, Subprogram 1.2 - Institutional performance - Projects for financing excellence in RDI, Contract no. 1PFE/30.12.2021

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INTELLIGENT SYSTEM FOR HIGH PRECISION APPLICATION OF LIQUID PLANT PROTECTION PRODUCTS

Patent Application No. A-00212 / 2024

GHEORGHE Gabriel-Valentin, GĂGEANU Iuliana, PERSU Cătălin,
TĂBĂRAȘU Ana-Maria

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ABSTRACT:

The invention refers to a system for the high-precision application of plant protection liquid products, mounted on an agricultural drone for carrying out phytosanitary treatments in field crops, in order to precisely apply them and reduce the amount of phytosanitary substances applied.

DESCRIPTION:

Currently, in the case of classic drones, the application of the treatment is done continuously, regardless of whether there are problems in the crop or not, regardless of the nature of the phytosanitary product to be applied to the plant or the fact that it must be applied in a row, between plants, or between rows, thus wasting large quantities of substances on the soil or on the cultivated plants.

The main disadvantage of current equipment is that this equipment does not have an integrated intelligent system for detecting plants and applying liquid plant protection substances with precision, resulting in a huge waste of PPP (Plant Protection Products) and does not achieve uniform spraying of the plants below them due to the application over the entire surface and from a fairly high height above the plant because in all drones the nozzles are above the landing gear and not below.

The technical problem solved by the proposed solution, according to the invention, consists in creating an intelligent system for the high-precision application of liquid plant protection products mounted on an agricultural drone for carrying out phytosanitary treatments in field crops, so as to allow for the precise treatment of extensive plant surfaces in areas identified with problems.

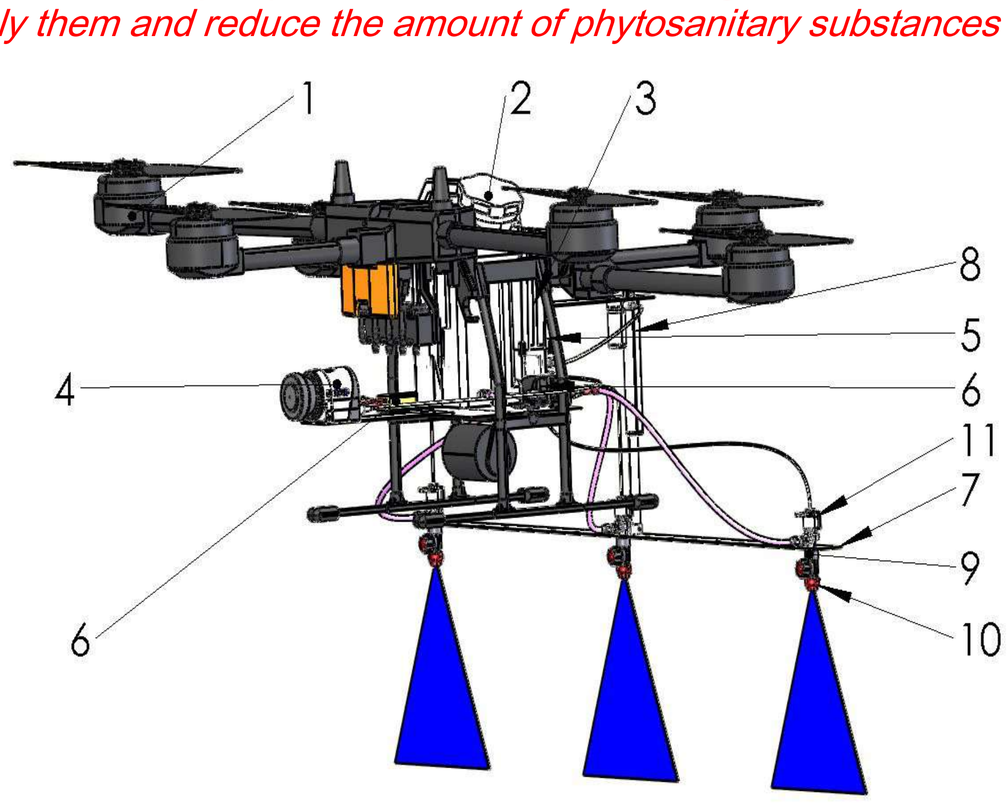

Fig.1. – *Aerial drone with intelligent system for high-precision application of liquid plant protection products.*

COMPONENTS:

The intelligent system for high-precision application of liquid plant protection products is mounted on an agricultural drone **(1)** equipped with a tank **(2)** for plant protection substances and a battery for driving the motors **(3)**. It is equipped with a radar system for precise positioning in the field and for maintaining ground guard. The intelligent system for high-precision application of liquid plant protection products consists of a Lidar sensor **(4)**, which can measure the distance from the sensor to the plant, an Arduino UNO board **(5)**, which will initiate the commands of all components. From the tank **(2)**, using a 12VDC electric pump **(6)**, the phytosanitary substances are pumped at a pressure of up to 5.5 bar to a spray ramp **(7)**, adjustable using an electric actuator **(8)** on which three nozzle holders **(9)** are mounted, equipped with calibrated spray nozzles **(10)**, and three solenoid valves **(11)**, all powered by two Tattu Plus 16000 mAh 44.4V 25C 12S1P LiPo batteries **(12)**.

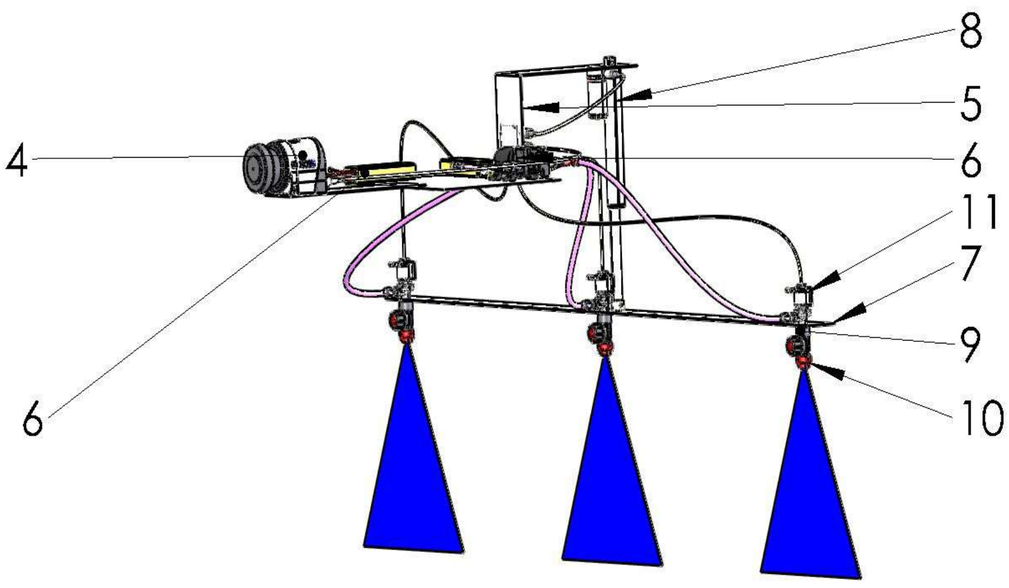

Fig.2. – *Intelligent system for high-precision application of liquid plant protection products.*

OPERATION:

The drone **(1)**, with the tank **(2)** loaded with liquid phytosanitary substances, with the battery **(3)** charged and the electric servomotor **(8)** closed, will take off operated by remote control and, in manual flight mode with the drone height set and displayed, will move over the targeted agricultural land with the camera turned on, to position it according to the applied substances, if they must be applied to the plant or to weeds. After the Lidar sensor **(4)** has detected a safe flight height, depending on the crop, the electric actuator **(8)** acts to move the ramp **(7)** under the landing gear and to bring the nozzles **(10)** together with the nozzle holder supports **(9)** closer to the intended target. The Lidar sensor **(4)** is set at a height lower than the flight height to detect the crop. When a plant is detected by the Lidar sensor, the Arduino Uno control system **(5)** activates the pump **(6)** and the solenoid valve **(11)**, depending on the area where the plant was detected by the Lidar sensor. All components are powered by batteries **(12)**.

Thanks to the Lidar sensor **(4)** and the Arduino Uno intelligent control system **(5)**, it will be able to detect crop plants by setting the reading distance of the Lidar sensor according to the height of the crop and will apply phytosanitary treatments with precision through the solenoid valves **(11)** mounted before the nozzles **(10)**.

ADVANTAGES:

- ❑ thanks to the system using a Lidar sensor and the intelligent control system, upon reaching a safe flight height, the electric actuator will act and position the spray boom closer to the target;
- ❑ thanks to the Lidar system and the intelligent control system, it will be possible to detect crops by setting the Lidar reading distance in the system according to the height of the crop;
- ❑ precise application of phytosanitary treatments through solenoid valves mounted before the nozzles operated by the Arduino Uno system, using the Lidar sensor;
- ❑ the possibility for farmers to treat targeted agricultural crops with phytosanitary substances only in areas identified as requiring phytosanitary treatment, without using ground machinery, which compacts the land and destroys part of the crops.

ACKNOWLEDGEMENT:

This project was supported by the Ministry of Research, Innovation and Digitalization of Romania, through the Financing Contract: No. 9N/01.01.2023 (no. 451623 / 30.12.2022). Object of the Basic Program: *"Multidisciplinary research in the field of digital agriculture for economic competitiveness and sustainable development, in the context of climate change"*. (SUSTAIN-DIGI-AGRI code PN 23 04) Project: PN 23 04 02 01: *"Innovative technology for the production of biofertilizers aimed at restoring soil biodiversity and mitigating the effects of drought on agricultural lands"*.

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Dessert Cream with Added Microencapsulated Extract Powder from Eggplant (*Solanum melongena* L.) Peels A Value-Added Product and Its Production Technology

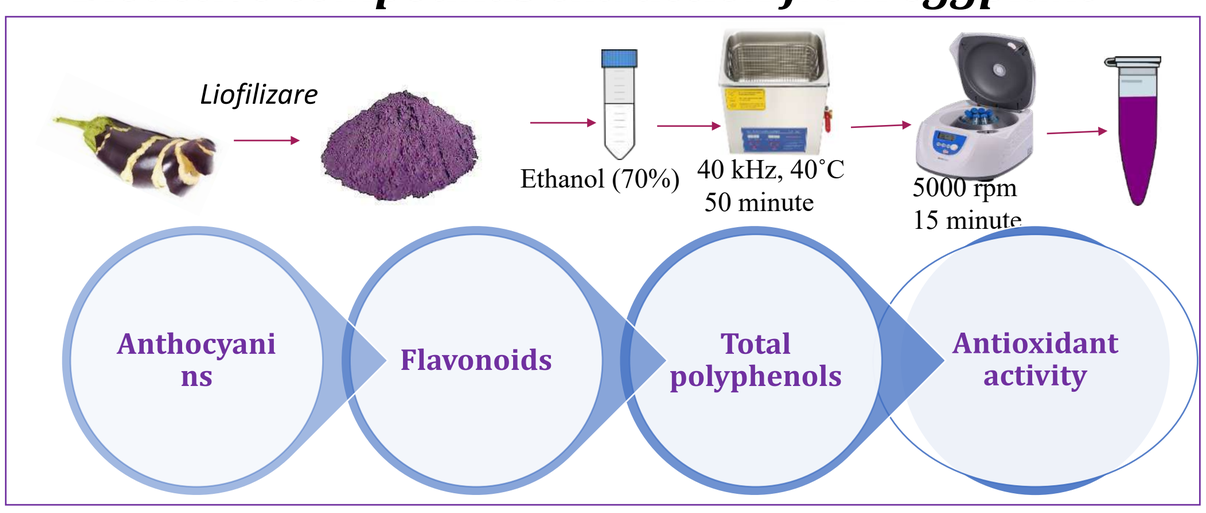
H

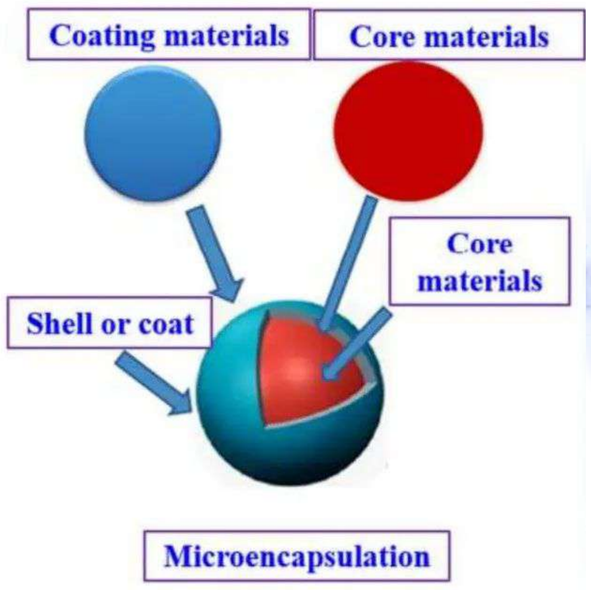
Patent/project number:A00164/8.05.2025

Authors: Georgiana Horincar, Andronoiu Doina Georgeta, Cotârleț Mihaela, Bahrim Gabriela, Aprodu Iuliana

The present invention relates to the development of a process for obtaining a type of dessert cream intended for use in confectionery and pastry products, through the incorporation of microencapsulated extract powder from eggplant (*Solanum melongena* L.) peels. Due to its composition rich in natural colorants and antioxidants extracted from eggplant peels, the powder imparts an attractive color to the product, contributes to the improvement of its sensory characteristics, enhances the diversification of the base product, and provides antioxidant properties with beneficial effects on consumer health. The objective of this invention is to replace synthetic additives with natural compounds extracted from eggplant peels, which exhibit antioxidant properties and are non-toxic. To the best of our knowledge, no studies have been reported on the development of value-added dessert creams using eggplant peel extract as a natural colorant and source of bioactive compounds with antioxidant potential.

Bioactive compounds extraction from eggplant

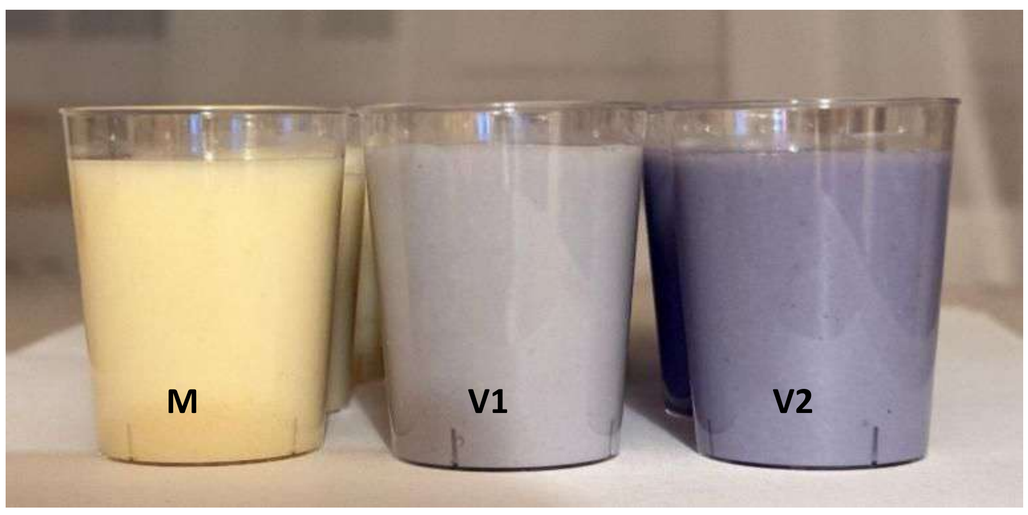




Preparation of Value-Added Dessert-Type Cream

Ingredients:

- 62,89% milk;
- 12,24% flour;
- 12,29% butter;
- 11,02% sugar;
- 1,5% lemon juice;
- 0,06% vanilla essence.
- 5% Microencapsulated Extract from Eggplant Peels *(v 1)*
- 10% Microencapsulated Extract from Eggplant Peels *(v 2)*



Phytochemical Characteristics	Extract from Eggplant Peels	Microencapsulated Extract from Eggplant Peels	Samples		
			Blank	**V1 (5%)**	**V2 (10%)**
Eficiența încapsulării antocianilor(%)	-	96,52±0,27	-	-	-
Total Anthocyanin content, µg D3G/g DW.	0,53±0,01	0,31±0,01	-	0,19±0,08	0,52±0,03
Total flavonoids content, mg EC/g DW.	5,97±0,12	2,74±0,05	0,21±0,01	0,47±0,01	0,67±0,01
Total poliphenols content mg AG/g DW	12,66±0,07	8,26±0,14	0,45±0,07	2,82±0,05	5,10±0,04
Antioxidant activity mMol ET/g DW.	179,72±0,26	51,59±0,64	0,51±0,01	1,46±0,01	2,51±0,02

In conclusion, the use of microencapsulated eggplant peel extract powder as a functional ingredient in dessert-type cream represents a natural alternative to synthetic antioxidants and colorants, meeting consumer demand for natural and healthy food products.

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Technological Approach to Producing a Value-Added Beer Incorporating Bioactive Compounds from Eggplant (*Solanum melongena* L.) Peels

Patent/project number: Research project UDJG: GI 03/1.03.2018
Authors: Georgiana Horincar, Claudia Ungureanu, Aprodu Iuliana

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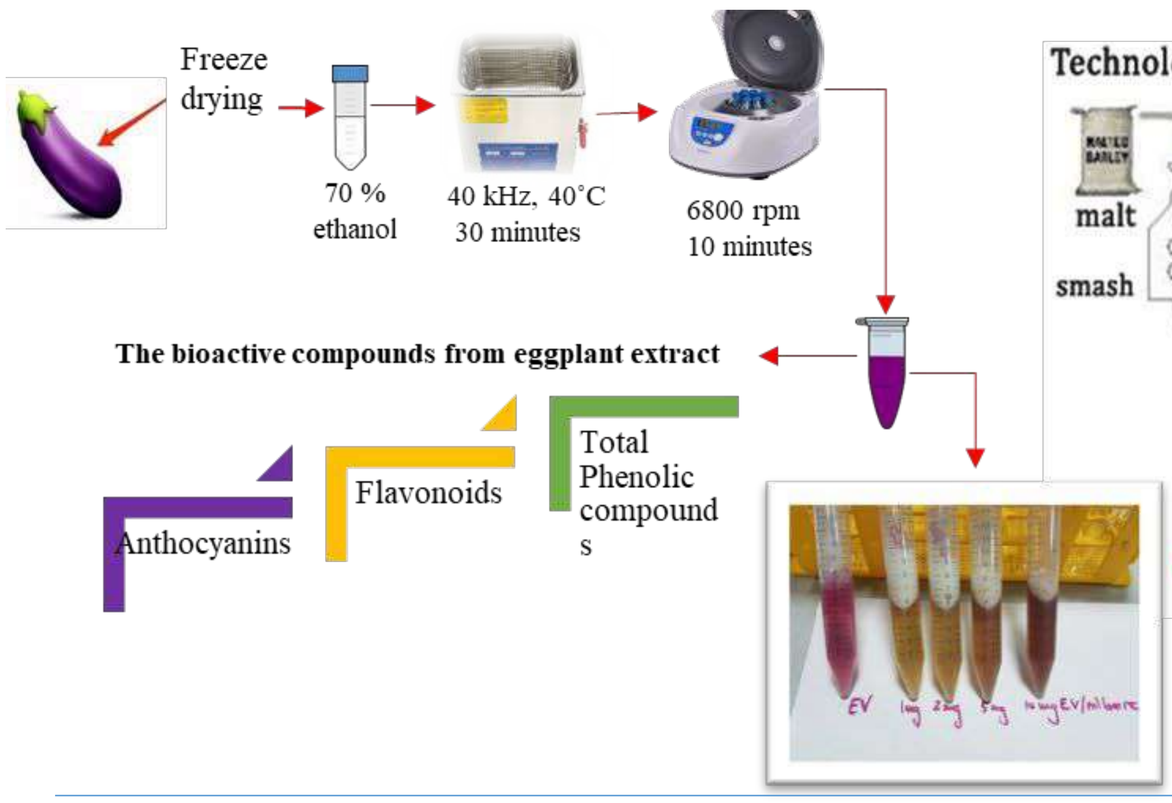
The present invention relates to the production of a value-added beer enriched with eggplant (*Solanum melongena*) peel extract, resulting in a functionalized product with enhanced antioxidant potential. The method involves the technological process of beer production and the incorporation of eggplant peel extract (EPE), which is rich in anthocyanins, flavonoids, and phenolic compounds. Incorporation of EPE into the beer at the end of the fermentation process led to an increased concentration of bioactive compounds and higher antioxidant activity.

The resulting beer demonstrates improved biological value, primarily due to its elevated antioxidant content, without negatively affecting key organoleptic properties such as aroma, taste, and clarity. Furthermore, the addition of EPE imparted a reddish color to the beer, enhancing its visual appeal to consumers. These results suggest a promising application of eggplant extract as a functional ingredient in beer. This invention represents an innovative approach to the valorization of plant by-products and supports the principles of the circular economy. This invention addresses the growing demand for functional foods with clean-label and health-promoting ingredients.



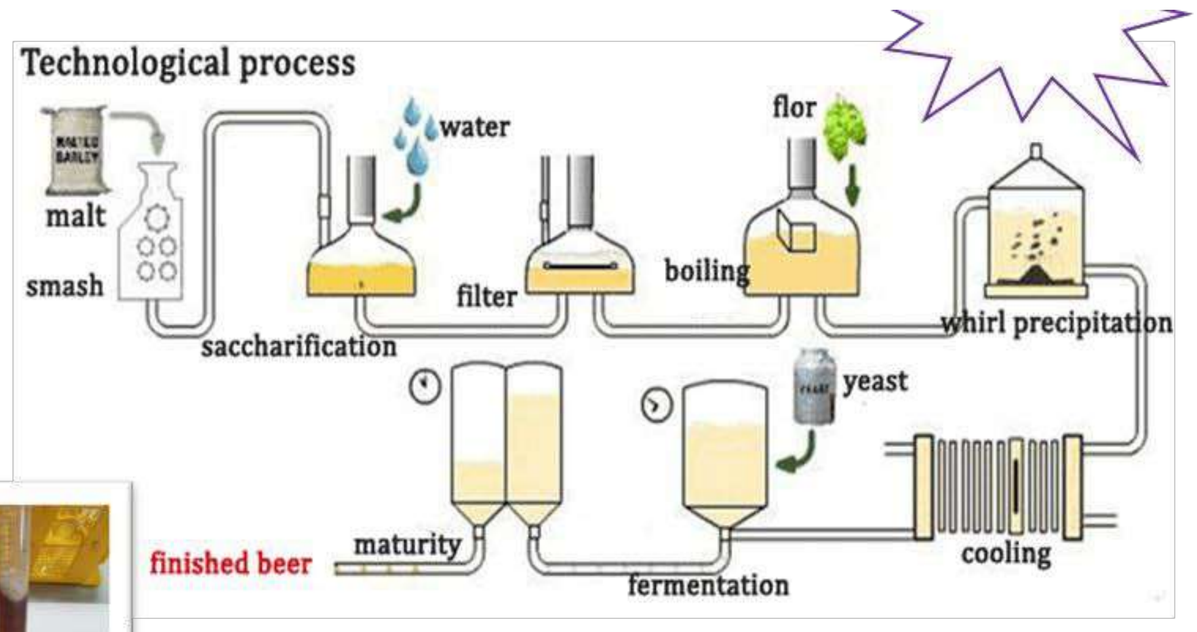


Table 1. Phytochemical characterisation of beer enriched with different concentrations of eggplant peel extract.

	TMA (mg D-3G/ 100 mL beer)	TPC (mg GAE/100 mL beer)	TFC (mg CE/ 100 mL beer)	Antioxidant activity			
				Inhibition (%) - DPPH	DPPH (mM Trolox/ 100 mL beer)	Inhibition(%) – ABTS	ABTS (mM Trolox/100 mL beer)
Control beer	0	42.6	6.5	77.71	120	57.29	4
B/EPE 1 (1mg/mL)	0.11	43.9	7.5	80.55	124	58.79	4
B/EPE 5 (5mg/mL)	0.44	54.4	12.8	83.33	129	73.64	3
B/EPE 10 (10mg/mL)	0.84	63.1	17.1	85.82	133	80.02	2

The addition of EPE to beer resulted in the increase of total monomeric anthocyanin content (TMA) up to 0.84 mg delphinidin-3glucoside/100 mL beer. Moreover, the total phenolic content (TPC) increased by 3 to 48 % above the control sample (42.6 mg GAE/100 mL). A similar trend was observed in case of Total flavonoid content (TFC). Thus, EPE addition resulted in TFC values up to 21 times higher compared to the control sample. Finally, the antioxidant activity increased by 11% upon the EPE addition, compared to the control.

Incorporation of EPE into beer at the end of the fermentation process, resulted in increased bioactive compounds concentration and higher antioxidant activity, without altering the physicochemical characteristics of the product. These results suggest a promising use of eggplant extract as a functional ingredient for beer.

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Sinergijski Set Organskih Tinktura „NELI 3-u-1“
"NELI" SYNERGISTIC ORGANIC TINCTURE SET
3-IN-1 SYSTEM

Autor: Dr Neđo Lipovčić / Kotor Varoš - Teslić / Savez inovatora Republike Srpske / Republic of Srpska - Bosnia and Herzegovina

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SR/ TEHNIČKA KARTA INOVACIJE

OPIS PROBLEMA I RJEŠENJA
- **Problem: Pad opšteg imuniteta i hronična upalna stanja uzrokovana stresom i neadekvatnom apsorpcijom aktivnih supstanci iz standardnih suplemenata.**
- **Rješenje: Inovativni set od tri komplementarne tinkture koje prate prirodni bioritam organizma. Inovacija se ogleda u nutricionističkom balansu čili paprike (kapsaicin kao katalizator cirkulacije), propolisa (prirodni štit) i selektovanog ljekovitog bilja.**

TEHNIČKE KARAKTERISTIKE I PROCES
- **Sastav: 100% organski ekstrakti bez upotrebe vještačkih konzervansa.**
- **Inovativni postupak: Metoda hladne maceracije koja čuva termolabilne fitonutrijente.**
- **Sinergija sastojaka: Čili paprika u formuli služi za ubrzavanje cirkulacije, čime se omogućava brži transport i do 40% bolja apsorpcija aktivnih materija iz propolisa i bilja u krvotok.**

BEZBJEDNOST I KONTROLA (Autoritet)
- **Nadzor: Proizvodnja se odvija pod kontinuiranim nadzorom Instituta za zaštitu javnog zdravlja Republike Srpske.**
- **Sertifikacija: Dr Neđo Lipovčić kao sertifikovani proizvođač i nutricionista garantuje precizno doziranje aktivnih komponenti.**

TRŽIŠNI POTENCIJAL I PRIMJENA
- **Ciljna grupa: Osobe sa oslabljenim imunitetom, sportisti (zbog cirkulacije) i populacija izložena sezonskim virusima.**
- **Ekološki aspekt: Upotreba isključivo autohtonih sirovina iz ekološki čistog područja Kotor Varoša, što doprinosi održivom razvoju lokalne zajednice.**

KLJUČNE PREDNOSTI
- **Originalnost: Prvi dvojezično brendiran set koji spaja kapsaicin (čili) sa pčelinjim proizvodima u preciznim medicinskim omjerima.**
- **Praktičnost: Pakovanje prilagođeno korisniku (kapaljke za precizno doziranje).**
- **Naučna osnova: Formulacija bazirana na nutricionističkim studijama o biodostupnosti nutrijenata.**

EN/ INNOVATION TECHNICAL DATA SHEET

PROBLEM & SOLUTION
- **The Problem: Reduced overall immunity and chronic inflammation caused by stress and poor absorption of active substances from conventional supplements.**
- **The Solution: An innovative set of three complementary tinctures following the body's natural biorhythm. The innovation lies in the nutritional balance of chili pepper (capsaicin as a circulation catalyst), propolis (natural shield), and selected medicinal herbs.**

TECHNICAL CHARACTERISTICS & INNOVATIVE PROCESS
- **Composition: 100% organic extracts, free from artificial preservatives.**
- **Innovative Method: Cold maceration process that preserves thermolabile phytonutrients.**
- **Synergy: Chili pepper in the formula accelerates blood flow, enabling faster transport and up to 40% better absorption of active compounds from propolis and herbs into the bloodstream.**

AUTHORITY & SAFETY
- **Supervision: Produced under the continuous supervision of the Institute for Public Health of the Republic of Srpska.**
- **Certification: Formulated by Dr. Nedjo Lipovcic, a certified producer and nutritionist, ensuring precise dosage of bio-active components.**

MARKET POTENTIAL
- **Targeting the global "Wellness & Immunity" market, specifically athletes and individuals requiring high-bioavailability natural recovery tools.**
- **Ecological aspect: Use of exclusively autochthonous raw materials from the ecologically clean area of Kotor Varoš, contributing to the sustainable development of the local community.**

KEY ADVANTAGES
- **Originality: The first bilingual branded product combining capsaicin (chili) with bee products in precise medical ratios.**
- **Practicality: User-friendly packaging (droppers for precise dosing).**
- **Scientific basis: A formulation based on nutritional studies on nutrient availability.**

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THEREFRESH CONCEPT

PROJECT: HOSPITALITY CULTURE

Author: Florin Pirus & Team

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Our company has been on the market for more than 12 years and we are continuously expanding.

Our activity is in the HoReCa field, we own 7 coffeeshops, a coffee roaster and a restaurant. In our cafes we offer our own brand of specialty coffee, hot chocolate, smoothie bar, catering and delivery services, in addition we are expanded with an online store where we offer our customers a varied range of products and accessories for serving and preparing tea and coffee.

Vision *TheRefresh is the place where you can really taste well-being!*

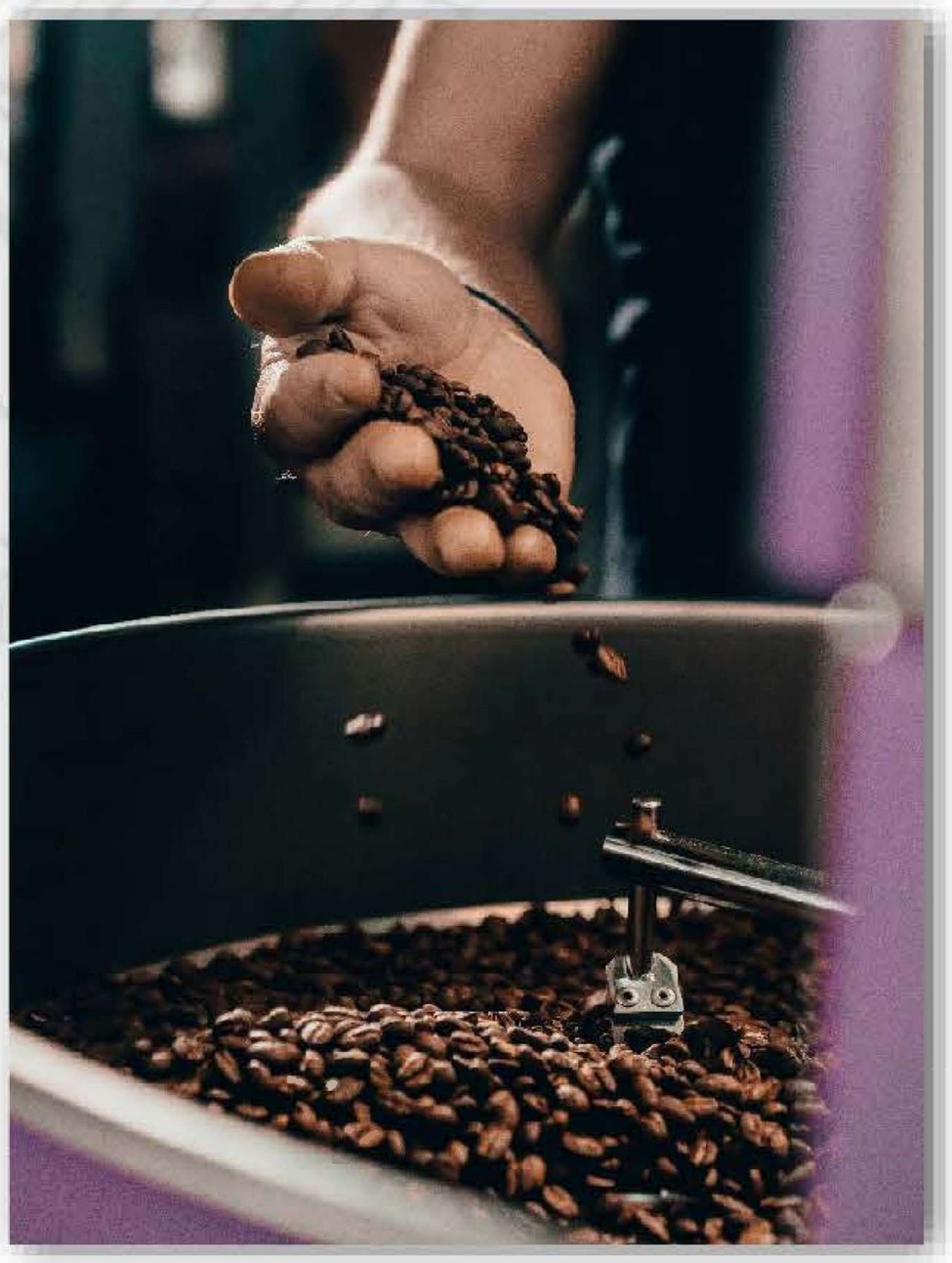
TheRefresh is more than a company or even a cafe. TheRefresh is a complex concept, which is based on the strong idea of refreshing, stimulating and educating the senses, to facilitate reaching the optimal level of energy and well-being.

TheRefresh is a concept aimed at offering customers a substitute for a healthy and balanced meal in the form of smoothies, teas and coffee.

TheRefresh is the place where the team is educated to serve all products in their finished form at the highest quality, honoring cultural factors and professional preparation methods. TheRefresh is more than a company or even a cafe. TheRefresh is a complex concept, which is based on the strong idea of refreshing, stimulating and educating the senses, to facilitate reaching the optimal level of energy and well-being.

TheRefresh is a concept aimed at offering customers a substitute for a healthy and balanced meal in the form of smoothies, teas and coffee.

TheRefresh is the place where the team is educated to serve all products in their finished form at the highest quality, honoring cultural factors and professional preparation methods.



Scan

Contact: S.C. COFFEE&BEVERAGE S.R.L
E-mail: florin@therefresh.ro Tel.: +40 721 726 116 www.therefresh.ro

Opportunity
CORNELIUGROUP Research-Innovation Association
Creation
INVENTCOR
Realization
Power of Creative Mind
Deva ROMANIA

Packaging the future

Biodegradable packaging by Fiodorov Olga

PROCESS FOR OBTAINING THE BIODEGRADABLE PACKAGING

Patent/project number: s 2024 0097 MD

Author: Olga Botnari (Fiodorov)

H

Patent application: no. s 2024 0097 from 04.10.2024

Purpose:

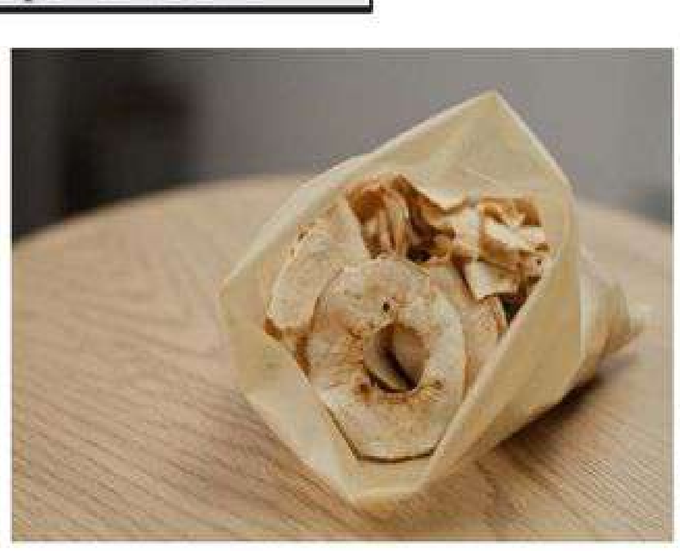
Obtaining biodegradable packaging by utilizing fruits and vegetables in the form of food film.

Solution:

This invention describes a technological process for producing a biodegradable packaging material made from fruit and vegetable-based biodegradable films with the addition of natural plasticizers, intended for use in the food and pharmaceutical industries.

Advantages:

- Biodegradable, antimicrobial and edible;
- Pleasant aroma, color and appearance;
- Low weight, easy and direct inscription;
- Degree of resistance to oil and grease penetration.



Biodegradable packaging - general view

Biodegradable packaging samples

The process involves several stages: (1) preparation of the raw material by cutting the fruits into optimal sizes for processing; (2) selective thermal treatment (blanching) of dense-structured fruits to inactivate enzymes and preserve sensory attributes; (3) mechanical pulping of the fruits to obtain a homogeneous paste with fine particle size; (4) homogenization of the composition and incorporation of a natural plasticizer (gelatin–chitosan, 0.5–3%) to enhance the mechanical strength and flexibility of the resulting film. The fruit paste is then cast in a uniform layer on a non-stick surface and subjected to a controlled drying process in a convection oven, with gradually increasing temperature (from 55°C to 70°C) until a residual moisture content of 6–12% is achieved. During this stage, natural polymerization reactions (involving pectin and uronic acids) occur, contributing to the gelation and stabilization of the film matrix. The resulting film has an average thickness of ~0.263 mm, a uniform and translucent appearance, specific fruit aroma, is water-soluble, and microbiologically stable. The packaging is then sealed and stored under controlled conditions (10–15°C, 40–60% relative humidity) to prevent degradation. This type of packaging offers a sustainable and eco-friendly alternative to conventional synthetic materials.

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VURGER PROTEIN MIX – A VERSATILE PLANT-BASED PROTEIN FORMULATION FOR BURGERS AND DIVERSE CULINARY APPLICATIONS

Project number: **EIT Food RIS – CEL 2025 RO, IMP-RIS-2325-19153-02**

Author/s: **Delia-Gabriela Dumbrava[1], Ersilia Alexa [1], Codruța Petcu [2], Adela Radu [2], Ionel Călin Jianu [1], Camelia Moldovan [1], Diana Raba [1], Ileana Cocan [1], Viorica-Mirela Popa [1], Corina Misca [1], Despina Bordean [1], Aurica Borozan [1], Mariana-Atena Poiana [1]**

1- University of Life Sciences ”King Mihai I” from Timisoara; 2- S.C. Pronat S.R.L.

Description: **Vurger Protein Mix** represents an advanced, multi-component plant-based matrix engineered as a high-fidelity functional analogue for animal-derived proteins through the synergistic integration of botanical protein isolates and legumes sourced from certified organic agriculture. By optimizing nutritional density alongside superior organoleptic attributes, the formulation leverages the biochemical interaction between vegetable protein fractions and dietary fibers to ensure high biological value—characterized by a balanced amino acid profile—while simultaneously achieving high structural plasticity and a succulent texture upon rehydration. Free from synthetic additives, preservatives, and gluten, this clean-label intervention addresses the requirements of sustainable food systems and modern vegan or vegetarian dietary patterns, offering functional versatility for both artisanal and industrial applications. Developed under the auspices of the **EIT Food RIS CEL-2025 (RO)** project, this innovation is the result of a strategic research partnership between the **"King Mihai I" University of Life Sciences in Timișoara** and **Pronat S.R.L.**, the latter of which facilitates its commercial distribution within the specialized market.

Core Value Propositions for the Consumer:

1. Comprehensive Nutrition and Protein Equilibrium The synergistic combination of isolated and textured pea and fava bean proteins, supplemented by chickpea flour, chia, and flaxseeds, provides a high intake of vegetal proteins, dietary fibers, essential fatty acids, and micronutrients. This formulation ensures prolonged satiety while contributing to the maintenance of muscle mass and metabolic vitality.

2. 100% Organic and Clean-Label Ingredients All constituents are derived from certified organic agriculture, strictly excluding synthetic additives, preservatives, or artificial colorants. This end-to-end traceability ensures transparency and food safety, addressing the demands of a consumer segment increasingly focused on ingredient provenance and quality.

3. Authentic Palatability and Enhanced Culinary Experience Utilizing natural spices and functional ingredients—such as beetroot powder, miso powder, smoked paprika, cumin, and coriander—the product delivers a complex sensory profile with distinct umami notes and a harmonic balance of sweet, savory, and smoky flavors. The result is a plant-based burger that offers an authentic gastronomic experience capable of satisfying conventional meat consumers.

4. Functional Versatility and Preparation Convenience As an instant dry premix, the product requires only rehydration and molding prior to thermal processing, facilitating rapid preparation and zero-waste efficiency. Beyond burgers, the matrix is adaptable for meatballs, fillings, rolls, or other creative culinary applications tailored to individual preferences.

5. Sustainability and Socio-Ecological Responsibility By relying exclusively on organic, plant-based sources, the product contributes to the reduction of the carbon footprint and promotes a circular food system. Furthermore, the production process upholds the principles of organic farming and the valorization of local resources.

6. Accessibility and Value-to-Quality Ratio Despite the inclusion of premium ingredients and organic certification, the final pricing remains competitive. It reflects a calibrated equilibrium between high-quality raw material costs and the extensive benefits provided to the consumer, ensuring broad market accessibility without compromising rigorous quality standards.

Ingredients: pea protein powder isolate*, textured pea* and fava bean* protein (pea protein concentrate*, fava bean protein concentrate*, salt), chickpea flour*, chia seeds*, flaxseeds*, inactive yeast flakes* (yeast*, **wheat** flour*, sea salt), beetroot powder*, fine sea salt*, garlic*, onion*, tomato flakes*, smoked paprika*, cumin*, dried parsley leaves*, coriander*, miso* powder (sea salt, maltodextrin*, miso* powder (17%) (**soybeans***, brown rice*, salt, *A. oryzae*), carrots*, onion*, coriander*, spices* (ginger*, garlic*, nutmeg*, pepper*), parsley*, sunflower oil*, black pepper*.

**From certified organic agriculture. EU/non-EU Agriculture*

Nutritional Information,Per 100g

Energy,1486 kJ / 355 kcal
Fat,8.25 g
— of which saturates,1.4 g
Carbohydrates,22.95 g
— of which sugars,5.76 g
Fibre,14.67 g
Protein,45.9 g
Salt,2.68 g

Contact: deliadumbrava@usvt.ro

MEAT DELICE
INNOVATIVE PRODUCT FROM PORK WITH DEHYDRATED FRUITS FILLING AND CRUST
TRADEMARK OSIM 159881/21/03/2019

Faculty of Management and Rural Tourism, University of Life Sciences "King Mihai I" from Timisoara, 300645, Timisoara, Romania

Authors:
Raba Diana Nicoleta, Mișca Corina Dana, Bordean Despina Maria, Dumbravă Delia Gabriela, Popa Viorica Mirela, Moldovan Camelia, Caraibot Ioan

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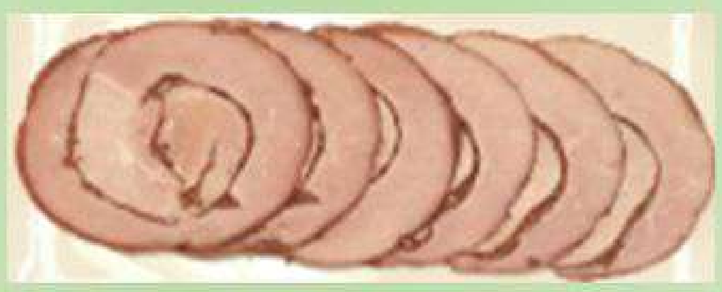

ABSTRACT

"Meat delice" is an innovative product which combines pork ham and wild dehydrated fruits (lingonberries and sea buckthorn) cooked by gentle thermal treatment. "Meat delice" have been developed based on following aspects: it is addressed to all consumers category; it is prepared from natural ingredients with high quality nutrients (high quality pork ham proteins, vitamins, fiber and minerals contents of the fruits, antioxidant properties of lingonberries and sea buckthorn); raw materials are provided by an integrated chain; it is processed using gentle technological flow with the product with minimum processing impact over the nutrients quality; can be produce through systems: conventional, natural and ecological.

Product have been developed based on the next aspects:
- ✓ addressed to all consumers category;
- ✓ natural ingredients, high quality nutrients;
- ✓ raw materials provided by an integrated chain;
- ✓ easy to implement technology;
- ✓ gentle technological flow with the product, minimum processing impact over the nutrient's quality;
- ✓ production systems: conventional, natural and ecological.
- ✓ high quality pork ham proteins, vitamins, fiber and minerals contents of the fruits, antioxidant properties of lingonberries and sea buckthorn.

The innovative aspects of product
- ➢using of wild fruits mixture from dried powder of lingonberries and sea buckthorn;
- ➢high quality and quantity of animal proteins, enhanced in vitamins, fiber, minerals, antioxidants intake of lingonberries and seabuckthorn

Original elements of product
- ➢ distinguished appearance of roulade on the outside and in section;
- ➢ exquisite taste and appearance;
- ➢ gentle thermal treatment.

Moisture, Protein content, Fat content, Total phenolic and DPPH % inhibition of backed pork ham with dehydrated fruits filling and crust

Product	Moisture [%]	Protein [%]	Fat [%]	Total phenolics [mgGAE/100g]	DPPH % inhibition
MeaBacked pork ham with dehydrated fruits filling and crustt Delice	15	25.87	6.05	103.3	55.97

Nutritional value of backed pork ham with dehydrated fruits filling and crust

Parameter	g per 100g
The energy value	157kJ /656 kcal
Fat	6.2
- of which saturated fatty acids	2.5
Carbohydrates	1
including sugars	-
Protein, %	24
Fibres	0.6
Salt	0.7

Microbiological parameters of backed pork ham with dehydrated fruits filling and crust storaged at 2-4^{0}C

Coliform bacteria	2	STAS ISO 4831 - 92
Escherichia coli / gr	0	SR ISO 7251:1996
Salmonella / 25 gr	Absent	SR ISO 6579:2003
Coagulase positive staphylococci / gr	5	SR ISO 6 388-92
Sulphite-reducing bacteria /gr	5	SR EN 13401:1997
Bacillus cereus / gr	0	SR ISO 7932:1997
Yeast and molds / gr	30	SR ISO 7954:2000

ECONOMIC IMPACT

The commercialization of product will boost the enterprise's market competitiveness and solidify its standing in the meat food products sector.

Acknowledgements

This study was funded by the Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI)
The research was performed with the support of the Interdisciplinary Research Platform and the Molecular Biology Laboratory belonging to the University of Life Sciences "King Mihai I" from Timisoara Romania..

Adaptive Robotic Gripper with Silicone Contact Surfaces

Authors: Roberto Constantin DOARA, Petru Daniel CIORAN, Alexandru George MAMULARU
Coordinator: Professor Aurel Mihail TITU

Scientific Research Project

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DESCRIPTION

The designed robotic arm is an advanced mechanical system engineered for precision handling and adaptability, featuring three slim, articulated arms that end in specialized silicone gripping heads. Each gripping head is designed with a slightly rectangular shape and fine, step-like micro-textures on one side, enhancing friction and improving control during object manipulation. The silicone material, available in blue or black, provides a soft yet secure contact surface, allowing the system to handle delicate, irregular, or sensitive objects without causing damage.

The arm is powered by high-precision servo motors or electric actuators, enabling smooth, controlled, and repeatable movements. Its lightweight yet durable structure supports efficient operation in various environments, from industrial settings to research laboratories. The three-point gripping configuration ensures balanced force distribution, increasing stability and reducing the risk of slippage. Additionally, the modular design allows for easy customization, maintenance, and integration into automated systems, making this robotic arm a versatile and reliable solution for modern applications.

ADVANTAGES

A major advantage of this robotic arm is its high versatility, due to the three silicone gripping heads that can handle fragile or irregular objects. Silicone ensures a secure grip without applying excessive force, protecting sensitive surfaces. Additionally, pressure distribution across three contact points improves the stability of the handled object. The system is energy efficient and can be programmed for repetitive or complex tasks. Moreover, the risk of product damage is significantly reduced compared to traditional rigid grippers. The design also allows easy maintenance and quick replacement of worn components.

APPLICATIONS

1.Food Industry

The robotic arm can be used in the food industry to handle delicate products such as fruits, pastries, or fragile packaging. The silicone heads allow gripping without crushing or damaging the items. Additionally, the material is easy to clean and compatible with hygiene standards. Automating this process reduces human error and increases production line efficiency.

2. Medical and Laboratory Use

In the medical field, the arm can be used to handle sensitive instruments or biological samples. Gentle gripping is essential to avoid contamination or damage. It can also be integrated into automated laboratory systems for testing and analysis. Its precision and high level of control make it ideal for environments where safety and accuracy are critical.

3. Logistics and Warehousing

In warehouses, the robotic arm can handle a wide range of products, from rigid boxes to fragile items. The flexible gripping heads adapt to different shapes, reducing the need for multiple gripping systems. This optimizes space and costs. Additionally, automating sorting and packaging processes increases operational speed and reduces the risk of product damage.

*Prof. Eng.& Ec. **Aurel Mihail TITU**, Sc.D. & Ph.D., Dr. Habil., Dr.h.c.*
The Academy of Romanian Scientists Full Member;
Scientific Secretary at the Academy of Scientists from Romania,
Economic, Legal and Sociological Sciences Section;
PATLIB Expert Level III at European Patent Office;
Director of Regional Centre OSIM-EPO for Intellectual Property Protection (PatLib Sibiu);
President of Romanian Association for Alternative Technologies Sibiu (A.R.T.A. Sibiu);
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LIME & CONDENSED MILK CRÊPE

A MODERN REINTERPRETATION

H

Authors: Ungureanu Raul, Nistorescu Oana – Georgiana; Mentor: Ramona Violeta Cazalbașu

Constantin Brâncuși University of Târgu Jiu, through the study program Engineering and Management in Public Food Services and Agrotourism, participated in the Student Competition " Initiating and Developing an Innovative Business" – 8th Edition, held between May 13 – 14 at the University of Life Sciences " King Michael I" of Romania in Timișoara. The Lime & Condensed Milk Crêpe – A Modern Reinterpretation won 1st Place – Culinary Creation Category: The Infinity Crêpe awarded for Harmony of Flavor and Aesthetic Refinement.

A refined dessert in which the traditional crêpe is transformed into a contemporary gastronomic experience. Thin crêpe layers, delicately golden and crisp on the outside while remaining soft inside, envelop a smooth and silky filling made from sweetened condensed milk and fresh lime. The vibrant citrus notes perfectly balance the gentle sweetness of the cream, bringing a refreshing burst to every bite. The plating embraces artistic creativity: a vibrant green, sponge-like "moss," created through a modern aeration and rapid-baking technique, introduces playful texture and intense color to the dish. Delicate drops of cream enhance the dominant flavors, while a refined cocoa powder design adds visual contrast and elegance. This dessert tells a story on the plate — a harmonious meeting between tradition and innovation, flavor and visual artistry — resulting in a surprising, memorable, and sophisticated culinary experience.

Lime & Condensed Milk Crêpe – A Modern Reinterpretation

SCAN ME

Contact: *ramona.cazalbasu@e-ucb.ro*

Presentation link: *Clătita infinitului, pe podium la o competiție studențească organizată la Timișoara - Gorj Express*

WHEAT FLOUR BREAD WITH ROSEHIP POWDER ADDITION AND ITS PREPARATION METHOD

Nicoleta VARTOLOMEI, Maria TURTOI

Liceul Tehnologhic Târgu Ocna, Bacău, România

Universitatea „Dunărea de Jos” din Galați, Galați, România

Motto: ***Fiat Panis!***

Abstract

The invention relates to a bread with the addition of rosehip powder and to the process for obtaining the same. According to the invention, the product is obtained from wheat flour type 550, 1.8 % yeast, 1.5 % salt, 0.5–3.0 % rosehip powder, and water depending on the water absorption capacity of the flour, the amounts of the ingredients being expressed as a percentage of the amount of flour. According to the invention, the process consists in mixing the ingredients, kneading and fermentation with refolding under known conditions, followed by successive operations of dividing, modelling, final fermentation, baking, cooling, packing and storage for delivery.

Brevet de invenție nr. RO133910A2 din 27.02.2026

DESCRIEREA INVENȚIEI

Problema tehnică pe care o rezolvă invenția este îmbunătăţirea proprietăţilor reologice ale aluatului şi îmbunătățirea calităţii pâinii prin adaos de pudră de măceşe, respectiv crearea unei alternative de înlocuire a acidului ascorbic de sinteză cu pudră de măceșe, un produs natural care conține acid ascorbic.

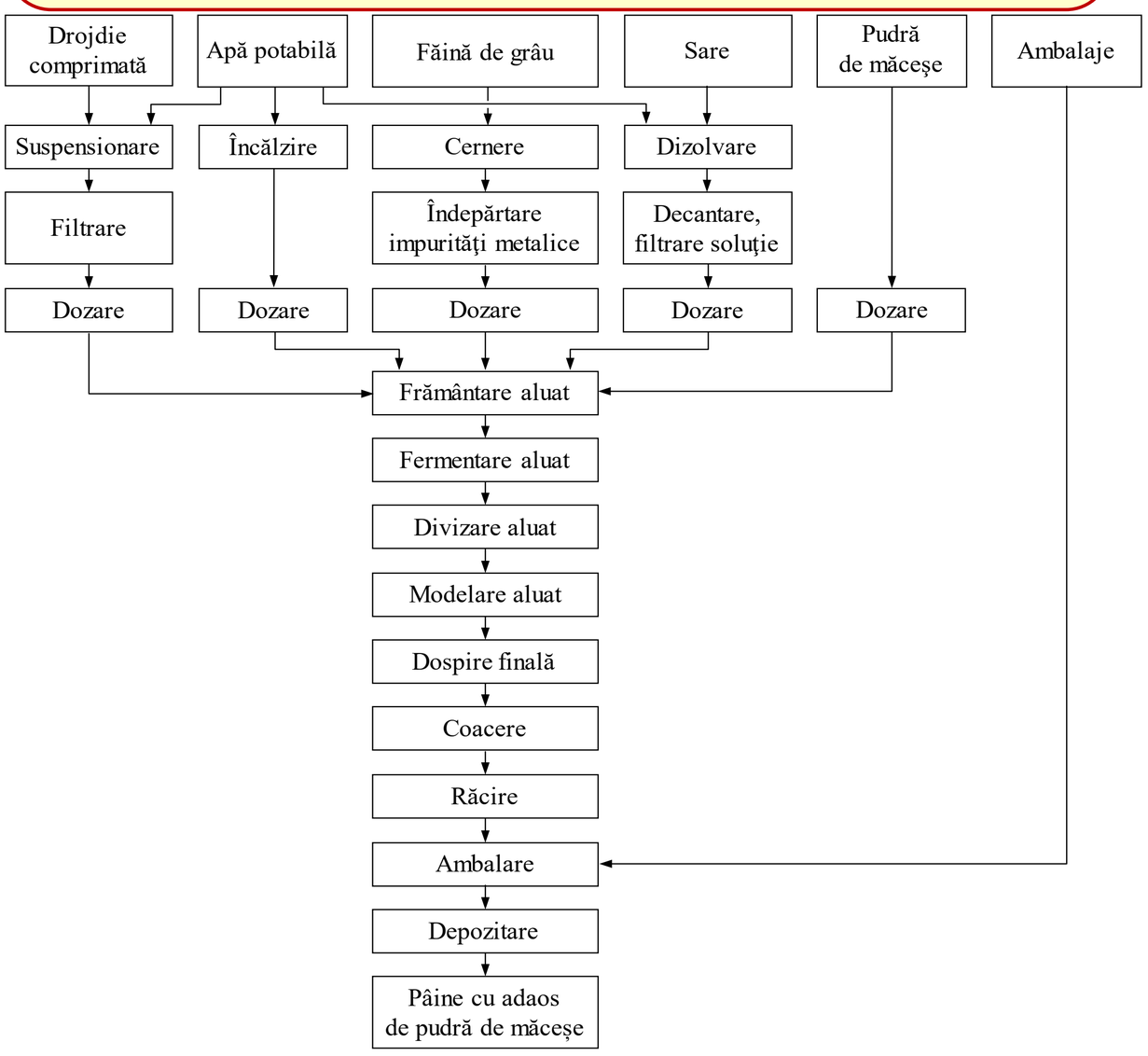


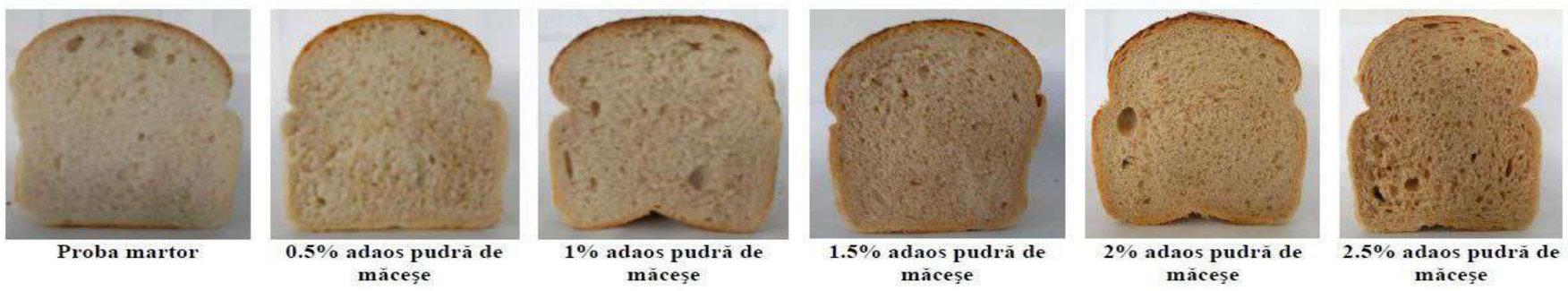
Fig. 1. Schema bloc de fabricare a pâinii din făină de grâu cu adaos de pudră de măceșe

Tabelul 1. Reţeta de fabricaţie pentru obținerea pâinii cu adaos de pudră de măceșe – metoda directă

Materii prime / Regimul tehnologic	UM	Valori
Materii prime şi auxiliare		
Făină de grâu tip 550	kg	100
Apă	litri	În funcție de capacitatea de hidratare a făinii
Drojdie comprimată	kg	1,8
Sare	kg	1,5
Pudră de măceșe	Kg	0,5–2,5
Regimul tehnologic		
Durata frământării	min.	10–12
Durata fermentării	min.	20–30
Temperatura de fermentare	°C	– inițială 29...30 – finală 30...31
Durata refrământării	min.	2
Masa bucății de aluat	g	375
Durata dospirii bucăților de aluat	min.	50–60
Temperatura de dospire	°C	31...32
Durata coacerii	min.	25–30
Temperatura de coacere	°C	220...240
Masa pâinii	g	350

Tabelul 2. Efectul adaosului de pudră de măceșe asupra calității pâinii

Proba / Ingredient activ	Volumul pâinii cm^3	Umiditatea miezului %	Porozitatea miezului %	Elasticitatea miezului %
Martor	485,0	41,8	87,0	90
Probă cu adaos de acid ascorbic 2 mg/100 g	594,0	42,7	90,1	92
Probă cu adaos de pudră de măceșe 1,0 %	588,0	42,9	89,9	91
Probă cu adaos de pudră de măceșe 1,5 %	614,5	42,3	90,7	92
Probă cu adaos de pudră de măceșe 2,0 %	574,0	43,9	87,0	91



Concluzii

Pâinea obținută din făină cu adaos de pudră de măceșe este mai închisă la culoare, în funcție de adaosul utilizat întrucât pudra de măceșe vine, pe de o parte, cu un aport de substanțe minerale, deci contribuie la creșterea conținutului de cenușă al amestecurilor făină – pudră de măceșe, pe de altă parte cu compuși de culoare – carotenoizi (licopen, luteină, zeaxantină etc.) care sunt provitamine și antioxidanți.

Mulțumiri

Autoarele mulțumesc Universității „Dunărea de Jos” din Galați pentru sprijinul acordat la obținerea brevetului de invenție.

Autor corespondent: vartolomeinicoleta28@yahoo.ro

„TASTE OF NOVACI„

LOCAL GASTRONOMIC POINT WITH A TASTE OF HOME

H

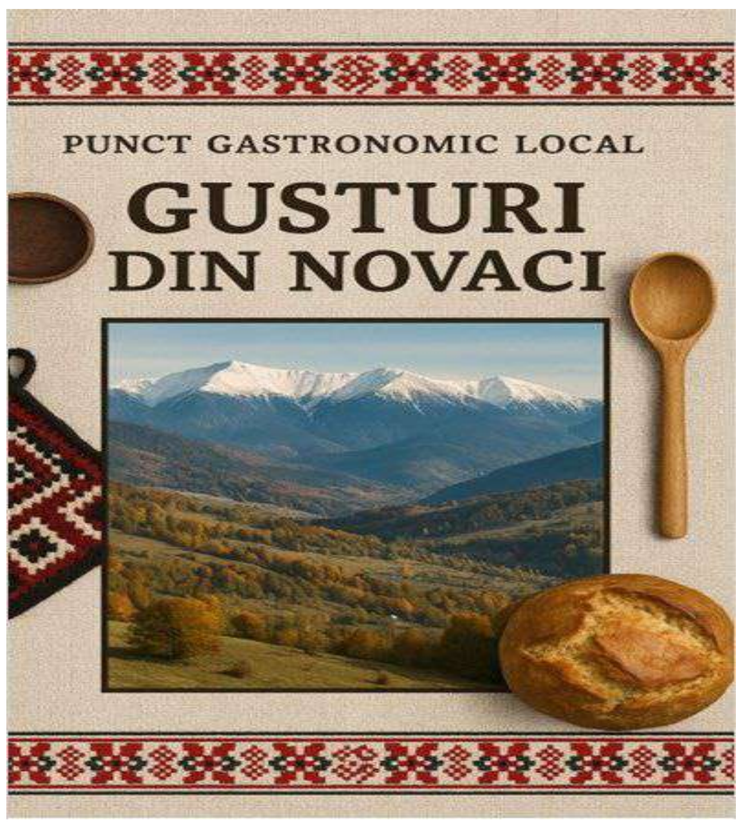
Author: Popescu Alexandra-Georgiana; Mentor: Pecingină Irina-Ramona

Constantin Brâncuși University of Târgu Jiu, through the study program Engineering and Management in Public Food Services and Agrotourism, participated in the Student Competition ,, Initiating and Developing an Innovative Business,, - 8 th Edition, held between May 13-14 at the University of Life Sciences ,,King Michael I,, of Romania in Timișoara". "Taste of Novaci - Local gastronomic point with a taste of home" won 2nd prize at Section 3 of the Business Plan Arena and was appreciated for its originality, economic feasibility and emphasis on capitalizing on local resources.

The Local Gastronomic Point offers a practical solution for capitalizing on products from rural households through small, family-run food service units adapted to the specific features of each tourist region with recognized culinary traditions.

Establishing a Local Gastronomic Point in the Novaci area represents an innovative and efficient way to support the development of the rural community and to diversify the local tourism offer. It will be located in the town of Novaci and will operate as a family business, where traditional Oltenian dishes will be prepared using local ingredients, following old recipes. The Local Gastronomic Point will feature a daily menu with a range of dishes specific to the Novaci area. The traditional recipes served will be made using local, natural, and seasonal ingredients. Traditional dishes based on ancient recipes are often the most flavorful and rich in taste

The innovative character of the business lies in the fact that it supports rural community development and diversifies the local tourism offer, helps preserve and promote local traditions, contributes to the creation of sustainable tourism and to increasing the region's visibility, and can become a central pillar of the tourism development strategy in the Novaci area.



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Presentation link:
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AURIC INFINITY HYBRID BIOREACTOR / BIO FERMENTOR (WOODEN / STAINLESS STEEL)

Patent: EP24174365.7

Authors: Alexander Gantenbrink, Vitalie Popa

H

The **auric infinity HYBRID** is a cutting-edge bioreactor and bio fermentor that seamlessly integrates the natural benefits of various wooden pressure vessels (such as oak, acacia, and more) with the precision and durability of stainless steel pressure vessels. This combination accelerates fermentation and ageing processes for still and sparkling products, offering an advanced yet natural approach to fermentation. The system utilizes only yeast and bacteria for fermentation, ensuring a natural process free from added additives or preservatives.

Versatility: auric infinity HYBRID is highly adaptable and designed to support various fermentation applications. It functions effectively in aerobic and anaerobic conditions, with or without pressure, making it ideal for diverse industries such as winemaking, brewing, spirit ageing, biofuel production, pharmaceutical manufacturing, and more. This flexibility allows the system to accommodate various fermentation needs across multiple sectors.

Pure Fermentation: auric Infinity HYBRID exclusively relies on yeast and bacteria for fermentation, guaranteeing a natural process without added additives and preservatives. The system offers complete control over oxidation, contamination, and evaporation during primary and secondary fermentation and ageing stages, ensuring a consistent and pure outcome.

Wood's Natural Compounds: One of the standout features of the auric infinity HYBRID is its ability to enhance the fermentation process by infusing the **unoxidized chemical compounds** from wood into the fermenting medium. The unique sealed environment of the stainless-steel pressure vessel optimizes this natural infusion, accelerating fermentation and ageing.

Customization: With an integrated perforated cylindrical filter, the auric infinity HYBRID offers unmatched flexibility in fermentation. It supports the fermentation of liquid (e.g., juice) and solid materials (e.g., marc, such as berries or pomace), allowing a diverse range of products to ferment within the same system.

Uniqueness: The system can support dual fermentation processes simultaneously—one in the wooden barrel and the other in the stainless-steel pressure vessel. By simply opening two valves, the two fermentations can be combined at any stage, either before or after completion, providing enhanced control and the opportunity for innovative product development.

Continuous Fermentation: A key feature of the auric infinity HYBRID is its ability to facilitate continuous fermentation. The customizable temperature and pressure settings of the wooden and stainless-steel pressure vessels allow them to function independently or in tandem, providing unparalleled control and adaptability. Furthermore, different wooden barrels can be swapped during the continuous fermentation process, optimizing the system's efficiency and enhancing the overall product quality.

The **auric infinity HYBRID** represents a breakthrough in fermentation technology. It combines natural materials with modern precision to offer unparalleled flexibility, control, and innovation across a wide range of industries.

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RAPID SCREENING METHOD OF IMAZALIL AND THIABENDAZOLE FROM CITRUS

Inventors: Cristiana RADULESCU, Radu Lucian Olteanu, Ioana Daniela DULAMA, Ioan Alin BUCURICA, Toma GALAON, Raluca Maria STIRBESCU, Andreea Laura BANICA, Bogdan Bradut MINEA

Assignee: Valahia University of Targoviste

Patent Application RO 138394 A0 /30.09.2024

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Field of Applicability: Food Industry

The main advantage of the invention is the fact that it finds practical use in the food industry (complex analysis laboratories, quality control of raw materials, the consumer information department/National Authority for Consumer Protection), with the role of warning about the risk of contamination with residues of imazalil and thiabendazole and implicitly on the risk to human health, but also the role of warning and awareness of suppliers and processors.

Originality: Rapid screening method

The technical problem that the invention solves is to establish a rapid screening method for imazalil and thiabendazole in citrus fruits. Regardless of the product (i.e., grapefruits 0110010, oranges 0110020, lemons 0110030, limes 0110040 or mandarines 0110050 - as codified by Commission Regulation EU 2020/856 of 9 June 2020) the sample and reagent quantities are specified exactly, as and working parameters.

Importance of invention: Food safety

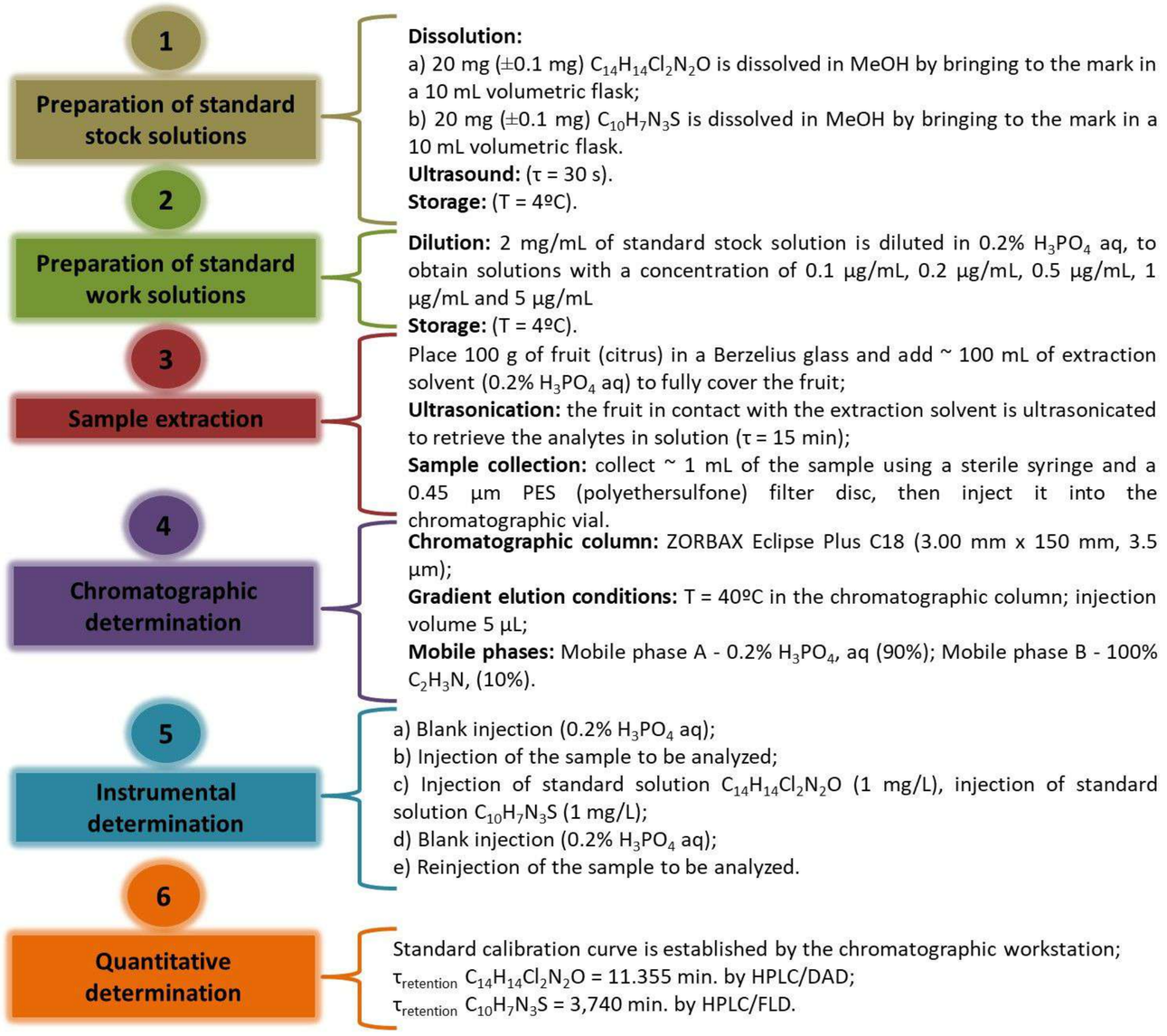
The invention relates to the rapid screening method of imazalil and thiabendazole from citrus fruits with applicability in the field of food safety. The method uses high-performance liquid chromatography (HPLC) coupled with ultraviolet-visible DAD (diode array detector) and FLD (fluorescence detector) detectors for the simultaneous detection of imazalil and thiabendazole residues on the surface of citrus fruits (lemons, mandarines, grapefruits, oranges, and limes).

The European Food Safety Authority (EFSA) in the technical report approved in March 2023, based on member countries' reports on official controls on pesticide residues in food products, stated among other things: citrus fruits, seed fruits and fresh herbs are the product groups with the higher detection frequency of pesticide residues. More than 90% of the samples analyzed contained one or more residues.

All these considerations are the basis of the concept of this invention which takes into account the need to determine the concentration of pesticide residue (imazalil and thiabendazole) on the surface of citrus fruits, fruits whose peel is used for human consumption. The developed method is based on a fast sample preparation/extraction step (20 minutes) and presents a high sensitivity considering the detection and quantification limits, especially for the determination of thiabendazole. Also, the analytical results indicate a very good degree of repeatability.

Analytical aspects

The method, according to the invention, consists of the following steps: (1) Preparation of standard stock solutions of imazalil and thiabendazole; (2) Preparation of working standard solutions; (3) Citrus sample extraction (i.e., grapefruit, oranges, lemons, limes and mandarines); (4) Chromatographic determination; (5) Instrumental determination; (6) Quantitative determination.



Conclusions: Technical problem solved by the invention & final thoughts

The proposed screening method is rapid (about 40 minutes), with a limit of detection (LOD) set at 0.003 mg/kg for imazalil and 0.00045 mg/kg for thiabendazole and a limit of quantification (LOQ) set at 0.01 mg/kg for imazalil and respectively 0.0015 mg/kg for thiabendazole, with high sensitivity regarding the simultaneous determination of the two pesticides from different categories of samples.

By applying the invention, the following advantages are obtained:

- reduced working time (aprox. 40 minutes);
- reduced amounts of reagents;
- effective application of the screening method regardless of the studied citrus category;
- no equipment or consumables are needed in the sample preparation stage that require high costs, utilities or special training of the operator;
- working parameters are identical for citrus fruits (i.e., lemons, mandarines, grapefruits, oranges, limes), which allows the simultaneous determination of imazalil and thiabendazole from different categories of samples;
- low degree of toxicity of the resulting products (residues).

https://www.osim.ro/images/Publicatii/Inventii/2024/bopi_inv_09_2024.pdf

Research Infrastructure: https:/ /eertis.eu/erio- 2300- OOOm-4240

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Mihaela's sweet & salty

INNOVATIVE SWEETS BY MIHAELA

Author: Mihaela SOLOMON

H

My passion for sweets is based on native creativity and conceptual innovation in continuous development. In order to make the my innovative sweets, I use the best high quality ingredients such as flour, butter, sugar, cream, fruit, cocoa from the organic range and only natural flavors and food colorings. I create recipes that bear my personal mark in terms of quantity/quality and the unique manufacturing process. My range of sweets includes simple but also sophisticated products with a special taste, such as: cakes, macarons, roulades, cakes in multiple layers, muffins, Pavlova, creme brulee, homemade chocolate fudge, ice cream, entremets and many others. Nothing compares to Mihaela's sweets!

Nothing compares to Mihaela's sweets!

Contact: *ella1511@yahoo.com*

Adriana's Honey

Authors: Ignat-Matei Adriana
Ignat-Matei Adriana Daniela
Ignat-Matei Alexandra Roxana

H

Bee products intended for a healthy diet. In order to produce organic honey, bees are relocated to pollution-free areas as far away as possible from inhabited areas such as mountains, plains, and hills. **Types of honey: polyflora, cherries, lime, chestnut, fir, sunflower, scallops.**

In addition to honey, we also produce pollen, propolis, wax and a series of ENERGIN-like mixed products.

Capaceala is a beekeeping product that people don't really know, but it has great health benefits. As everyone understands, this is the cover of the honeycomb, with which the bees "seal" the honey deposited in each cell of the honeycombs.

In the mixture, honey with sea buckthorn fruits represents a complete cure with numerous healing properties for the body. In honey with sea buckthorn we find Vitamin A, the complex of B vitamins (B1, B2, B6, B9), Vitamins E, K, P and F, beta-carotene (more concentrated than in carrots) and other microelements such as calcium, magnesium, phosphorus, iron, potassium and volatile oils.

Contact: +40720575824 danielaign9@yahoo.com

Mihaela's
sweet & salty

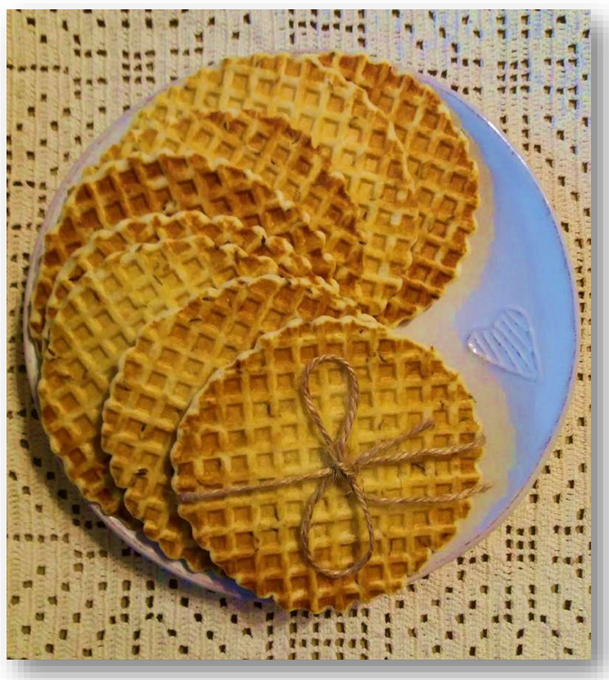
SALTY BAKERY

Author: Mihaela SOLOMON

H

The action of kneading the dough requires passion, patience, time and love to obtain wonderful products. Plastering salted dough for bread, pretzels, salted sticks, tarts and salted biscuits is an art. I try to rediscover old traditional Romanian recipes and more to reinterpret them in the current context.

I also approach certain recipes from the international cuisine, especially the French one, from which I make Quiche Lorraine, Tarte Flambee, Baguette. But I also want to realize various types of traditional Pida from Turkey.



SCAN ME

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PROCESS FOR OBTAINING THE RED DYE BETACYANIN FROM THE FRUITS OF AMERICAN POKEWEED (*Phytolacca americana* L.)

PATENT: MD 1817 / 2025.01.31, patent application: MD s 2024 0046 / 2024.04.30.

AUTHORS: Raisa IVANOVA, Igor CASIAN, Ana CASIAN

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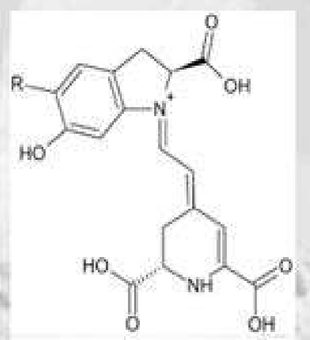
APPLICATION FIELDS: The invention relates to the food industry and can be applied in agriculture, in the pharmaceutical and cosmetic industries.

AIM: To obtain a natural red dye from inexpensive raw materials, beneficial use of invasive plants, particularly *Phytolacca americana* L.

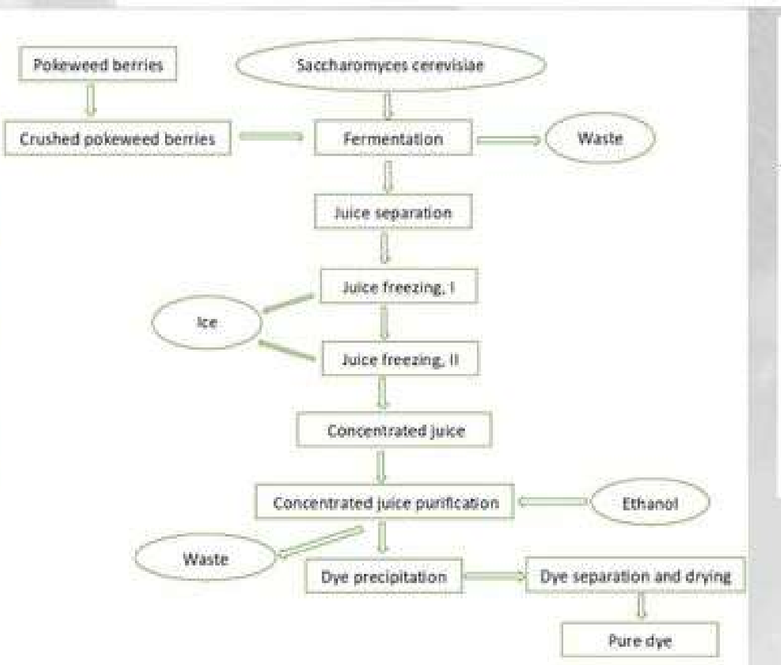
SOLUTION:

By proposed scheme, a dark purple powder is obtained with a content of 14.0-18.0% betacyanin, which dissolves well in water. In the concentration range 0...0.10 g/L, the calibration curve of the absorption dependence on concentration has high linearity coefficient of 0.9999.

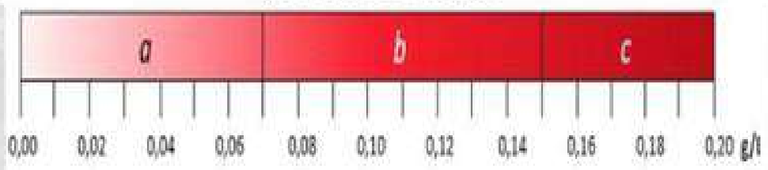
Pokeweed fruit



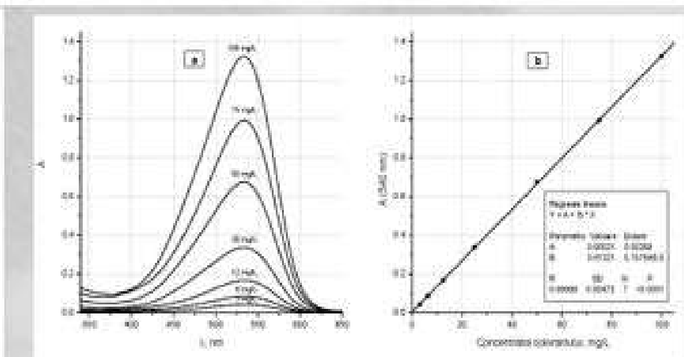
Chemical structure of betacyanin



Scheme for betacyanin dye obtaining from pokeweed fruits



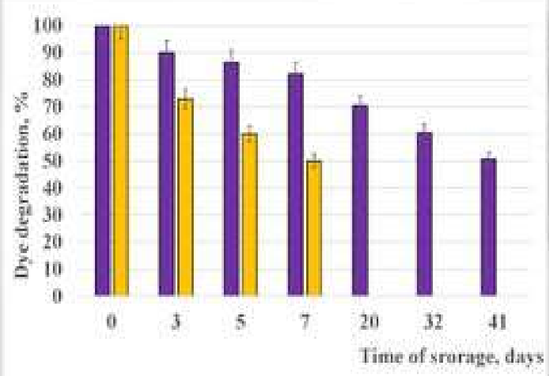
Color scale of aqueous solutions containing betacyanin red dye: a – insufficiently red (< 0.07 g/L); b – optimal red (0.07-0.15 g/L); c – intense red (> 0.15 g/L)



Specter of dyes (a) and dependence of absorption (at 540nm) on dye concentration in aqueous solutions (b).

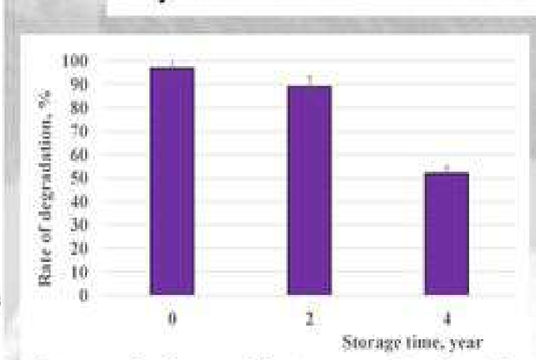
Aqueous solutions of dye with concentration 1.0-1.2 g/L at temperature of +4±2°C lost up to 50% of its initial content during 38-40 days, at 30±1°C - 6-7 days, but at a temperature of +40±1°C within 46-50 hours of storage.

The red dye powder is stabile at room temperature +18-20°C for 24 months; the dye lost only 10% of its initial content.



Dye degradation in aqueous solutions (1.0-1.2 g/L) at different storage temperatures:

■ – 4-6 °C: □ - 30 °C



Degradation of betacyanin dye in the powder form at temperature of 18-20°C.

ADVANTAGES:

- The sedimentation and purification of the dye by separating the ballast substances with the application of ethyl alcohol, which is approved for use in the food, cosmetic and pharmaceutical industries, allows obtaining the harmless finished product;
- this scheme is based on the use at different stages below freezing temperatures (-18...-25°C), low temperatures for sedimentation and purification (+4±2°C) and moderate positive temperatures in the dehydration process of the dye (40±2°C) which protected the betacyanin from thermal degradation and ensured the stability of the color during the dye storage;
- the developed technological scheme eliminates the need to use dye stabilizers.

IMPLEMENTATION STAGE: Product, laboratory research.

ACKNOWLEDGMENTS: Research was carried out within the Subprogramme 011101 "Genetic and biotechnological approaches to agroecosystem management under climate change conditions" for 2024-2027, financed by the Ministry of Education and Research of the Republic of Moldova. The authors would also like to thank the Ministry of Education, Science, Research and Sport of the Slovak Republic for supporting Raisa IVANOVA's project within the framework of the bilateral scholarship program for 2024-2025.

6th International Exhibition, INVENTCOR
3-5 April 2025

ARTISANAL BISCUITS WITH THE ORGANIC ROSEHIP POWDER ADDITION

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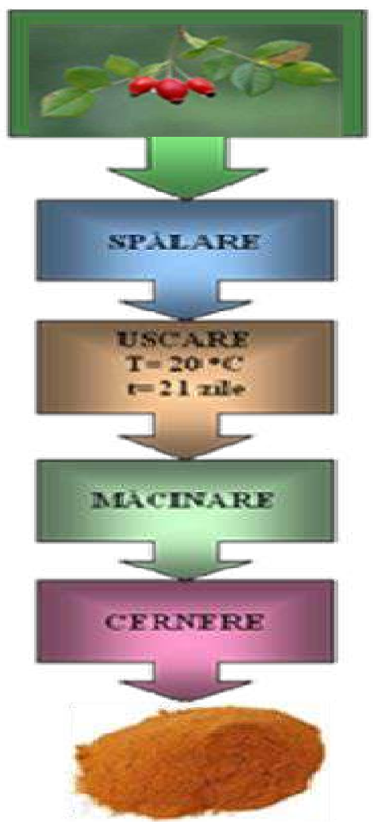
*Authors:*Alina - Mihaela MOROI, Nicoleta VARTOLOMEI*, Simina TĂNASĂ, Ana-Maria ROSU, Diana-Carmen MIRILA, Claudia TOMOZEI, Mirela LEHADUS-PANAINTE

The purpose of this work was to study the influence of the organic rosehip powder addition on the artisanal biscuits quality. In order to estimate the physico-chemical and sensory characteristics of complex products with the addition of vegetable powder, it was proposed to obtain artisanal biscuits with rosehip powder in a ratio of 0.5%, 1.0%, 1.5%, 2% and 2.5%. The use of domestic raw materials represents a particular advantage to considerably reduce production prices, so that the market price of the finished product is also affordable.

Rosehip fruits (*Rosa canina L.*) are used in food due to their rich content in bioactive compounds such as polyphenols, essential fatty acids, galactolipids, folates, antioxidants, vitamins and minerals, especially for vitamin C (ascorbic acid), rosehips being recognized as plant source rich in vitamin C. The increased antioxidant potential of plant powder from native plant sources was argued theoretically and experimentally through the analysis of quality indicators, antioxidant activity and CIELab color parameters.

Following the estimation of the organoleptic indices, it was established that the artisanal biscuits-with the addition of 1.5% rosehip powder have a pleasant color and smell and favorably influenced the organoleptic indices of the obtained samples and can be proposed for consumption by potential consumers on the market.



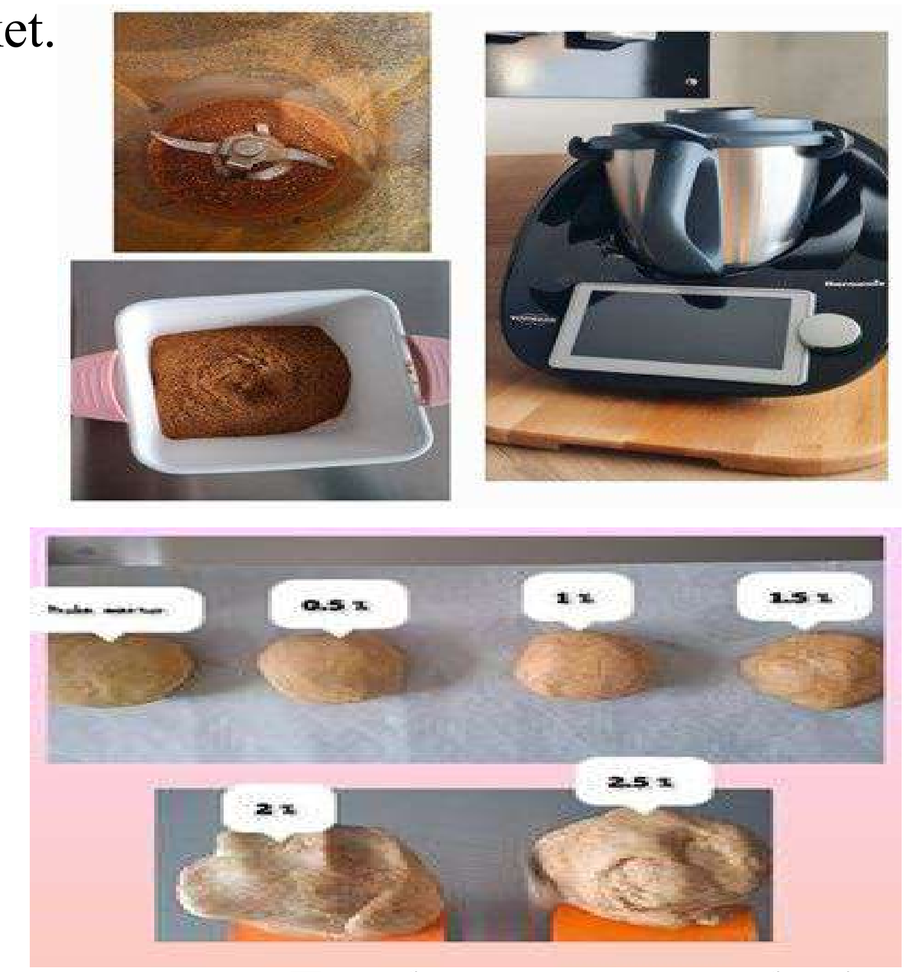


Table 1. *Physical-chemical properties of rosehip powder*

Moisture %	Carbohydrates %	Fibres %	Proteins %	Fats %	Ash %	Vitamin C mg/100 g
13.40	65.00	8.63	4.89	0.76	6.50	820

For the sensory analysis, 5 basic parameters were evaluated, namely: colour, taste, conscious, appearance, smell.

The evaluation of each index was appreciated with a score scale of 1-5 points.

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VBUNG® Technology

No Added Additives and Preservatives

Maceration, Fermentation, Malolactic Fermentation and Aging under Continuous Pressure in Custom Wooden Barrels

WWW.VBUNGVDOOR.COM

Standard Patent AU 2018203047 from 4th of May 2017 / Application EP 3564354A1

The speed of oxidation during maceration, fermentation, malolactic fermentation and aging is much faster than the process of winemaking itself which is a huge disadvantage and requires control using manly Additives and Preservatives.

The invention refers to a Totally New ***VBUNG ® Technology*** by applying:

Isobaric Winemaking Process inside Custom Wooden Barrels Giving Control Over Oxidation, Contamination, and Evaporation.

1. Positive pressure can be created naturally by CO2 during fermentation or artificially using any food-grade gasses allowed
2. Negative pressure can be created using a vacuum system

No added Additives and Preservatives Winemaking
=
Grapes + Custom Wooden Barrel + VBUNG ® Equipment

Custom Wooden Barrel :

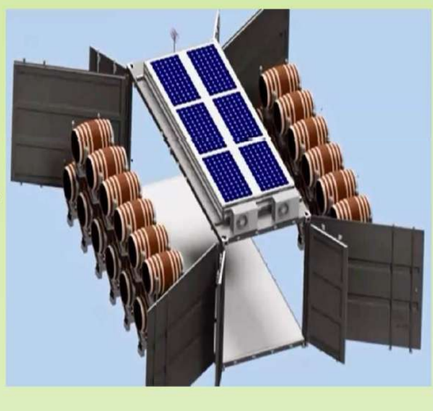
1. Food Grade Silicone Rod Between Staves / Barrelhead
2. Reinforced Hoops With Bolts
3. Acrylic Barrel Head for Sunlight / Visual / Sensors

VBUNG Patented Equipment :

1. Safety Relief Valve / Spunding Valve
2. Adjustable Racking Filter / Sparger / Liquid Inlet and Outlet Port
3. O2/N2/CO2/Ar…etc. Food Grade Gasses Inlet and Outlet Port
4. Temperature / Pressure / Dissolved Oxygen …etc. Sensors/ Wireless Sensors

Advantages

1. Sustainable Technology and Equipment without the use of Additives and Preservatives
2. Sustainable Mobile Winery in the vineyard with solar panels, sensors, and mobile data
3. Accelerated Winemaking and Aging technological process
4. Equipment Control over Oxidation, Contamination, and Evaporation
5. New or Old Wooden barrels can be used once custom modifications are done
6. Whole bunch, Juice, or Berries can be used
7. No Juice clarification is needed (No flotation, cold settling, or centrifugation)
8. No temperature or humidity control is required (Fermentation at high temperatures for white winemaking is not a problem)
9. Direct Sunlight for the whole technological process
10. No need for topping the barrels
11. Taking out wine samples for laboratory or tasting without oxidation, contamination, evaporation
12. Barrel regeneration with compressed O2 or Air before vintage
13. Extended lifetime for wooden barrels due to custom construction
14. Can be applied to making and aging Wine, Beer, Cider, Vinegar, and aging Spirits.
15. Reduced labor, time, and cost.
16. Global potential



NEW ORGANIC DIGESTIVE BISCUITS WITH RARE BLACK MULBERRY ADDITION AND DELIGHTFUL JELLY

Project number: "Simulated Enterprises in Food Industry at the "Vasile Alecsandri" University of Bacau", 11183/18.07.2024

Ana-Maria GEORGESCU, Gabriela MUNTIANU, Ana-Maria ROSU, Diana-Carmen MIRILA, Alina Mihaela MOROI, Nicoleta VARTOLOMEI, Ileana-Denisa NISTOR, Mirela LEHADUS-PANAINTE*

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1. DESCRIPTION

AIM OF RESEARCH → **to obtain an innovative food product with a functional character, such as organic biscuits with the addition of black mulberry powder (*Morus rubra*).**

NOVELTY → **the addition of black mulberry powder (in different additions: 1%, 2.5%, and 5%) obtained by squeezing the mulberry fruits, followed by drying and grinding the mulberry pulp into a fine powder.** This powder can be used in various ways in the food industry due to its distinctive taste and numerous health benefits. The biscuits obtained under laboratory conditions were subjected to sensory and physico-chemical analyses.

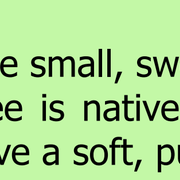
MULBERRY FRUITS are small, sweet fruits that grow on the mulberry tree, a type of tree that is part of the *Moraceae* family. The mulberry tree is native to Asia but now grows in many parts of the world, including Europe and North America. These fruits have a soft, pulpy texture and are black, red, or white in color.

2. MULBERRY FRUITS PROCESSING

Defrosted mulberry fruits

MULBERRY PULP → Oven drying, 40 °C – constant weight → **MULBERRY POWDER**

MULBERRY JUICE → PREPARATION OF MULBERRY JELLY



3. BISCUITS OBTAINING

WHEAT FLOUR | *BUTTER* | *SUGAR* | *MULBERRY POWDER* | *HEN EGGS* | *SALT* | *BAKING SODA*

INGREDIENTS MIXING

DOUGH KNEADING

FORMING THE BISCUITS

OVEN BAKING, 180 °C

COVERING WITH BLACK MULBERRY JELLY

PACKAGING AND LABELING

4. RESULTS AND DISCUSSION

A. Sensorial analysis

Organic biscuits with mulberry powder addition, obtained in laboratory conditions, were sensory analyzed through the *hedonic test*.

The purpose of the hedonic test method is to assess the taste quality of biscuits.

Grade	1	2	3	4	5	6	7	8	9
Assessment	Extremely unpleasant	Completely unpleasant	Semi-pleasant	Slightly unpleasant	Indifferent	Weakly pleasant	Pleasant	Very pleasant	Extremely pleasant
Final score	**8.5**								

B. Nutritional value

Proteins (g)	Lipids (g)	Carbohydrates (g)	Energetic value (Kcal)
4.65	16.69	55.96	403.72

5. COMPANY ESTABLISHMENT

CAEN code

- **1072** — Manufacture of biscuits and cookies; manufacture of cakes and preserved pastry products

6. PRODUCT FAIR

7. CONCLUSIONS

Due to the high content of antioxidants, vitamins and minerals, the addition in any form (syrup, powder or fruit itself) gives food products a functional character, often used in traditional medicine too for various ailments and symptoms.
This innovative food product is the first of its kind on the market, as there are no longer any biscuits that feature this new black mulberry addition.

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POMACES VALORIZATION FOR OBTAINING ENRICHED DEHYDRATED FRUIT ROLLS

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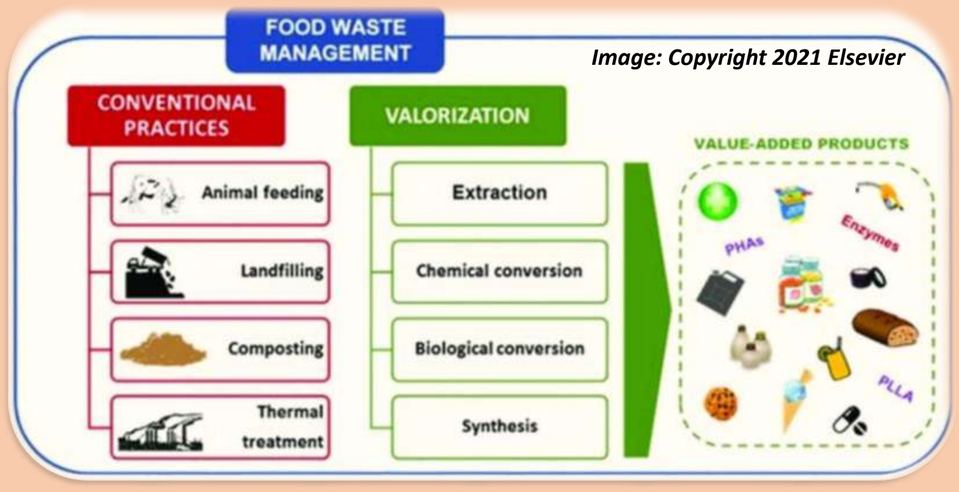
Research project

Authors: Luminița GROSU, Oana-Irina PATRICIU, Irina-Claudia ALEXA

- Interest in investigations concerning the reuse of by-products and waste of agro-food origin is increasing, with the aim of finding innovative solutions to valorize them in different areas.



- An important quantity of bioactive compounds remains in the solid matter of pomace; therefore, it is rich in polyphenols, organic acids, and minerals, and having thus remarkable antioxidant capacity.
- The development of foods that provide additional health benefits beyond basic nutrients is a current and growing trend in the food industry.
- Research and development aim recovering the pomace resulting from wine and juice industries and valorized it as lyophilized powder to add value to the foods.

FRUIT ROLLS / FRUIT LEATHERS
dehydrated fruit-based products

often eaten as a snack or dessert, which can represent an interesting alternative to replace conventional candies or dried fruits

obtained by mixing fruit puree and other ingredients and then dehydrating its under specific conditions

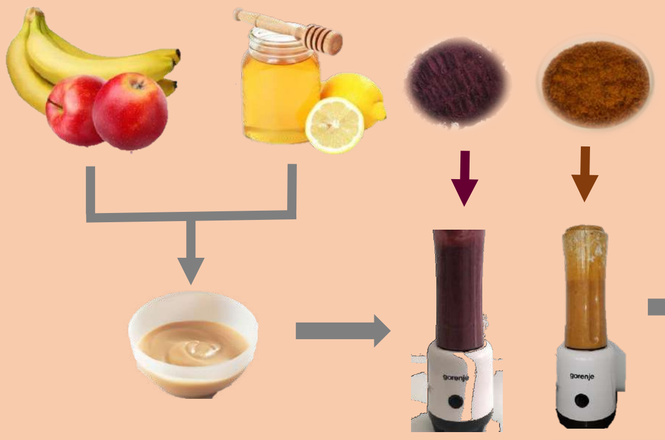
Objectives

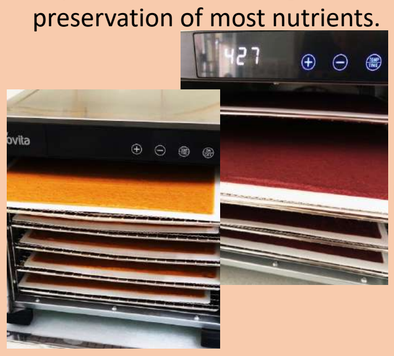
Valorization of grape and seabuckthorn pomaces by introducing it as a functional ingredient in powder form:

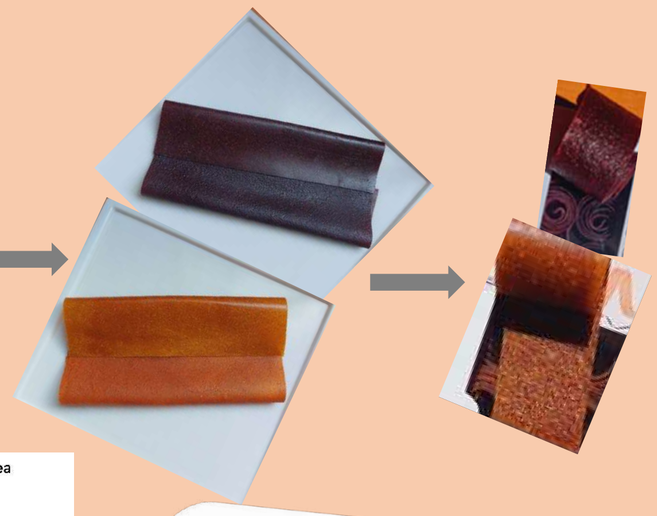
- ✓ developing an innovative food product: fruits rolls
- ✓ sensory evaluation and consumer acceptability

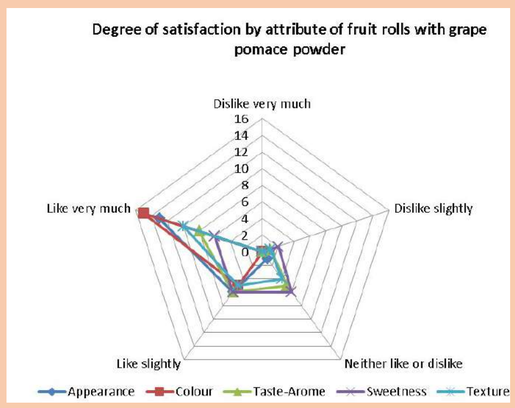
- ❖ The research consists in formulating of dehydrated fruit rolls enriched with adequate proportion of lyophilized pomace powder.
- ❖ The dehydrated fruit rolls were prepared using: apples, bananas, honey, lemon juice and grape pomace or sea buckthorn pomace powders.
- ❖ The innovation consists in adding lyophilized pomace powder to the fruits puree before drying process, which, to the best of our knowledge, has not been reported so far.

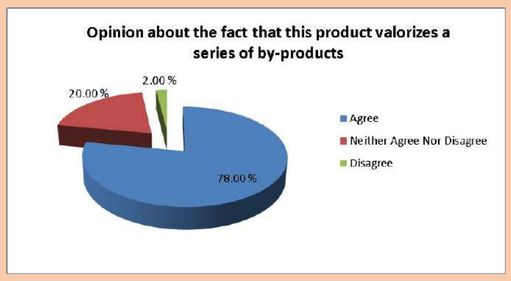
The drying parameters are important, allowing the preservation of most nutrients.

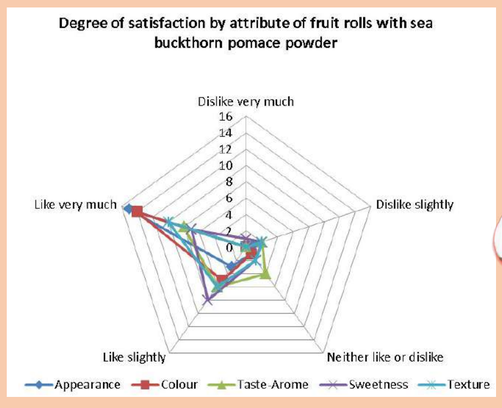












Following sensory analysis, the dehydrated fruit rolls with grape or sea buckthorn pomaces powders were well accepted by the participating panelists. In addition, almost 80 % of them agreed that these products valorize some by-products.

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FREEZE-DRIED POMACE POWDER WITH ACACIA HONEY

H

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Mentors: *Elena-Mirela SUCEVEANU, Luminița GROSU, Oana-Irina PATRICIU, Irina-Claudia ALEXA*

Our project approach is reusing pomaces, either by obtaining new functional food products, through the pomace powder's incorporation.

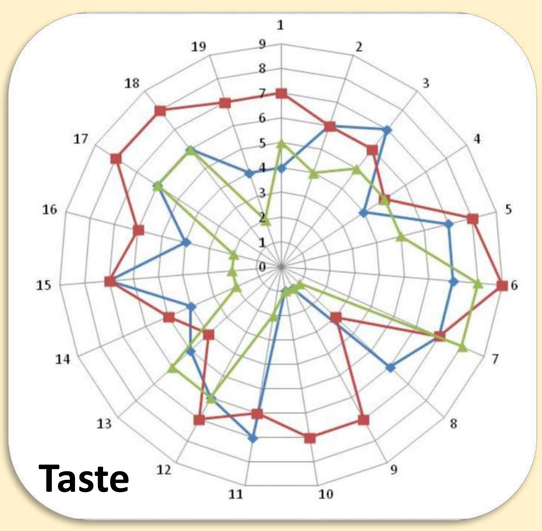
For the present project, innovative products based on acacia honey and different freeze-dried pomaces powders were formulated.

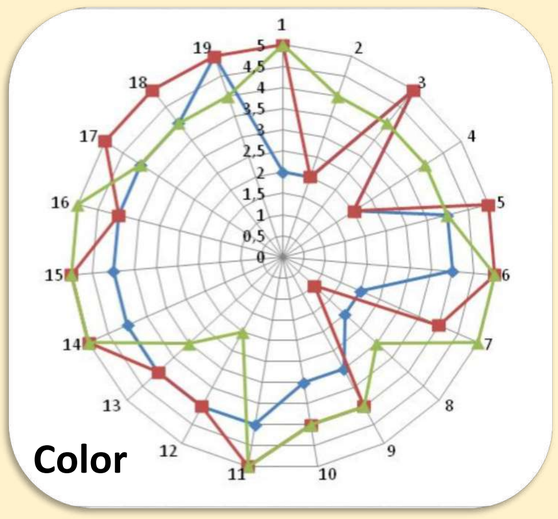
The obtained products provides both energy and a series of health benefits in terms of nutrients, being easily assimilated.

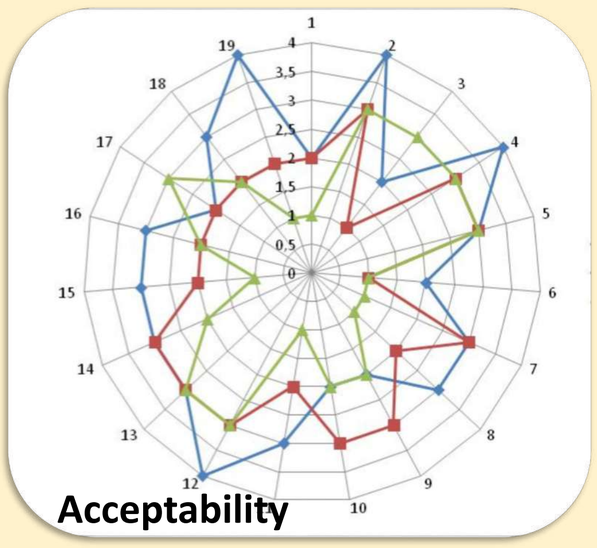
The addition of pomaces powders may impact the sensory characteristics of products, such as flavor, color, and texture.

It was essential to find the adequate proportion of pomace powder added to honey for good consumer acceptability, knowing that incorporating a higher level of pomace powder (> 15%) may lead to consumer rejection due to the darker color, possible bitterness, astringency, etc.

Following the formulation and sensory analysis of all products, the appropriate proportion of pomace powder was established based on the best consumer acceptability.







✓ **Due to the freeze-dried pomaces powders, the obtained products contain flavones, anthocyanins, tannins, vitamin C, etc., biomolecules possessing antioxidant and radical scavenging capacities.**

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6th International Exhibition, INVENTCOR
3-5 April 2025

YOGURT WITH THE ORGANIC ROSEHIP POWDER ADDITION

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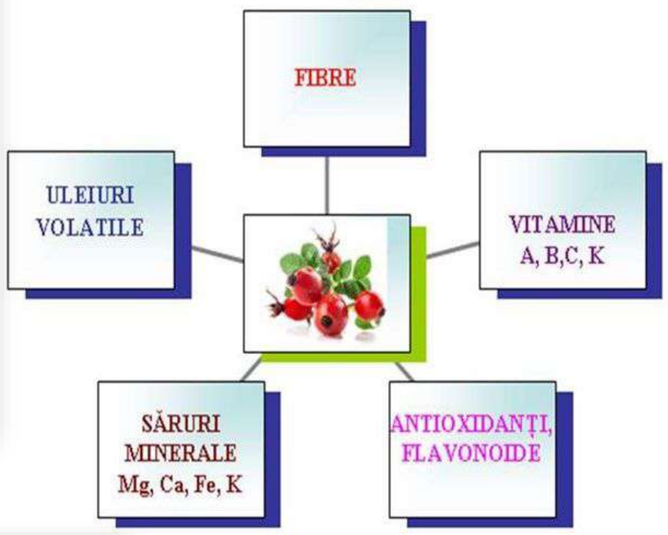
Yogurt largely reflects the nutritional value of milk, the raw material from which it is obtained. To make up for its deficiencies or to compensate for some of its bioactive properties, yogurt is often fortified by adding other ingredients, the most common being grains and fruits. Although fruit has been added to yogurt for a long time, recently studies have been reported that investigated the influence of addition fresh cut fruit and dried fruit in pieces or powder form on the physicochemical, sensory, and functional properties of yogurt.

The fruits of rosehip (*Rosa canina L.)* are used in food due to their content rich in antioxidant bioactive compounds, vitamins and minerals, especially for vitamin C (ascorbic acid), rosehip being recognized as a vegetable source rich in vitamin C.

The purpose of this work is to determine the influence of the organic rosehip powder addition on the yogurt quality. The rosehip powder was prepared by grinding the dried pulp of rosehip fruits by an ultra-centrifugal laboratory mill type ZM 200 Retsch (18.000 rpm, 4 min) and sieving the powder with sieves of different size to select the particles having around 180 μm size.



250 grame	Iaurt normal (2% grasime)	Iaurt grecesc (2% grasime)
Calorii	154	179
Carbohidrati	17 grame	10 grame
Zahar	17 grame	9 grame
Proteine	13 grame	24 grame
Grasime	4 grame	5 grame
Calciu	34% din Doza Dilnica (DZ)	22% din DZ
Sodium	7% din DZ	4% din DZ

Table 1. *Physical-chemical properties of rosehip powder*

Moisture %	Carbohydrates %	Fibres %	Proteins %	Fats %	Ash %	Vitamin C mg/100 g
13.40	65.00	8.63	4.89	0.76	6.50	820

Sensory analysis was performed with the 20-point test. Yoghurt with the organic addition rosehip powder has good sensory properties, appreciated when tasting. The most valued sensory attributes were appearance, smell and taste. Yogurts with organic rosehip powder scored higher than the control, which means they were accepted by the tasters.

Therefore, univariate statistical analysis are currently in progress in order to determine statistical differences between samples for the factors: rosehip powder concentration and storage time (days).

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BIOFUNCTIONAL PREMIXES (PMXBF) BASED ON SPELT WHEAT WITH APPLICABILITY IN THE FLOUR FOOD INDUSTRY

Patent application OSIM: A 00408/27.07.2023

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Keywords: sea buckthorn, grape pomace, lingonberries, MIXOLAB, phytonutrients

INTRODUCTION

Biofunctional premixes (PMXBF) are a mixture of flour-based ingredients/grain grinding products mixed with fruits, which can be used immediately, without requiring prior preparation, thus facilitating and accelerating the technological process. The very wide range of assortments includes both premixes and complex mixtures for bread, bakery specialties, pastries-confectionery, biscuits and pasta. Scientifically, these food concepts have made it possible to make flour products with improved nutritional properties, thanks to access to raw materials rich in bioactive principles.

Although common wheat is the basic cereal in our country, technical and scientific research are increasingly oriented towards expanding the range of assortments, the use of new cereals in the milling and bakery industry, as well as the implementation of new technologies, adapted to the requirements The present invention concerns to the development of premixes based on Triticum spelta wheat flour (PMXBF) with applications in the flour based food industry (bread, pasta, biscuits, pastry), with 5....25% meal ratio added flour from fruits of sea buckthorn (Hippophaë Rhamnoides L.), and/or lingonberries (Vaccinium vitis-idaea L.) and/or pomace resulting as a by-product of winemaking. The results obtained on the nutritional properties, phytonutrient content of premixes, as well as the rheological suitability of the dough, highlighted the possibility of implementing the technologies to obtain PMXBF-based products in the farinaceous food industry.

MATERIALS AND METHODS

4 variants of experimental models of PMXBF based on Spelta wheat flour (GS) and dried fruits were developed and characterized: red blueberries (AR), sea buckthorn (C), marc (T) and their mixture. The percentage of fruits added in fortified flours was: 5,10,15,20 and 25%

The experimental part of the claimed invention involved the following steps: A. Elaboration of experimental models of biofunctional premixes (PMXBF) based on Triticum spelta wheat flour, with the addition of valuable fruits from the autochthonous spontaneous flora, namely red blueberry fruits and sea buckthorn, as well as marc resulting from winemaking; B. Analysis of physicochemical, microbiological properties, nutritional value and active principles of functional premixes PMXBF obtained, C. Study of the influence of drying temperature of fruits in the composition of premixes on the constituent active principles; D. Testing the suitability of using functional models in obtaining flour food products; E. Characterisation of products obtained from a nutritional, sensory and active ingredient content.

In order to use functional premixes in the flour food industry with products such as biscuits, pasta, leavened dough bakery products and pastries, the suitability of premixes from a technological point of view in 4 assortments of dough was tested, and the products obtained were analyzed from a nutritional, sensory and active principles content.

RESULTS AND DISCUSSIONS

Figure 1. Biofunctional premix (PMBXF) based on Spelt wheat flour

Figure 2. PMBXF pasta based on Spelt wheat flour

Figure 3. PMBXF muffins based on Spelt wheat flour

Figure 4. PMBXF biscuits based on Spelt wheat flour

Figure 5. PMBXF bakery product based on Spelt wheat flour

Table 2. Nutritional value (minimum and maximum values) of PMXBF-based flour foods

Products	Proteins (%) Min.-max.	Lipids (%) Min.-max.	Glucids (%) Min.-max.	Mineral substances (%) Min.-max.	Energy value (kcal/100g) Min.-max.
Biscuits	6.24-8.67	21.79-29.57	54.57-62.65	1,84-2,29	477.00-513.89
Pasta	8.80-13.56	4.09-6.72	69.44-73.05	1.19-2.56	343.68-382.61
Muffins	6.10-6.83	16.67-28.00	37.40-60.88	0.96-1.20	378.00-475.47
Bakery product	8.54-10.46	9.86-13.05	47.35-52.56	2.21-2.95	340.00-429.00

Table 2. Content of fltonutrients (minimum and maximum values) of PMXBF-based flour foods

Products	Polyphenols (mg GAE/100g) min.-max.	Flavonoids (mg QUE/100g) min.-max.	FRAP value average (µM Fe2+/g) min.-max.	DPPH (%) min.-max
Biscuits	85.13-352.14	44.41-274.15	1.73-17.72	42.54-69.88
Pasta	99.52-371.38	64.23-214.14	3.86-27.57	39.46-74.54
Muffins	70.97-314.60	26,43-221.88	2.06-9.98	40.35-79.73
Bakery product	77.46-332.10	28.39-226.68	2.33-29.00	47.70-64.52

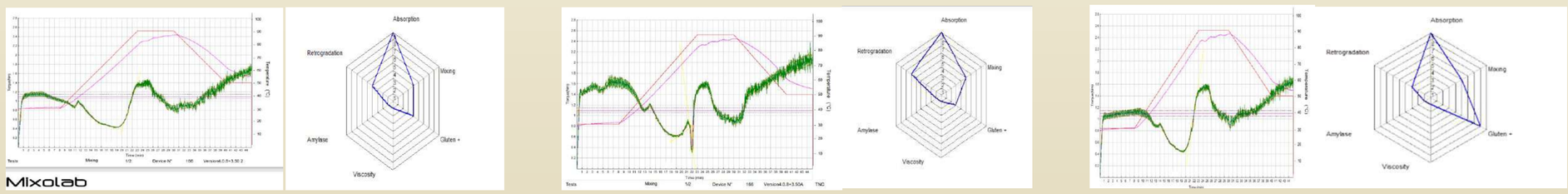

Figure 6. Rheological behavior and MIXOLAB profile of PMXBF

Rheological data highlight that an intake of 10-15% functional addition in flour premixes favors dough processing parameters and does not negatively influence the preservation and shelf life of products. Figure 6 shows Profiler Mixolab indices expressed on a scale of 0-9 (Mixolab Index) for a complete characterisation of flour (water absorption, mixing behaviour, gluten protein/strength, hot viscosity, amylase activity and retrograde).

The water absorption index (WAI) depends on the quantity and quality of flour components (protein, starch, fiber). The higher index ensures a higher water absorption capacity. The absorption index was maximum for samples of Spelt wheat premix with red blueberries, regardless of the percentage of red blueberries added. **Mixing index (MI)** provides information about the behaviour of flour when kneaded at 30˚C and expresses the stability and softening of the dough. When this index increases, the dough becomes more stable when kneading. The mixing index was 4 for dough obtained only from Spelt wheat, respectively for dough with 5% addition and increased to 5 for a premix with 10% addition, respectively 6 for 15%, which indicates a higher stability of the dough when kneading for a premix with 15% addition. **The gluten index (GI)** measures the behavior of gluten during dough heating. Gluten resistance is maximum in the sample with 20% red blueberries (gluten index value 6), compared to 4 in the control (dough obtained only from Spelt wheat). **Viscosity index (VI).** The increase in viscosity is due to both amylase activity and starch quality. Minimum values were obtained in the blank sample and with 5% addition. **The amylolysis index (AmI)** depends on the dough's resistance to diastatic activity. This index registers a minimum value for all analyzed samples, which denotes an increased amylase activity with effect on fermentation processes in the dough.

CONCLUSIONS

In conclusion, the present invention refers to the development of premixes based on Triticum spelta wheat flour (PMXBF) with applicability in the flour food industry (bakery, pasta, biscuits, pastry), obtained in a mixture of 5...25% with fruits from the local spontaneous flora (red blueberries and sea buckthorn), as well as by-products from winemaking (marc). The results obtained regarding the nutritional properties, the phytonutrient content of the premixes, but also the suitability of the dough from a technological point of view to technological processing, they highlighted the functional importance of PMXBF in food, as well as the possibility of implementing technologies for obtaining PMXBF-based products in the flour food industry.

ACKNOWLEDGEMENTS

This study was financed by West Regional Development Agency, Romania, through the Project "Achieving technology transfer to obtain innovative functional foods enriched in bioactive compounds—CTTU 2020", SMIS Code: 140030, submitted in the competition Regional Operational Program 2014–2020, Priority Axis 1: Promoting technology transfer.

HOMOGENEOUS POLYOXYPROPYLENE SOAPS AND PROCESS FOR OBTAINING THEM

Patent/project number: RO134446(A0) RO134446(B1)

H

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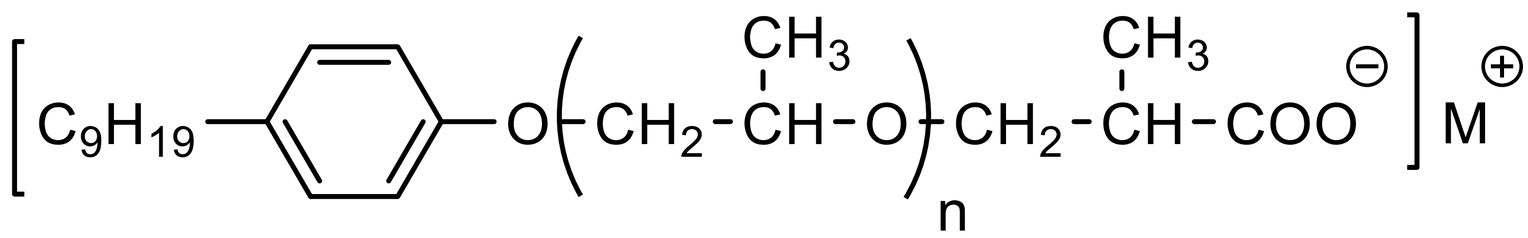
Description

The present patent application (CBI) relates to a process for obtaining homogeneous alkaline and/or ethanol ammonium ß-nonylphenyl polypropyleneoxy α-methylpropionates having the general formula:



where n represents the strictly determined homogeneous oligomerization degree of propene oxide (propylene) in the polyoxypropylene chain (n=0,3,6,9,12,18), and M+ is an alkali metal cation or mono-, di- and triethanolammonium cations.

Novelty

Preparation of polyoxypropylene soap, involves synthesis under phase transfer and/or micellar catalytic conditions, resulting in soaps of homogeneous beta -nonylphenylpolyoxy- alpha -methylpropionates of alkaline type and/or ethanol ammonium type, with nonionic-anionic structure.

Fields of potential application of the present patent. The potential application areas of the invention are: food processing, cosmetics, pharmaceuticals, textile post-processing or "preparative organic chemistry". The concept that suggested the diversification of these non-ionic-ionic architectures represents a new synergistic cumulation of homogeneous non-ionic colloidal competencies with anionic (carboxylate) competencies specific to traditional soaps. Original "niche" compounds not reported in the literature of the surfactant field have surfactant characteristics distributed over a wide HLB range.

ROMÂNIA

DUPLICAT

ELIBERAT COTITULARULUI BREVETULUI DE INVENŢIE NR. 134446

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

BREVET DE INVENȚIE

Nr. 134446

Acordat în temeiul Legii nr.64/1991 privind brevetele de invenţie, republicată în Monitorul Oficial al României, Partea I, nr.613, din 19 august 2014.

Titular: JIANU IONEL CĂLIN, TIMIŞOARA, TM, RO; JIANU ADELINA MARIA, TIMIŞOARA, TM, RO; ILIE ADRIAN COSMIN, TIMIŞOARA, TM, RO; RĂDULESCU MATILDA, TIMIŞOARA, TM, RO; BERCEANU VĂDUVA DELIA - MIRA, TIMIŞOARA, TM, RO; RUSU LAURA CRISTINA, TIMIŞOARA, TM, RO; ARDELEAN LAVINIA COSMINA, TIMIŞOARA, TM, RO; STÂNGĂ LIVIA CLAUDIA, BRAD, HD, RO; VELIMIROVICI DANA EMILIA, TIMIŞOARA, TM, RO; SUCIU OANA, TIMIŞOARA, TM, RO; STANA LOREDANA GABRIELA, TIMIŞOARA, TM, RO; STANCU GEORGE SILVIU, TIMIŞOARA, TM, RO; FOLESCU ROXANA, COMUNA COMLOŞU MARE, TM, RO

Titlul invenţiei: SĂPUNURI POLIOXIPROPILENICE OMOGENE ŞI PROCEDEU DE OBŢINERE AL ACESTORA

Inventatori: JIANU IONEL CĂLIN, TIMIŞOARA, TM, RO; JIANU ADELINA MARIA, TIMIŞOARA, TM, RO; ILIE ADRIAN COSMIN, TIMIŞOARA, TM, RO; RĂDULESCU MATILDA, TIMIŞOARA, TM, RO; BERCEANU VĂDUVA DELIA - MIRA, TIMIŞOARA, TM, RO; RUSU LAURA CRISTINA, TIMIŞOARA, TM, RO; ARDELEAN LAVINIA COSMINA, TIMIŞOARA, TM, RO; STÂNGĂ LIVIA CLAUDIA, BRAD, HD, RO; VELIMIROVICI DANA EMILIA, TIMIŞOARA, TM, RO; SUCIU OANA, TIMIŞOARA, TM, RO; STANA LOREDANA GABRIELA, TIMIŞOARA, TM, RO; STANCU GEORGE SILVIU, TIMIŞOARA, TM, RO; FOLESCU ROXANA, COMUNA COMLOŞU MARE, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 14/06/2019, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea şi aplicarea sigiliului

Director General

Marian - Cătălin BURCESCU

Bucureşti, Data eliberării 30/12/2021

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DIETARY SUPPLEMENTS BASED ON BEE PRODUCTS AND OILS ESSENTIAL OILS, WITH OR WITHOUT ADDED HERBS AND PROCESS FOR THEIR PREPARATION

Patent application : A00406/27.07.2023

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Description

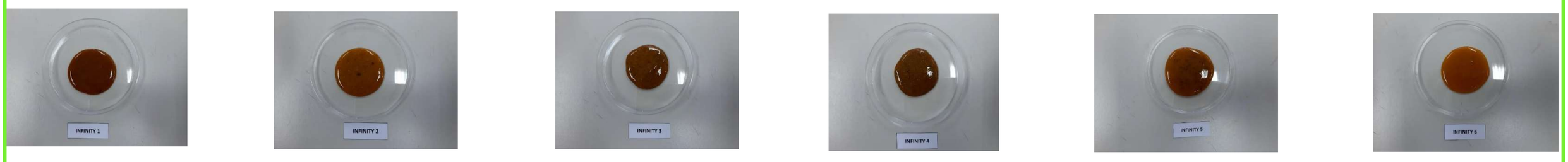
The present invention relates to a range of natural dietary supplements with high sanogenic potential and superior nutritional, antioxidant and sensory characteristics as well as to the process for obtaining them. The process according to the invention consists of the steps: mixing 91-93 parts by weight (w.w.) honey and 7-9 w.w. pollen granules, homogenizing in a blender, keeping the mixture for 10 days in the dark under thermostated conditions at a temperature of 25°C, adding in order to 85-94 w.w. pollen granules to the mixture. g. of this mixture to 2-3 p.g. soft propolis extract, 2-6 p.g. raw royal jelly, 0.05-2 p.g. various essential oils and 0-5.55 p.g. various herbal powders according to each recipe, homogenising the mixture well after each addition. To obtain the soft propolis extract, mix 1 part finely ground propolis with 2 parts 96° ethyl alcohol, shake well, leave to stand for 12 days at 25°C and then filter through Whatman grade 1 filter paper. The extract thus obtained is concentrated under vacuum (rotary evaporator) at 35°C to half its original volume. The dried herbs are finely ground and then the powders are passed through a sieve with 1.5 mm holes. The food supplements obtained are distinguished by a high content of bioactive compounds with very good antioxidant activity, high nutritional value and very good sensory scores.

The following effects were especially noted:

Creating new dietary supplements with a high sanogenic potential and superior nutritional, antioxidant and sensory characteristics, through a new technology, with optimized operating conditions and preparation of propolis extract, ensuring the functionality and bioavailability of the active ingredients used.

Ensuring a long shelf-life of the product (minimum 1 year), without requiring chemical or physical preservation processes, which will have a high social and economic impact on the food industry as well as on consumers.

The introduction on the market of a new range of food supplements made from hive products and essential oils, with or without the addition of herbal powders. The supplements are aimed both at people who want to improve their quality of life and at those who face various nutritional deficiencies.



Experimental models off innovative food supplements with superior bioavailability based on bee products and essential oils.

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TRADEMARK
M2021/002405

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BANAT'S UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY MEDICINE
"KING MICHAEL 1ST OF ROMANIA" FROM TIMIȘOARA

Marine culinary temptations include products from the category of meatballs and rolls, innovative by the facts that are prepared from seafood meat in varying proportions depending on the manufacturing recipe. The seafood used is: squid, mussels, shrimp, which can be used individually or combined. The products are both tasty and valuable from a nutritional point of view by the fact that they benefit both from the proteins with high biological value of seafood and from the vitamins, minerals and fiber from the vegetables used in the recipe: parsley leaves, peppers (only in rolls), green onions, green garlic and spices (salt, pepper, chili), both in rools and meatballs. The products are suitable for all categories of consumers over 3 years of age except those allergic to seafood.

Even if the seafood does not have a tradition of consumption in Romania, they have started to be more and more appreciated, and today they are also part of the diet of the consumer in our country.

Regardless of the species, seafood is highlighted by its high content of minerals (zinc, magnesium, phosphorus, calcium, iodine), vitamins (A, B, D, E) and protein. They are low in fat and are very rich in omega-3 and omega-6 fatty acids.

Compared to basic meat dishes, seafood dishes are characterized by:

- The diversified assortment determined by the variety of seafood, the technological processes applied for their preparation and the possibilities of association with different foods;
- Possibility of use in dietary nutrition;
- High nutritional value determined by complete protein, easily digestible fats, high content of vitamins A and B and minerals (fluorine, iodine);
- Special taste qualities and easy digestibility.

Mussels have the most impressive nutritional profile of all shellfish. They contain high levels of highly desirable long chain fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). Mussels are also a brilliant source of vitamins. They give you a shot of important minerals, such as zinc, which helps build immunity. Mussels even contain levels of iron and folic acid to rival red meats.

Squid is a mollusk belonging to the shellfish family, and they come in four varieties: black, white, hard shell and red. It is high in protein, minerals and low in calories. This makes squid or calamari a highly nutritious meal.

Shrimp is one of the most commonly consumed types of shellfish. Shrimp is very nutritious. It is fairly low in calories and provides a high amount of protein and healthy fats, in addition to a variety of vitamins and minerals.

"Tentatii Culinare Marine" Assortments	Seafood meatballs	Seafood rolls
Proteins (g)	18.5	20.1
Total fat (g)	2.5	2.3
- Saturated fat (g)	1.9	1.8
Total carbohydrates (g)	7.3	7.5
- Dietary fiber (g)	0.5	2.4
- Sugar (g)	0.2	0.5
Sodium (mg)	320	325
Energy value (kcal)	102	110
(kJ)	426	460

coresponding author: diana.raba@usab-tm.ro

UNIVERSITATEA DE ȘTIINȚE AGRONOMICE
ȘI MEDICINĂ VETERINARĂ DIN BUCUREȘTI

Obtaining active wine yeast biomass of *Saccharomyces cerevisiae*

Participating entity: Universitatea de Ştiinţe Agronomice şi Medicină Veterinară din Bucureşti (USAMVB)

TEODORESCU RAZVAN IONUT, BARBULESCU IULIANA DIANA, BEGEA MIHAELA, FRINCU MIHAI, DIGUȚĂ FILOFTEIA CAMELIA, MARCULESCU SIMONA IOANA, DUMITRACHE CORINA, CÎRÎC ALEXANDRU IONUŢ

Patent application: A00470/08.08.2024

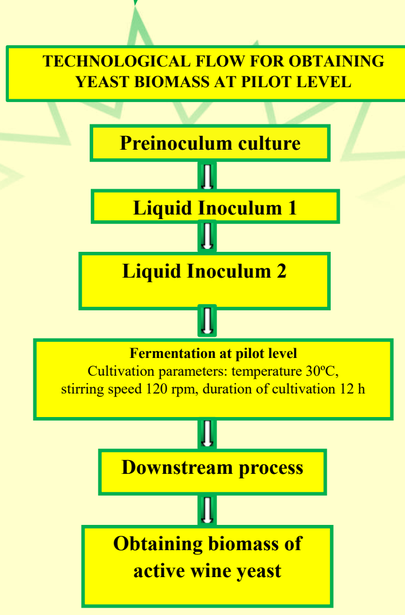
Applicants
USAMV Bucuresti
Pharmacorp Innovation
ICA R&D

DESCRIPTION

- The invention refers to the production of an active yeast biomass of *S. cerevisiae* NCAIM (P) Y 001534 to be used in the winemaking of white wines and especially for Fetească regală.
- The active yeast biomass can be used for the inoculation of the Fetească regală grape must. Yeast biomass can be used in a ratio of 25g wet biomass / 25L wort vessel, as well as in co-inoculation with other yeasts, such as *Lachea thermotholerans* (20g wet biomass *S. cerevisiae* with 20g wet biomass of *L. thermotolerans*).
- *Saccharomyces* strain was isolated from Cabernet Sauvignon grape must from Pietroasa Research and Development Station and identified by applying molecular methods. Initially, the ITS-RFLP PCR method developed by Esteve-Zarzoso et al. 1999 was used. The enzyme profile obtained after individual digestion with three restriction enzymes (HhaI, HaeIII and HinfI) corresponded to the *S.cerevisiae* species. Subsequently, the results were validated by sequencing the 5.8S-ITS region, having an identity percentage of over 99% with numerous *S. cerevisiae* sequences existing in the NCBI database.
- The *S. cerevisiae* strain was deposited in the Collection of Microorganisms - National Collection of Agricultural and Industrial Microorganisms (NCAIM) , obtaining the deposit number NCAIM (P) Y 001534.
- This product represents a first step in exploiting the oenological potential of indigenous yeasts to produce wines of superior quality, with a characteristic sensory typicity.

NOVELTY

The technical problem solved by the invention is the creation of a product based on active wine yeast biomass obtained from a molecularly identified yeast strain *S. cerevisiae* with collection number NCAIM (P) Y 001534.



APPLICATIONS

Through the fermentation of sterile diluted must Feteasca regala (30L) the Fetească regală wines acquires personality, in particular, the wines obtained at the Research And Development Station for Viticulture and Winemaking Pietroasa.

Biotechnological process for obtaining active wine yeast biomass

AVANTAGES

- The proposed process is economical, as the fermentation lasts a maximum of 14 h, due to the fact that it uses diluted sterile must with a content of soluble dry matter of 7 °Bx.
- The use of sterile diluted must of Fetească regală leads to obtaining an active yeast biomass with (WCW) 3006 g/82 L, 36.6 g/L with a cell viability of 1.7×10^{12} CFU/g;
- Inoculating white grape must with biomass obtained through the proposed process leads to the preservation of the typical character of Pietroasa wines.

ACKNOWLEDGEMENT
This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS/CCCDI - UEFISCDI, project number PN-III-P3-3.5-EUK-2019-0213, within PNCDI III. This paper has been partly financed by the Hungarian National Research, Development and Innovation Fund (2019-2.1.1-EUREKA-2020-00011) under the EUREKA network projects.

Contact person: Teodorescu Razvan, Email: razvan.teodorescu@gmail.com

RITUAL ACADEMY

cooking workshops for children and adults

Author: Ioana Octavia BOGDAN

H

Ritual Academy is more than just a cooking school – it is a space of discovery, creativity and education, where children and adults learn to cook healthily, understand the principles of nutrition and discover the joy of preparing and enjoying delicious dishes. Our courses are taught by Chef Ioana Bogdan, winner of the Young Chef trophy in 2018, with extensive experience in gastronomy and a special passion for culinary education. She is the creator of the Ritual and Sufertas brands.

SCAN ME

The cooking workshops were created out of the desire to transform every meal into a ritual of self-care, to educate future generations about the importance of a balanced diet and to inspire people to rediscover their passion for gastronomy._In our cooking workshops for children, we teach children to cook healthy and tasty food, focusing on natural ingredients and balanced recipes. Through play and practice, children develop their creativity, patience and autonomy in the kitchen.

Contact: ***ioanacismasiu@gmail.com***

RESTAURANT CAPONE

Authors: Capone TEAM

H

Traditional restaurant in the landscape of the city of Deva, offers you in a special atmosphere: traditional Romanian food, from its own kitchen.

Organizing weddings, baptisms, name days, festive days, private parties, as well as memorials, funerals, etc., with a capacity of up to 200 seats.
Daily menu 11:00 – 16:00

Themed dance evenings on Friday and Saturday.

SCAN ME

Contact: restaurantcapone@yahoo.com
Presentation link: https://www.facebook.com/restaurantcapone/?locale=ro_RO

PĂDURENEȘTI PIES

1008905 / 15.05.2020 OSIM Trademark

H

Author: Tămaș Adelina Bianca & Team

Pădurenești pies are a traditional specialty from the Pădureni Land, Hunedoara County. These are thin pies, with a simple dough of flour, water and salt, kneaded well and rolled out into very thin sheets. The filling varies, but the most popular ones are with cheese and herbs, sauerkraut or potatoes. They are baked directly on a hot pan, with oil, which gives them a slightly crispy crust and an authentic taste. They are served hot, plain or spread with butter, and are appreciated for their rustic flavor. In the past, they were prepared especially on holidays or at important community events. Today, Pădurenești pies are a symbol of traditional Hunedoara cuisine, preserving the authentic taste of old recipes.

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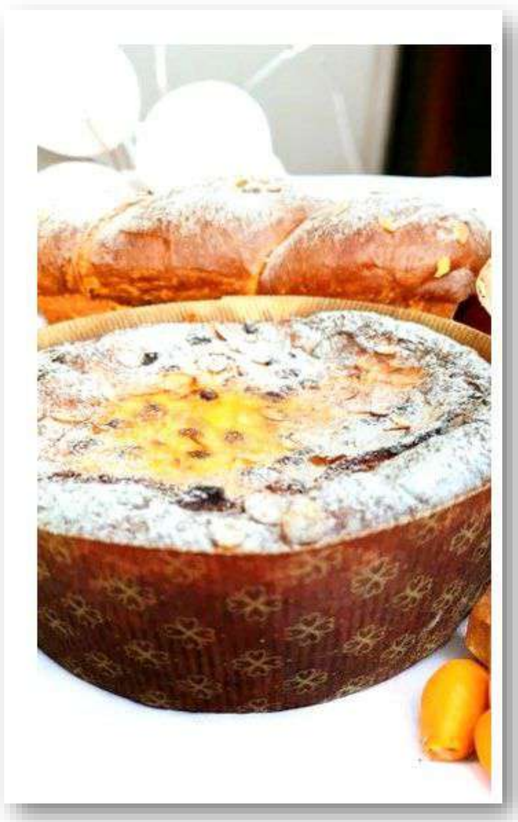
La BISCUTERIE

Authors: ***Ani MOCANU, Razvan POPA***

Passion

We, the La Biscuterie team, have managed to weave imagination, seasoned with passion for colorful innovations. Our story begins with the essence of nature, thus, through its rich gifts, it challenged our inventiveness to skillfully combine natural ingredients without processing nature, thus creating products that bring more harmony and inner joy. The delicious snacks are designed and made to improve the lifestyle, using syrups and wholemeal flours, ennobled with flavors inspired by the bouquet of the four generous seasons.



SCAN ME

Skills

We co-opted into our team nutritionists who helped us to balance our healthy delights; we procure basic ingredients only from producers who put full passion into what they offer us and rigorously respect the principle of natural ingredients not industrially processed:

Whole wheat flour - natural enzymatic correction;

Whole rye flour;

Spelled wheat flour;

Natural sweeteners: BIO natural grape syrup, unheated, obtained by evaporation, BIO agave syrup with low glycemic index;

BIO cold-pressed coconut oils, sunflower oil and other oleaginous fruits;

Natural spices, without preservatives or additives, most of them from organic farming.

Contact: +40 761 66 73 73 ***Presentation link: https://labiscuiterie.ro/***

LINDEN HOUSE / CASA TEI

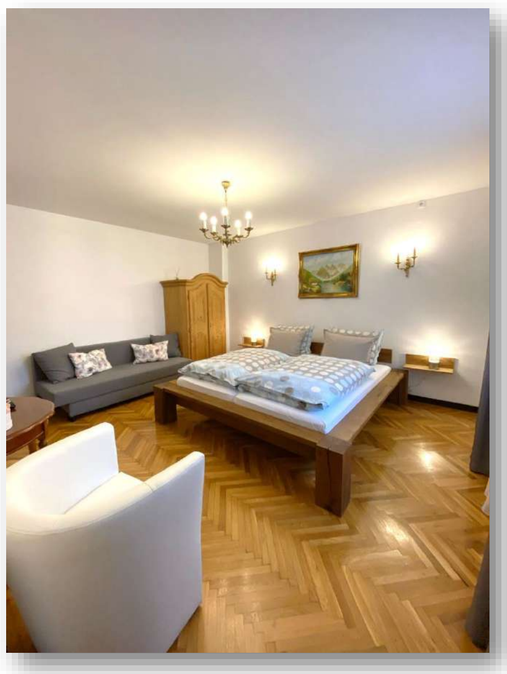
Authors: Ioana Adina SCHWACHHOFER

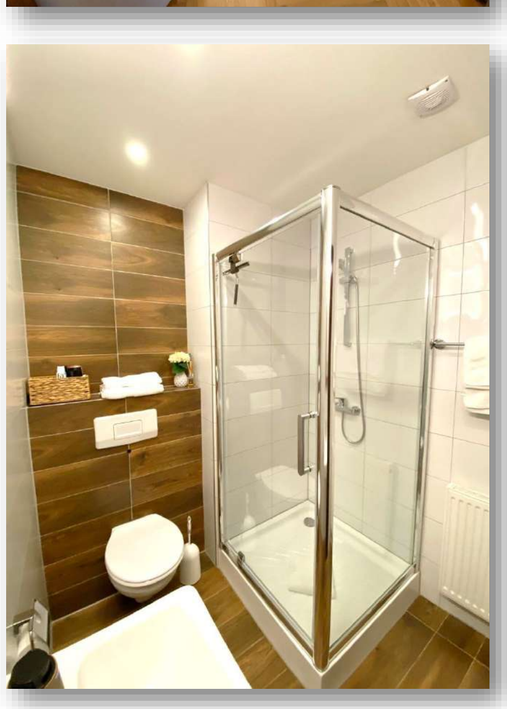
H

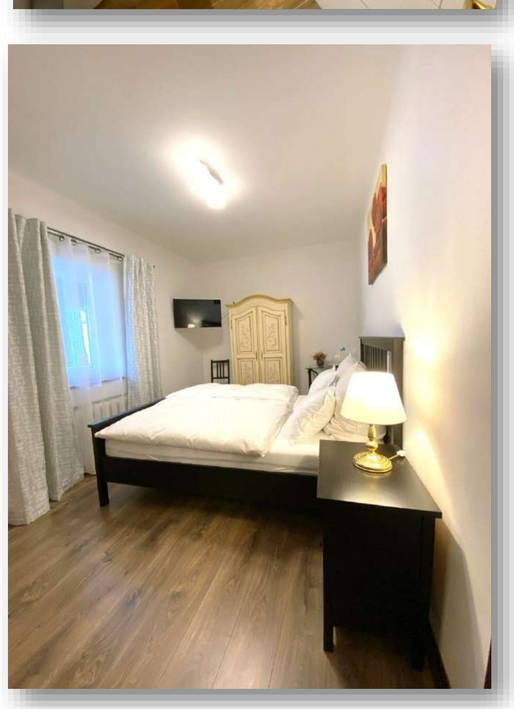
From the desire to do more, we created the original innovative concept Linden House / Casa Tei that combines the specific local tradition of the Sibiu area with the modern comfort of today's times. We are located in a residential area characterized by the original architecture of German houses with lots of greenery around and quiet near the Sibiu International Airport.

Linden House / Casa Tei is ideal for a holiday or business stay and you can quickly reach any part of our wonderful city of Sibiu by car or public transport.

Cozy B&B services in Hermannstadt / Sibiu offering three rooms and an apartment with courtyard parking!







Contact: *+40770599717*

casatei97@gmail.com

Presentation link:

https://www.instagram.com/casa_tei?igsh=N215ZXNpMXRlaHQ3

NEXUS TRAVEL

Travel agency

Author: Zenaida MOSNEAG & Team

H

Nexus Travel was founded in 1998 out of a desire to build our own vacations and make others enjoy them too! Over time, we have proven that we know how to respect our tourists, who remain loyal to us and become our friends.

"The best trip is always the next one“ - Live with us new unique experiences!

We offer all tourism-related services with high professionalism, promptness and responsibility:

– holidays in the country and abroad;

– booking plane tickets for all airlines and all destinations;

– medical insurance for trips abroad.

Nexus Travel is a member of ANAT.

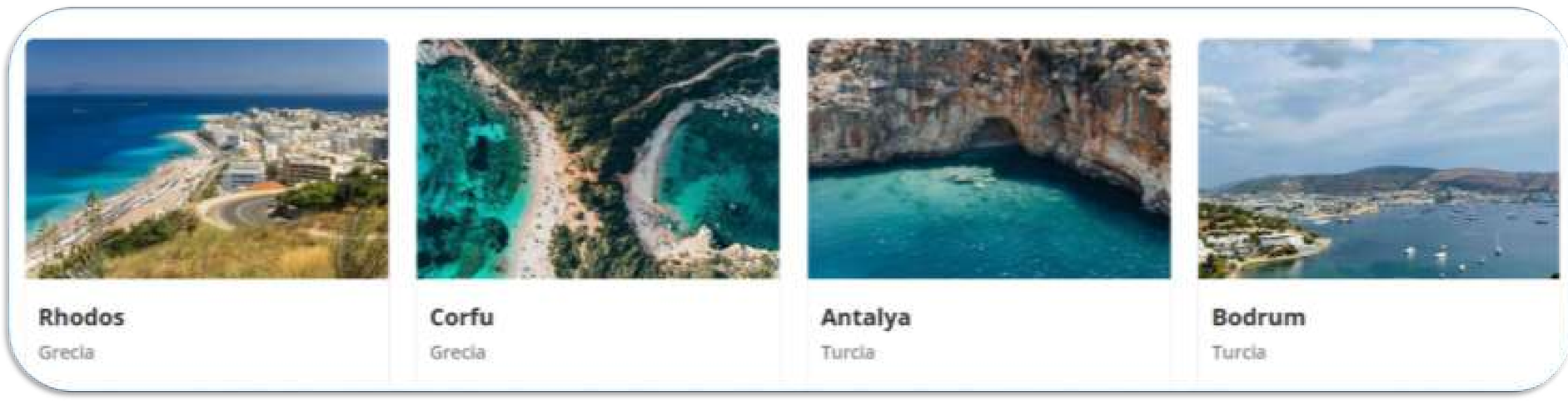
SCAN ME

Contact:

turism@nexustravel.ro

zenaida@nexustravel.ro

+40744 636 446



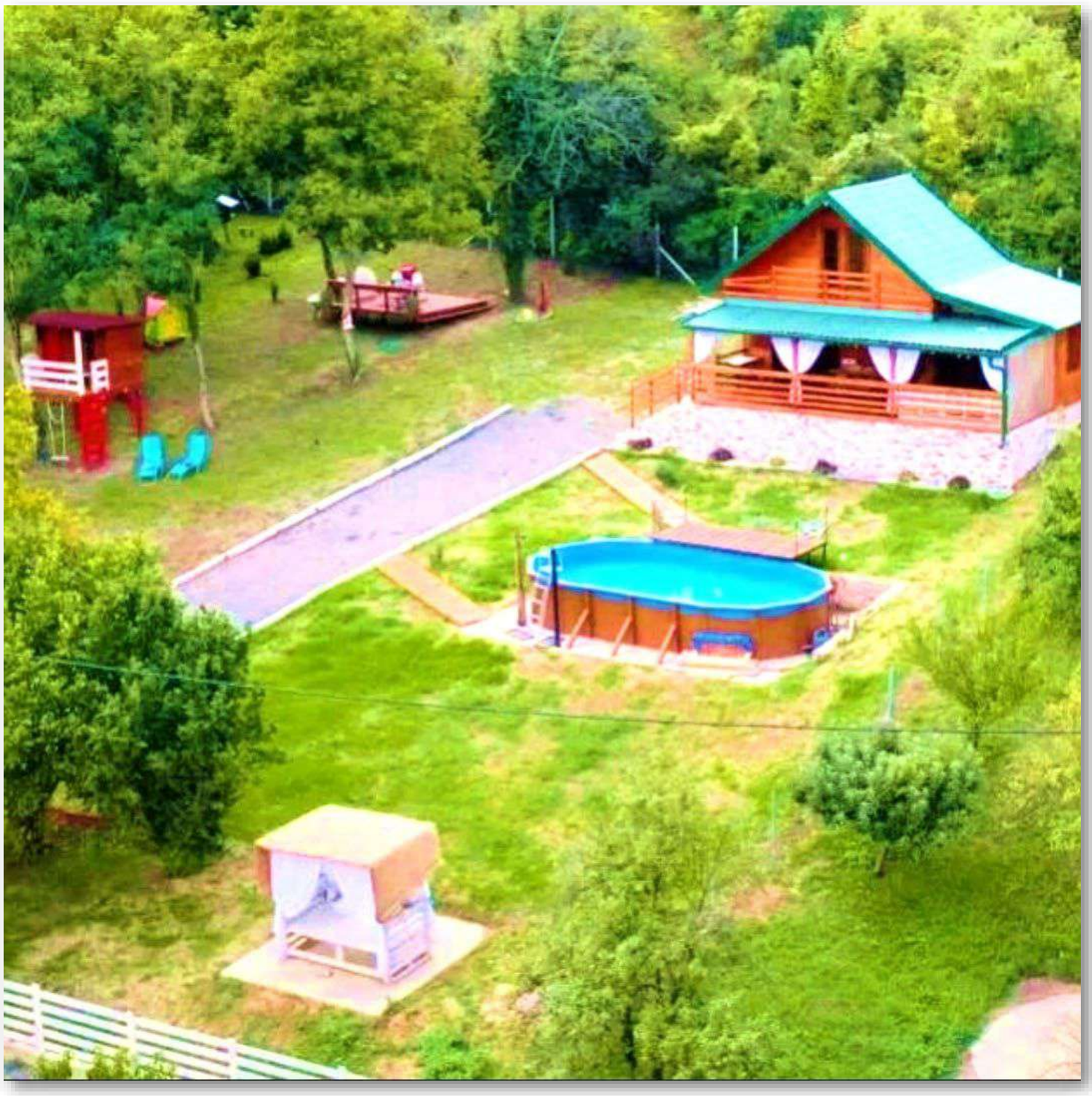
We like to think that any holiday dream can come true with us!

Kuca za odmor Oblutak

H

Author: Dragan PUDA

Holiday home Kuca za odmor Oblutak is located in Koruska-Duga Meda, Serbia, near Susek on the other side of the Danube river in a quiet area away from the hustle and bustle of the city, offering relaxation and refreshment for visitors.



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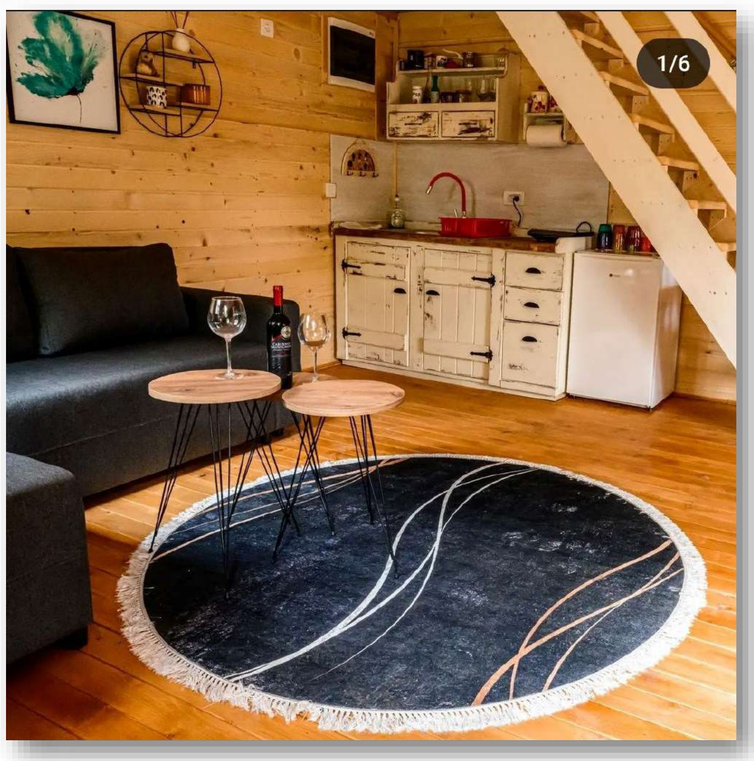
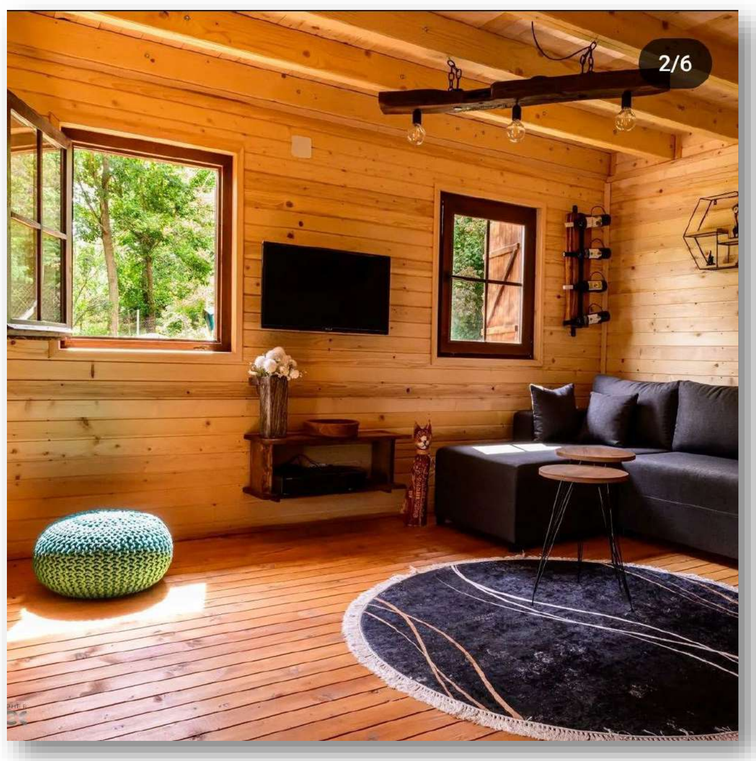
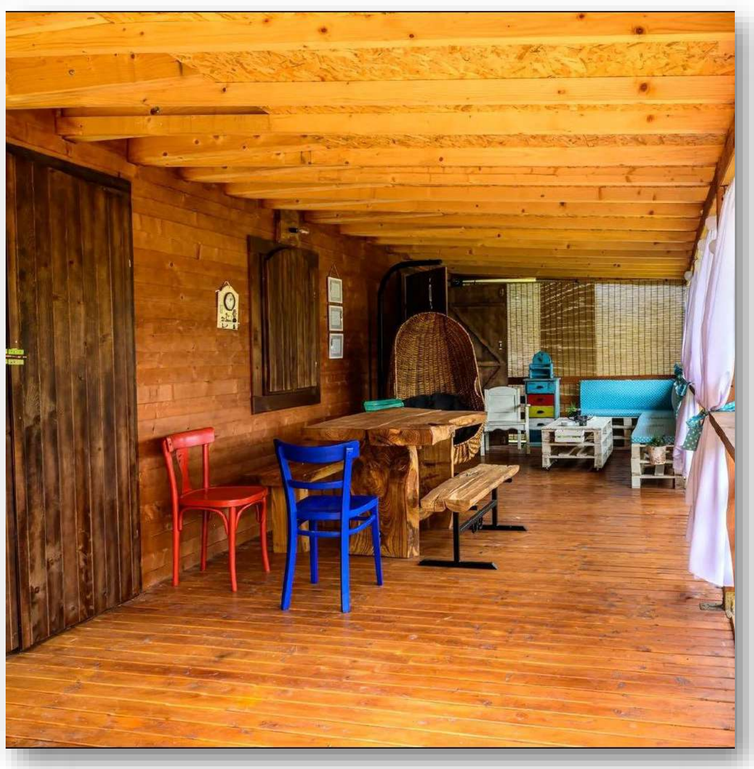






Contact: kucazaodmoroblutak@gmail.com

LA LIBRĂRIE

Author/s: Sergiu STANESCU & LA LIBRĂRIA Team

H

La Librarie is a wine, liquor and coffee shop that's offering a wide range of imported or niche Romanian products. Either to serve on site, in a chill-out atmosphere, or to take away, we are here to offer some piece of advice in order to help you choose what mostly suits your gourmet appetite. You can have a cigar too, and if in a lucky day, you may enjoy an evening of wine tasting.

SCAN ME

Contact:
+40749 063 833

BoRD13

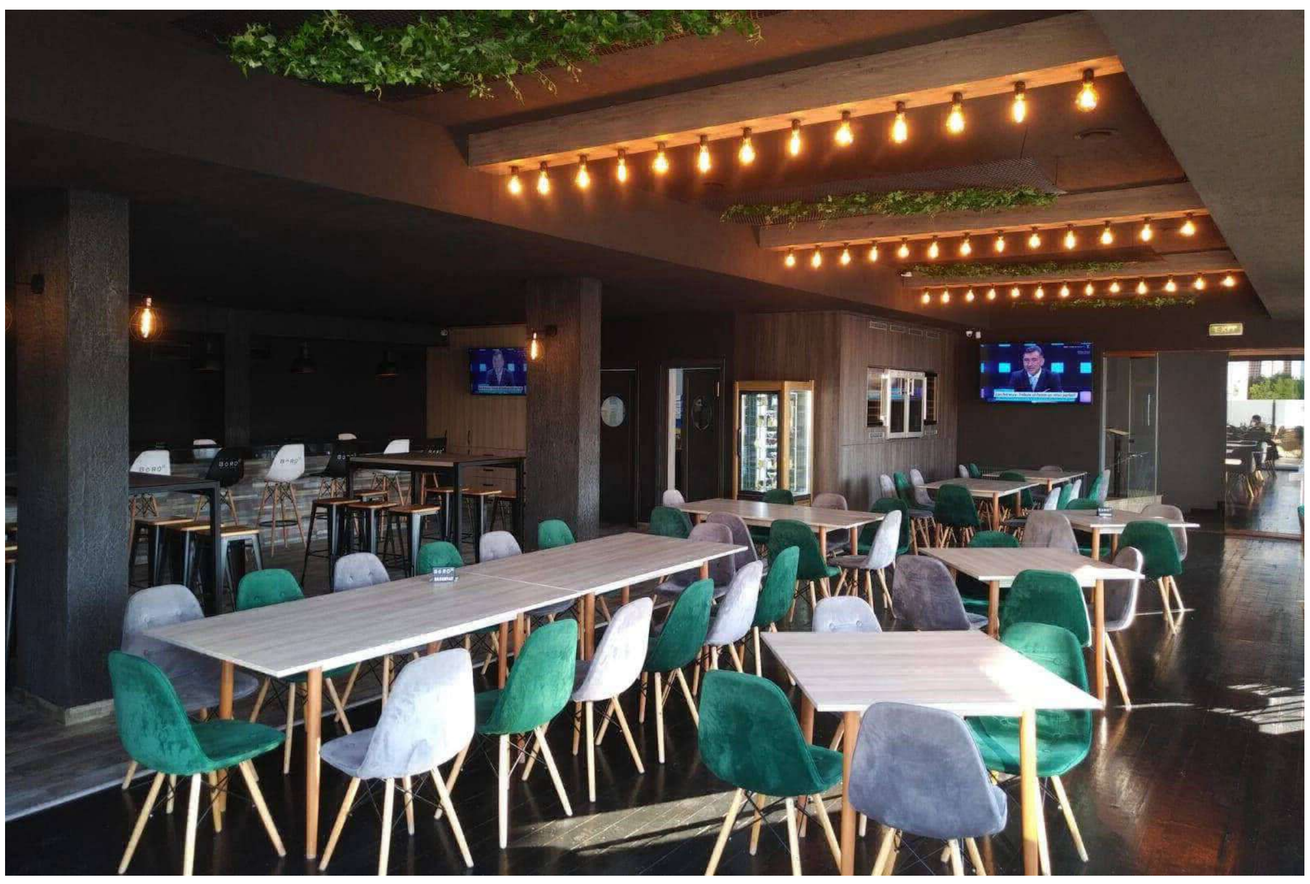
Gastro & Pub

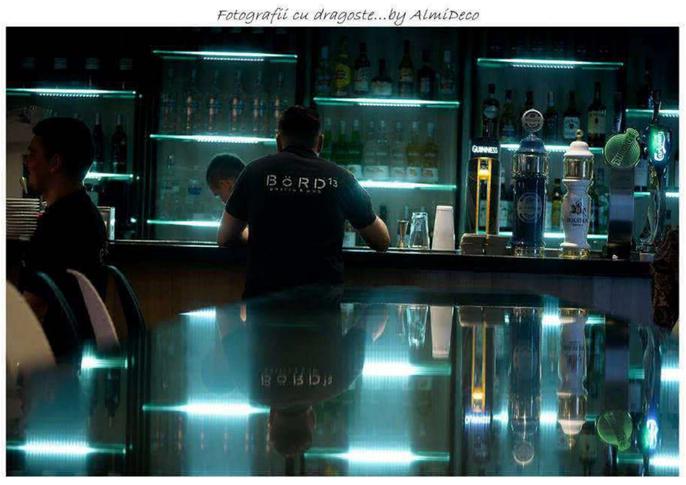
Authors: Mirela STANCU & Team

H

BoRD 13 one of a kind concept that brings closer the art of high-quality restaurant cuisine, with a new scenery. Enjoy a different culinary experience, where you will be impeccably served, with the most refined dishes, so that you and your loved ones can spend beautiful moments together.

A place created with soul, a unique BoRD13 concept!





International Cuisine: Spain, Greece, Italy, France, luckily they are not so far away.

Romanian Cuisine: The finest tastes of Romanian cuisine are defined at BORD 13.

Wines: with the help of the most famous wineries and wine houses in Romania, we have the most select wines for our customers.

Contact:

http://www.bord13.ro/index.html **office@bord13.ro** **Tel.: +40786709709**

STAR Closed Doner

Food Project

Authors: Irimia Marius Ionut & Team

H

At Star Doner & Pizza, creativity is at its highest, so through continuous innovation we create new products for our customers.

Through a unique Star brand process, we have developed a hot, juicy, crispy and full of surprises Closed Doner that amazes all your senses.

We created the STAR Taste World just for you. **STAR Doner & Pizza**, a new, original concept based on quality and diversity adapted to any situation, with a portfolio of over 70 products. The service is provided directly from our locations or based on the order with home delivery.

Contact: ***+40731 588 801*** ***https://www.facebook.com/profile.php?id=100088256882595***

Opportunity
CORNELIUGROUP
Research-Innovation Association
Creation
INVENTCOR
Realization
Power of Creative Mind
Deva ROMANIA

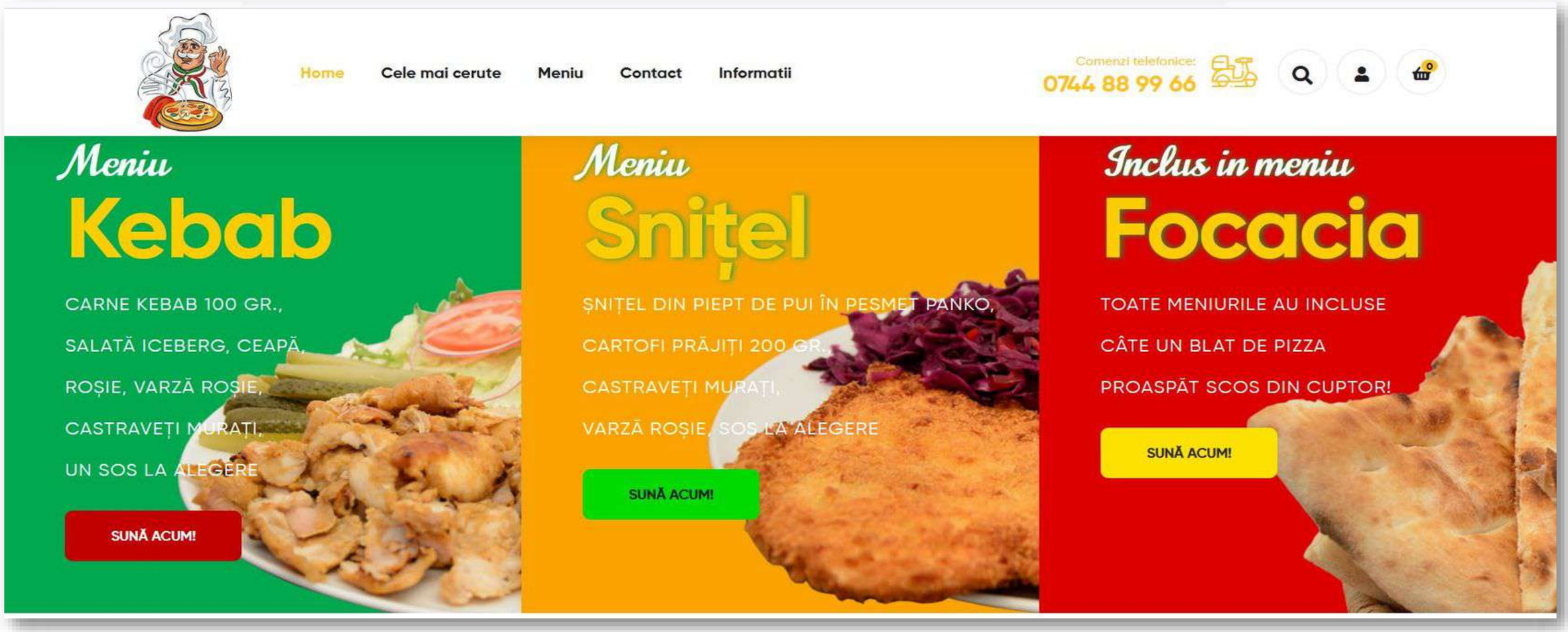
PIZZA SPEED

Author: Nicolae Florin PURCEL & Team

H

PIZZA SPEED DEVA is a concept based on quality, promptitude and perseverance! our team makes sure that all our customers remain satisfied with the quality of our products and that they intent to return with love anytime!

SCAN ME



Telefon comenzi:

0744 88 99 66

Adresa

Deva, Str. Mărăști, Complexul Croșeta

E-mail:

contact@pizzaspeed.ro

ABC ANAEROBIC BOTTLING CLOSURE FOR ANAEROBIC AND ACEPTIC FILLING

Patent: EP24183909.1

Authors: Alexander Gantenbrink, Vitalie Popa

H

ABC Anaerobic Bottling Closure

Revolutionizing Anaerobic and Aseptic Filling for Beverage and Pharmaceutical Industries

Product Summary:

The ABC Anaerobic Bottling Closure represents a cutting-edge advancement in the bottling industry, offering the first-ever reusable solution for anaerobic and aseptic filling. Designed to preserve product integrity and purity throughout the filling process, this closure maintains a stable anaerobic environment by utilizing inert gases such as argon, nitrogen, or CO2. It is an essential tool for industries requiring rigorous contamination control, including the beverage and pharmaceutical sectors.

Key Features:

- **Reusable Design:** Sustainable and efficient, significantly reducing waste and enhancing cost-effectiveness over time.
- **Anaerobic Environment Control:** This process utilizes inert gases (such as nitrogen or CO2) to maintain a controlled anaerobic atmosphere during filling, ensuring product quality.
- **Versatility:** Ideal for beverage bottling and pharmaceutical applications, with capabilities for aseptic conditions.
- **Sample Extraction:** This method facilitates sample collection without removing the closure, preserving the anaerobic environment throughout the process.

Operational Instructions:

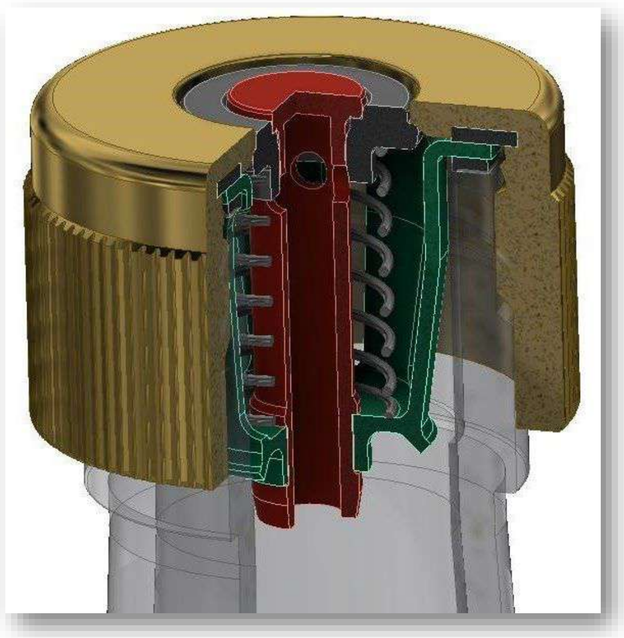
The ABC Anaerobic Bottling Closure offers two primary filling options to meet diverse operational needs:

1. Option 1: Upright Bottle Position

- **Step 1:** Create a controlled anaerobic environment within the bottle by flushing it with nitrogen (N2) or carbon dioxide (CO2) in conjunction with a vacuum process.
- **Step 2:** Fill the bottle with the desired liquid, ensuring anaerobic conditions are maintained throughout the operation.

2. Option 2: Upside-Down Bottle Position

- **Step 1:** Fill the bottle with sterile water, then use nitrogen (N2) or carbon dioxide (CO2) to evacuate the water, thereby creating an anaerobic atmosphere.
- **Step 2:** After evacuating the water, reposition the bottle upright and fill it with the desired liquid while maintaining anaerobic conditions.



Applications:

- **Beverage Industry:** Ideal for preserving the quality and purity of beverages, particularly those sensitive to oxygen exposure.
- **Pharmaceutical Industry:** Ensures aseptic conditions and protects the integrity of sensitive pharmaceutical liquids or biologics during bottling.

Advantages:

- **Sustainability:** The reusable design minimizes waste, contributing to environmentally friendly manufacturing practices.
- **Cost-Effectiveness:** Reduces operational costs by eliminating the need for single-use closures while maintaining product integrity.
- **Contamination Control:** Ideal for industries where contamination control is critical, setting a new benchmark for anaerobic and aseptic filling systems.

Conclusion:

The ABC Anaerobic Bottling Closure sets a new standard for anaerobic and aseptic filling technologies, offering unparalleled flexibility and operational efficiency. It is the ideal solution for beverage and pharmaceutical manufacturers looking to ensure product quality, enhance sustainability, and streamline their bottling processes.

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7th International Exhibition INVANTCOR

2-4 April 2026 – Deva, Romania

I

Textiles

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Deva ROMANIA

Artă Tradițională
Deva

WOOD ART AND TRADITIONS

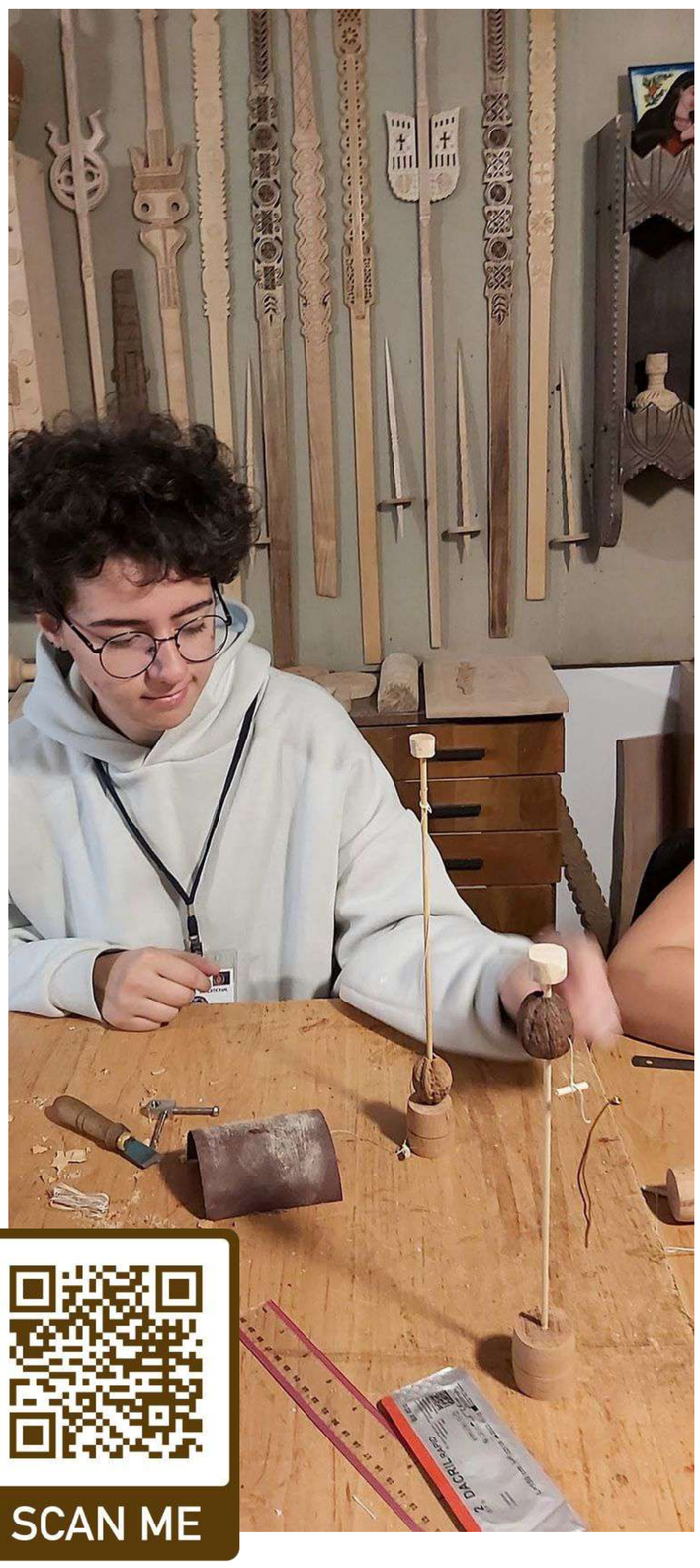
Author: Mircea LAC

I

He is a complete teacher in a way that is increasingly rare – a man of character, an encyclopedia of peasant art, and a craftsman who transforms the crude into collectibles. Now, Professor Mircea Lac is officially named by UNESCO a Living Human Treasure. He was called the "teacher of traditions" and dozens of articles and even books have been written about him. Anyone who knows Mircea Lac has the blessing of heaven to step well-guided into the fantastic world of peasant art.

Once he opens the door of his workshop, the smell of refinished wood surrounds you. Thousands of pieces steal your soul and you don't know which one to admire first. The teacher smiles gently, a sign that he is used to such reactions. And it's no wonder: Mircea Lac has been harnessing talent in students since the year I was born. Children follow him, and artists marvel at his collection of pieces laboriously crafted by him or his students over the years.

The youth cares - the values of the past are the foundation of our future!



SCAN ME

"Since 1975. Since then, I've had 30, even 40 students every year. I don't know the exact number. What matters more is how talented they are. Almost everyone seeks me out, even those who have gone abroad. They come to talk, to see their work, to smell the wood and dust. I have many students who have continued what I did here. In this, I have great spiritual satisfaction that many of my students went to Sibiu, to the restoration.“ Mircea LAC

Contact: artatraditionaladeva@gmail.com
https://www.facebook.com/artatraditionaladeva/

Lemnaria lui Radu

Unique wooden creations

Author: Radu Fachin

I

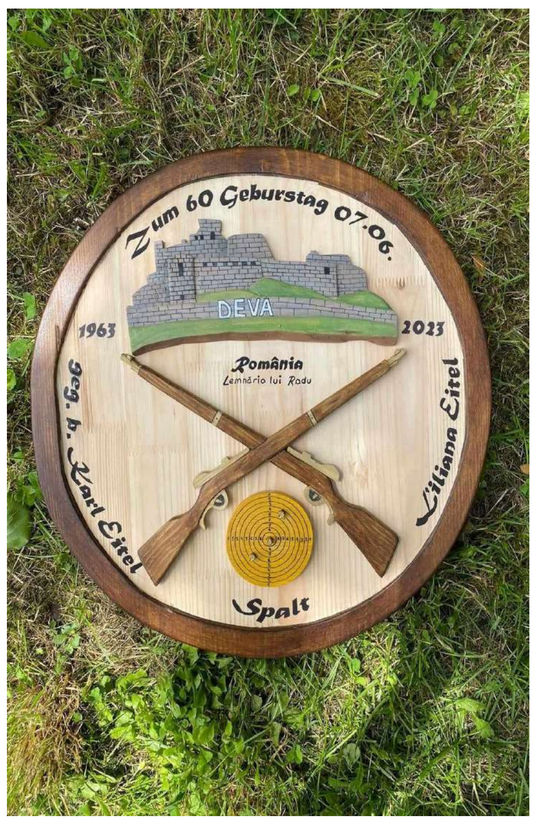
I am a passionate woodworker, a dedicated artisan with 8 years of experience in the field of woodworking, and eager to learn new techniques and skills. My work reflects a passion for craftsmanship and meticulous attention to detail.

The Art of Wood Personalization - Creations with Soul. One of my specialties and significant challenges in every project is crafting personalized items for clients. Over time, I've honed my skills to create miniature houses, faithful replicas of grandparents' homes, meticulously crafted based on photos. These mini houses bring a piece of history and emotion into our clients' living rooms.

Recycled Wood for a Sustainable Future. I am a staunch advocate for the use of recycled wood. In my workshop, wood becomes more than just raw material; it's a valuable resource we handle responsibly, contributing to environmental preservation.

Transforming Wood into Art and Utility. Wood is my favorite material for crafting captivating games, charming decorative items, and personalized toolkits for businesses and trades. Each piece of wood is carefully and passionately transformed, adding utility and turning it into a unique work of art.

I look forward to contributing my creativity and extensive experience in the art of woodworking to future projects. Handcrafted wooden items are more than mere objects; they bring stories and emotions into the homes and lives of our clients. Thank you.



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Website: https://www.lemnarialuiradu.ro/
Instagram: https://www.instagram.com/lemnarialuiradu/
Facebook: https://www.facebook.com/lemnarialuiradu/

Handmade Leather Accessories

Author: Alexandru Orzea

Hi! I’m Alex, and I turn pieces of leather into cool objects using only my hands and various tools. I taught myself leather crafting through curiosity, patience, and countless hours of exploring old techniques and creative guides.

Since 2022, I’ve been making wallets, knife sheaths, book covers, and other leather creations under my brand, Piei Drace. I love carving, embossing, and painting leather using traditional methods that bring each piece to life. No machines, no shortcuts- just patience, creativity, and a bit of imagination. Every piece is unique, just like a fingerprint. For me, leather crafting is where art, adventure, and imagination meet.

PIEI_DRACE

Contact: alex.orzea@gmail.com

https://www.instagram.com/piei_drace/

Green and Low-Carbon + Digital Technology
High-Efficiency Anti-Slip Shoes

Patent No.: *ZL 202130189910.X*

CAI No. ON02 **I**

Authors: *Shuqi Lin; Deyi Chen; Jian Lin; Shixiang Luo; Tao Qu*

Company: *Quanzhou Huaguang Vocational College; Quanzhou Qianchen Intelligent Technology Co., Ltd.*

Description :

Project Novelty: This project employs a dual-driven research and development approach combining "AI + real human" elements, integrating bionics design into the shoe making industry. Drawing inspiration from the morphology of pine bark and pine needles, a honeycomb hexagonal pattern has been designed. Paired with bio-based, green, and eco-friendly materials for the outsole, midsole, and inner lining, this design achieves a win-win situation of non-slip performance and environmental sustainability. Additionally, it utilizes plantar pressure sensing digital technology to capture real-time changes in plantar pressure, generating visual maps that enable personalized foot health management. This provides possibilities for personalized foot health management, showcasing innovation in both green, low-carbon initiatives and digital technology application.

Economic, Technical, and Social Benefits: Economically, it meets the market demand for high-quality non-slip shoes, drives the upgrading of the shoemaking industry, and creates new economic growth points. Technically, it breaks through the challenges of dynamic mechanical support and non-slip performance in traditional footwear, improving the industry's green low-carbon and digital technology levels. In terms of social benefits, it reduces the risk of falls, ensures people's travel safety and foot health, alleviates the burden on families and society, and promotes social harmony.

Development Prospects: With increasing emphasis on health and safety, the demand for non-slip shoes is expected to continue growing. The high-efficiency non-slip shoes of this project, with their unique design and exceptional performance, are poised for widespread application in various fields such as sports and daily travel. In the future, functions can be continuously expanded to meet the needs of different populations, presenting a vast market outlook.

Finished Product Illustration of High-Efficiency Anti-Slip Shoes

Flex Resistance Test for Anti-Slip Shoes

Anti-Slip Test on a Glass Surface Inclined at 15 Degrees

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Blooming-Spring Collection 2026

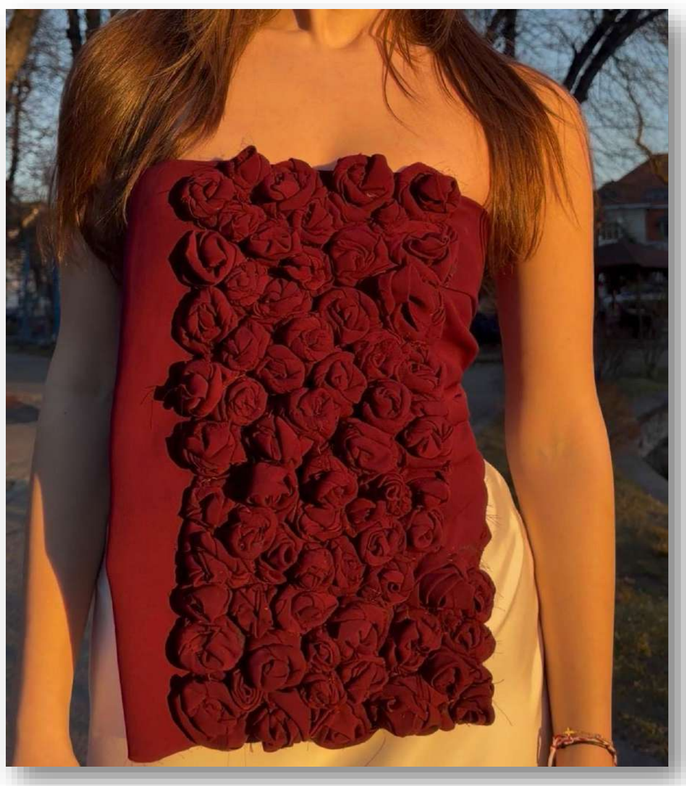
Patent/project number: Student Project

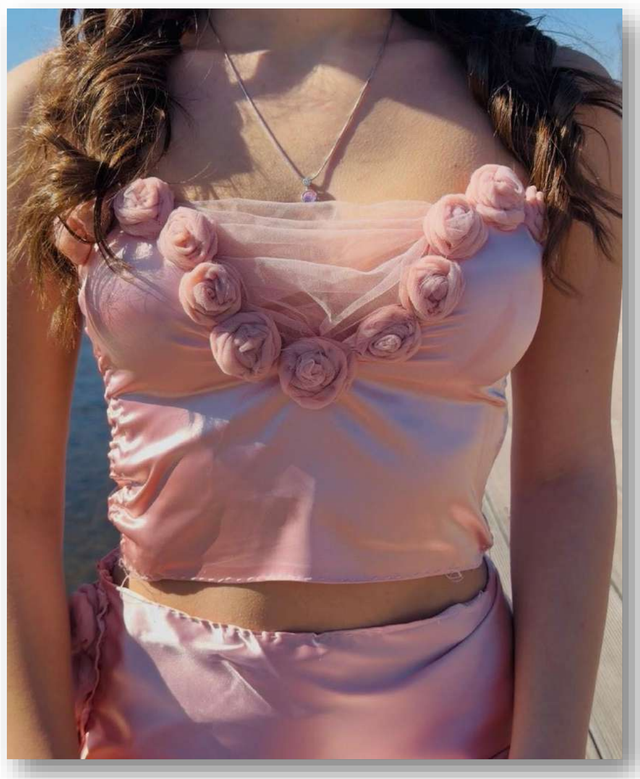
Author: Teodora POPA

Blooming-Spring Collection 2026 explores the idea of growth, transformation and devotion, reflecting the stages experienced by the lover. As it was entirely handmade (without the use of a sewing machine), this line highlights the dedication behind each piece, translating the intensity of love into delicate blooming flowers, vivid colours, refined textures and exquisite designs. Soft fabrics, innovative patterns combined with interesting cuts create a collection that feels elegant, while remaining effortlessly modern. The colour palette draws from both soft pastels and intense nuances that symbolize the fire and tenderness of love and of its memories. Each piece presents a stage experienced by a romantic couple, capturing passion and delicacy. The collection celebrates femininity, elegance, innocence and metamorphosis.

Burgundy Bloom: 3D Rose-Appliqué Top

The burgundy 3D rose-appliqué taffeta top creates a textured and refined look through the meticulously handcrafted roses adorning the front. Its elegant shape flatters all body types, while conferring a sophisticated and unique touch. Throughout an intense, feminine and passionate colour, a riveting texture and an intoxicating pattern, this garment gracefully outlines the delicacy of the feminine nature. Being worn at the office with a suit, at a restaurant or formal event with a long silky skirt or in the park with a pair of long black wide-leg trousers, this Burgundy Floral Top earns its title of being a versatile piece, perfect for any meeting, special occasion or important day at work.





SCAN ME

Angel's Whisper: Pale Pink Silk 2-Piece Set

The pale pink silk 2-piece set renders a paradisiac look highlighting the innocence, naivety and fineness of the angelic woman. Although the skirt appears simple from the front, at the back, it extends into a tulle train, decorated with handcrafted roses made of the same fabric. Contouring, but not divulging the whole chest, the bodice's design innovates by incorporating small pleats of tulle.

The set's uniqueness lies in the roses which outline the cups, the V-cuts of the skirt and top and the train carrying these floral memories of the wearer, making it a captivating ensemble ideal for elegant gatherings and memorable events.

Presentation link: *https://www.instagram.com/reels/DV1IsJBguP5/*

Contact: tia.popa@yahoo.com

Men's Sports Pants Integrating Intelligence and Healthcare

Patent No.: *ZL201810208539.4*

CAI No. ON03 **I**

Authors: *Juan Lin; Jian Lin; Huachen Wang; Shuqi Lin; Rongquan Wang; Tiansong Ke.*

Company: *Quanzhou Huaguang Vocational College; Fujian Xinghua Health Technology Co., Ltd.*

Description :

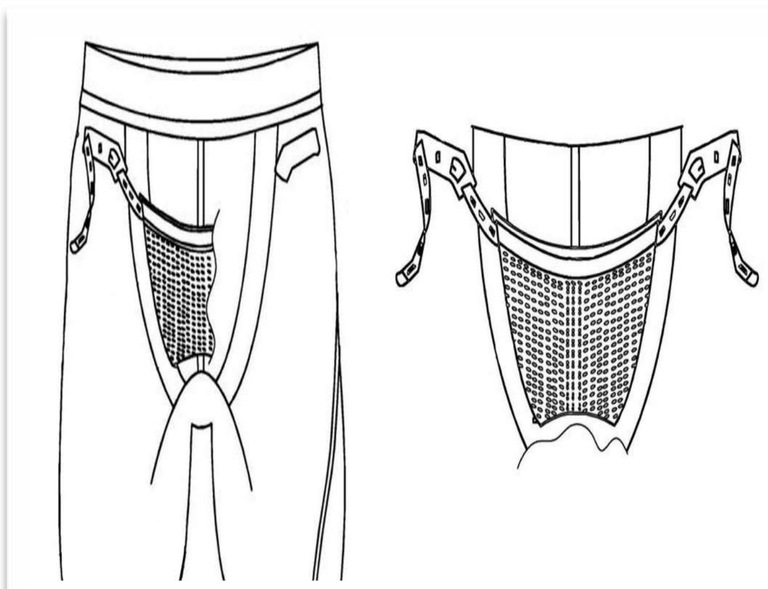
Project Novelty: The men's sports pants integrating intelligence and healthcare ingeniously combine ergonomics, magnetic therapy healthcare, and intelligent technology. Designed through AI algorithms, they enable real-time capture and dynamic regulation of human motion postures and physiological parameters. The AI algorithm of its air vent structure optimizes air circulation, while the magnetic therapy healthcare matrix innovatively incorporates the principles of traditional Chinese medicine acupoint massage. Moreover, the intelligent physiological protection device provides personalized protection for the male genitalia through a U-shaped crotch inner protective mesh and an elastic adjustment system, demonstrating unprecedented design novelty.

Economic, Technical, and Social Benefits: The men's sports pants integrating intelligence and healthcare not only enhance comfort and health protection during exercise but also meet the demands of modern men for high-quality sports equipment through the application of intelligent technology, holding vast market potential and economic benefits. Technologically, they drive the intelligent upgrading of the sports apparel industry. In terms of social benefits, they promote the popularization of a healthy lifestyle and raise public health awareness.

Development Prospects: With the increasing awareness of health and the widespread adoption of intelligent technology, the men's sports pants integrating intelligence and healthcare are expected to become a new favorite in the sports equipment market, leading the industry towards a more intelligent and health-oriented direction.

Finished Product Illustration of Sports Pants

Front and Back View Schematic of Sports Pants



Analytical Diagram of Intelligent Healthcare Integration in Sports Pants

Contact: Tel: 0086-0595-87354602 Email: 465706108@qq.com Website:https://www.hgu.cn/

THE ART OF TRADITIONAL SEWING: IE AND CHIMIR – SYMBOLS OF NATIONAL IDENTITY

I

Authors: Manole Maria, Malcoci Marina, Buga Angela, Doina-Bezuțchi Angela, Rusu Daniela, Mereacre Corina, Malcoci Maria-Eudochia, Corolevschi Marcela

The presented work – embroidered and hand-made ie and chimir – represents an authentic expression of the art of traditional sewing. Through the quality of execution, decorative coherence and fidelity to cultural values, the ensemble becomes not just a clothing item, but a symbol of national identity and an example of contemporary valorization of traditional heritage.

The clothing ensemble demonstrates: respect for traditional cut elements; use of hand embroidery techniques; chromatic harmonization between ie and chimir; capitalization of traditional ornamental symbols in a balanced and modern manner.

Through this work, the authors not only reproduce an element of heritage, but actively contribute to the perpetuation and reinterpretation of tradition. Handcrafting requires time, patience and technical competence, which increases the cultural and economic value of the product.

Figure 1 presents the clothing ensembles crafted by the authors. The ie (traditional blouse) is made of white linen with a full cut, characteristic of folk attire. The neckline is gathered and features a decorative blue drawstring, while the wide sleeves have a simple finish, emphasizing the vertical ornamentation. The decoration is balanced across the chest and sleeves, featuring hand-stitched geometric and floral motifs in shades of royal blue, light blue, and subtle yellow accents. The ornamental composition highlights rhythm, symmetry, and fine execution, reflecting the authors' technical mastery.

The chimir (traditional wide leather belt) harmoniously completes the costume. It is handcrafted, serving both a functional and aesthetic role. Its ornamentation features geometric motifs stitched in tones complementary to the blouse' s embroidery, creating a visual unity for the entire ensemble. The side-lace closure system adds an authentic element and allows for an adjustable fit at the waist.

Figure 1. Clothing ensemble: Ie și chimir

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Crafting Freedom

Phoonseeraah Tieanworn

Advisors: Jeerasak Jitrotjanarak, Chutiparn Lertvachirapaiboon

Crafting Freedom project empowers migrant women by providing training in crafting souvenirs, decorations, and jewelry using local materials like shells, marble, and stone. To enhance product value, her team supplies materials and knowledge to functionalize items with mosquito-repellent, antibacterial, and aromatherapy properties. The women assemble these products, which are then marketed and sold under the brand Ada through tourism networks and an online platform. This initiative not only offers sustainable income but also helps prevent vulnerable women from falling into human trafficking and illegal activities, giving them a path to independence and dignity.

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CRYSTAL PICTURE

I

Tapestry

Author: Katalin Leléné Czeglédi (Hódmezővásárhely)

Glue the template carefully, then choose which colors you will use to create the picture.

After that, you just have to sprinkle the beads in the appropriate places. After the glue dries, your wonderful crystal picture is ready.

Contact: otletclub.idea@freemail.hu

Presentation link: https://otletclub.5mp.eu/web.php?a=otletclub

PATCHWORK

Tapestry

Author: Katalin Leléné Czeglédi (Hódmezővásárhely)

I

Patchwork was originally a type of needlework made by American farm women, mainly from the usable parts of worn-out clothing.

It is a more modern version of this, adapted for use today.

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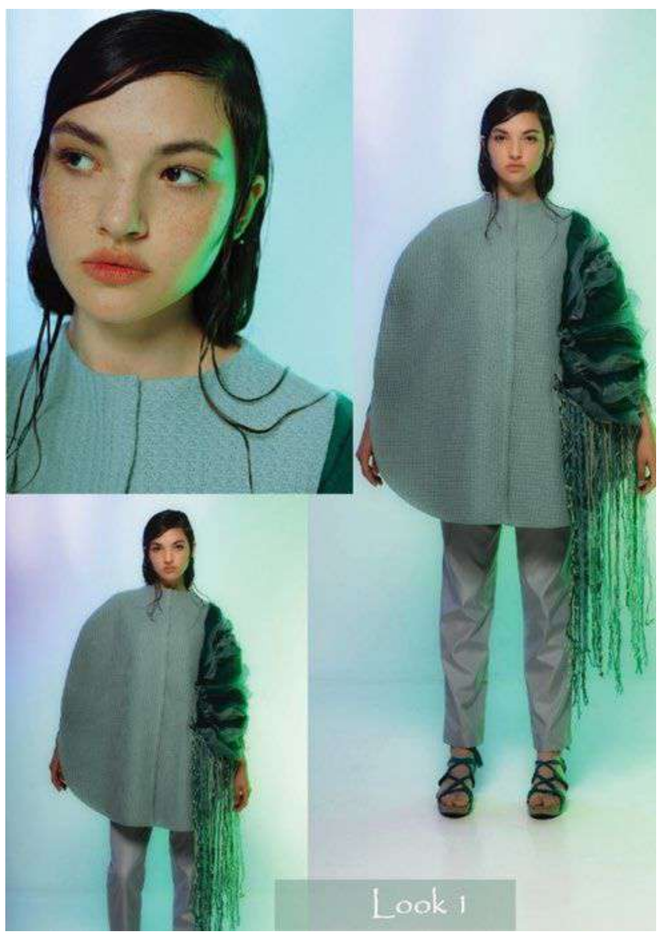
Presentation link: https://otletclub.5mp.eu/web.php?a=otletclub

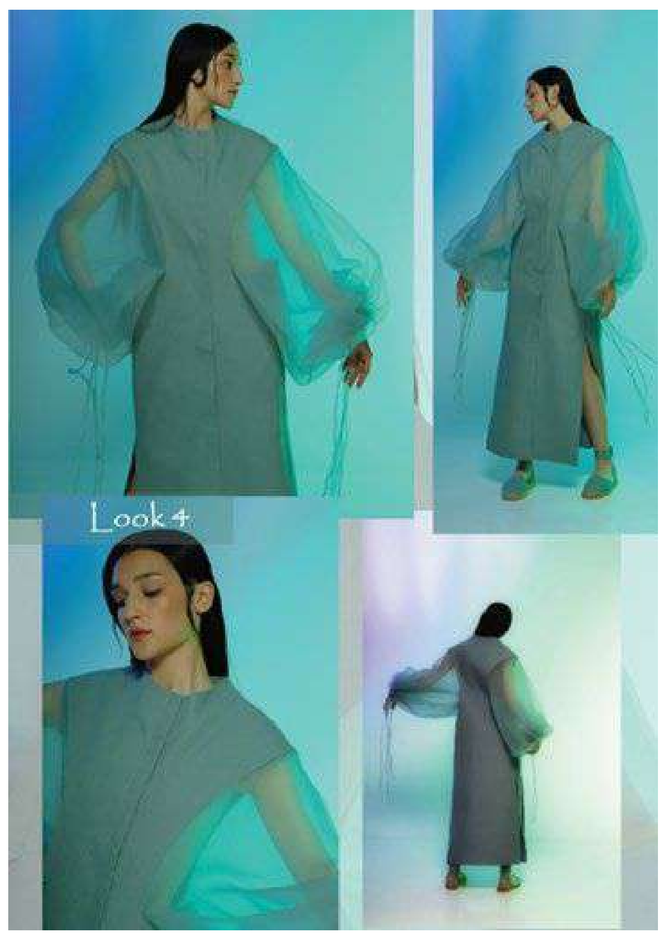
FLORET FASHION COLLECTION

Author: Nicoleta Sofronovici

I

The women's fashion collection is based on a contemporary theme, presented through formal and decorative means with a message carrying activist undertones and advocating peaceful protest regarding the awareness and accountability of the population towards the disappearance of biodiversity and the plant world. Materials used include denim, knitwear, combinations of textures, and decorative-structural and plastic expressions to outline straight, oval, rectangular, and trapezoidal silhouettes. The color palette revolves around shades of mint green and grays, with closure systems featuring slits, buttons, and snaps. The clothing pieces include pinafores, pants, blouses, dresses, and ponchos.





Contact: sofronovicinicoleta@gmail.com **+373 69489315**

Presentation link: https://www.youtube.com/watch?v=X2ndDo0WOdw

PERLET FASHION COLLECTION

I

Author: Mădălina Bianca BISTRIAN

Industrial sewing machines are designed to provide fast, smooth, vibration-free sewing at any speed. The newest machines are completly sealed to eliminate oil stains from the materials. They have simplified control panels that allow the user to adjust the sewing speed to suit their experience level. They come equipped with an integrated Direct-Drive servo motor.

The servomotor is coupled to the machine head by its own coaxial shaft that reduces vibrations and noise; this allows the user to stitch at any speed powerful enough to sew from thin to thick materials. The passion to keep up with technology helped me to succeed in creating the most spectacular dresses in my own PERLET workshop.

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Presentation link: https://www.facebook.com/perletbymadalinabianca/?locale=ro_RO

SCAN ME

THE TRANSFORMATION OF WASTE INTO UNIQUE ACCESSORIES

Patent/project number: MD Nr. 1978
Author/s: Malcoci Marina, Malcoci Maria-Eudochia, Corolevschi Marcela

I

Nowadays, sustainability is becoming increasingly important, and the reuse of materials plays a key role in reducing waste and protecting the environment. The products in figures 2 and 3 are handmade from the waste left over from the natural leather cutting process. Instead of being thrown away, some pieces of leather (fig. 1) were transformed into unique accessories, demonstrating that traditional craftsmanship can go hand in hand with ecological practices.

In figure 2, the products are decorated with fine embroidery in the traditional style. The embroidery not only beautifies the accessories, but also enhances each piese of material, demonstrating special attention to preserving traditional elements.

Figure 3 shows a collection of unembroidered leather accessories, characterized by simple lines and natural colors. The minimalist style of these accessories suggests a contemporary approach, while preserving traditional hand-crafting techniques.

The creation of these products not only reduces the impact on the environment, but also gives new life to waste. This sustainable approach demonstrates that there can be harmony between tradition and innivation, inspiring new ways of capitalizing on available resources.

Fig. 1. Waste left after cutting natural leather

SCAN ME

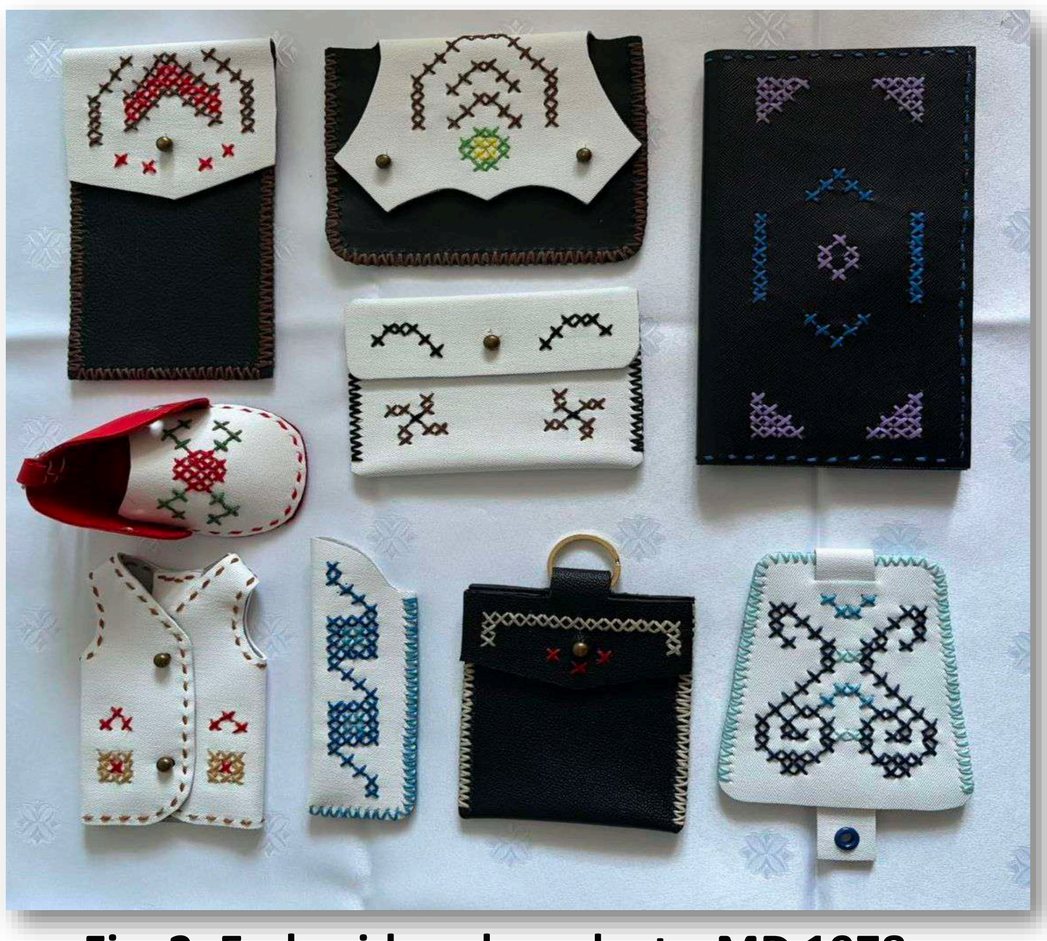

Fig. 2. Embroidered products, MD 1978

Fig. 3. Unembroidered products

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SILK THREADS BLENDING MACHINE

Author/s: Venkatesh Penumarthi

ANDHRA PRADESH - INDIA

I

Introduction

The tradition of handloom in Andhra Pradesh is so ingrained in its culture that it serves as the state's identity. There are several villages in Andhra Pradesh, each of which has its own distinctive method of weaving and pattern.

Very often the handloom is given the same name as that of the village where it is weaved.Dharmavaram town located in sri satya sai district is the silk hub of the Andhra pradesh state . Here thousands of people are making a living by weaving silk cloths especially sarees . The process of weaving is quite a strenuous job. It is causing severe health hazards to weavers in the long run. Our project is to reduce the problems faced by weavers in our region. Usually when a saree is completely woven, new silk threads are blended onto the old ones in a frame just like shown here. This is done manually by specialist weavers using hands and gum. It is a tedious process. So, we are designing a simple blending for weavers to mould threads onto the weaving frame.

For many years, weavers have been doing this blending job manually. They need to continuously sit for 2 to 3 days to complete the work. It is a slow process and causes wrist and neck pain to workers . so , our machine can speed up this process by using electricity. This machine also reduces physical strain to workers.

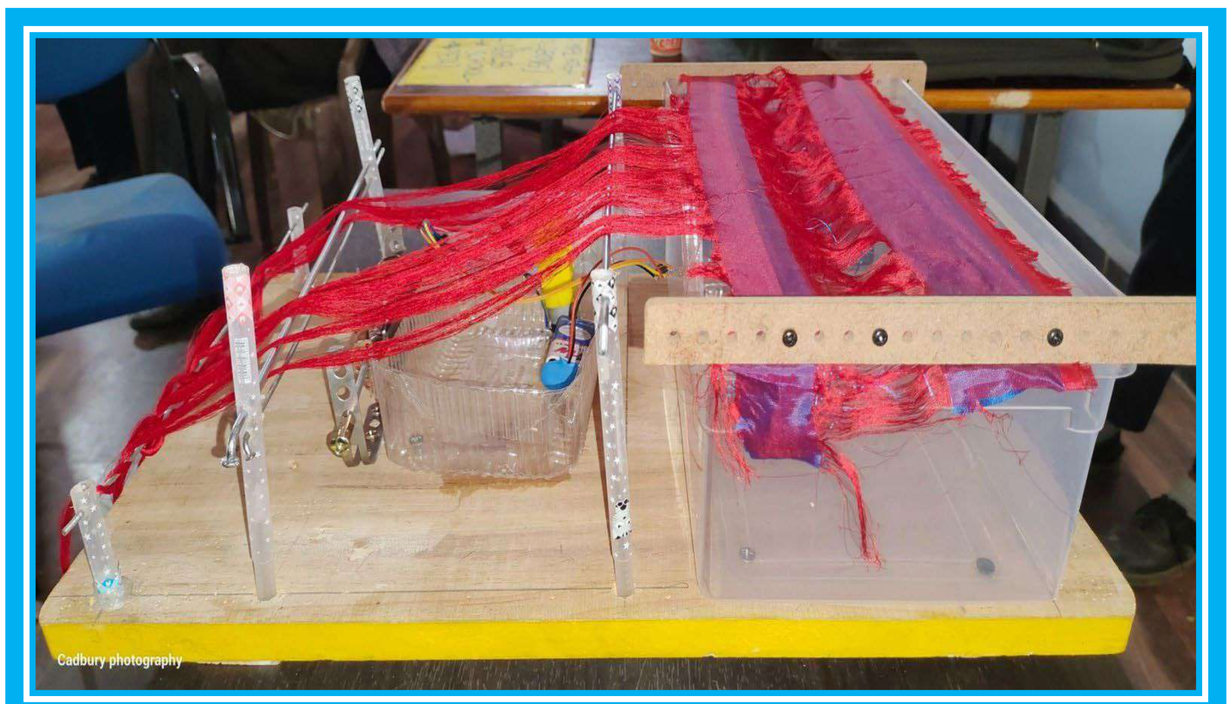
TOOLS AND RESOURCES

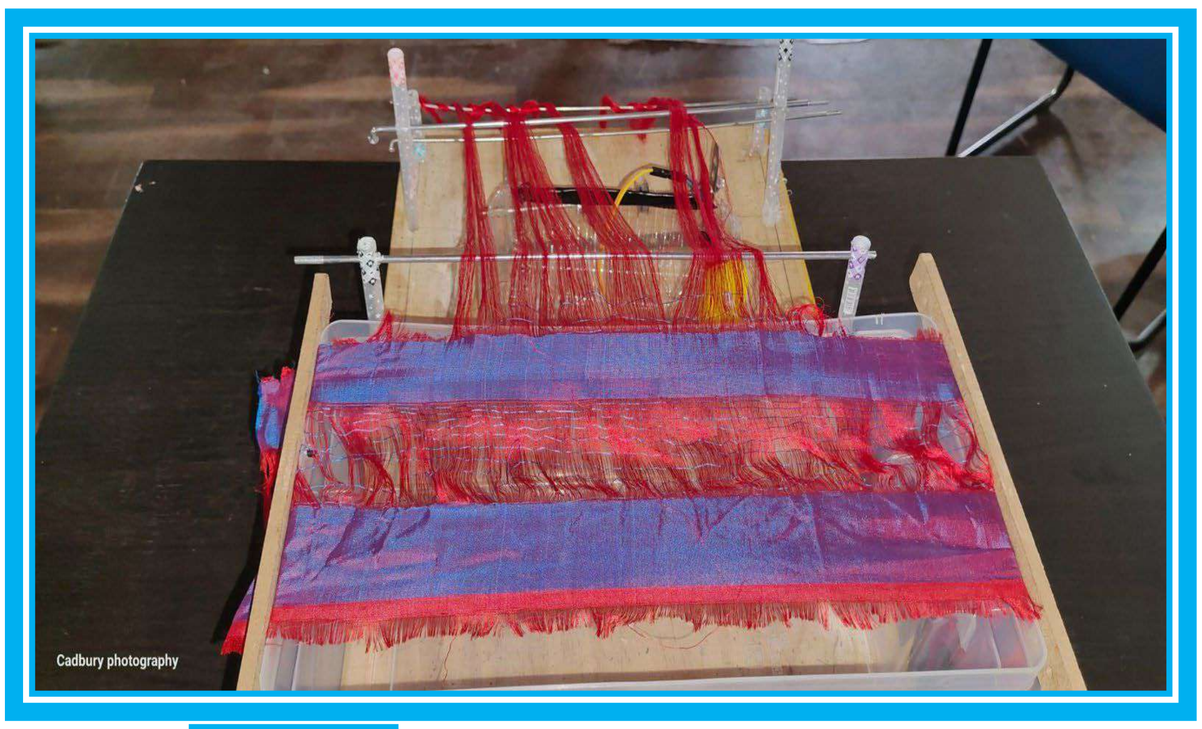
In our setup , we are using components such as BO Motor , two pedal wheels , 9V battery and other mechanical tools such as drill bit, wrenches, soldering gun etc. we also visited the real time weaving set up to see if practically this machine can be useful for them or not . We had found some technical problems in implementation since the silk threads are very delicate. We can't use the rotating fan with longer wheels, because it may cut the neighbouring threads. So with the help of a 3D printer we specially designed the rotating wheel for the blending machine.

We interacted with some weavers locally and asked for their opinion. According to their opinion, the Government should provide the proper facilities and loans to the weavers under the schemes implemented. The raw materials should be supplied at an affordable cost.. Using their advice , we designed our blending wheel . This device consumes less electrical energy and has so many advantages.

ADVANTAGES

Reduces physical strain uniform blending of threads customised designs improved quality Maximum efficiency.





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Gmail: penumarthivenkatesh05@gmail.com

Detail about Dharmavaram Silk Weaving, silk threads blending machine

https://en.wikipedia.org/wiki/Dharmavaram_handloom_pattu_sarees_and_paavadas

MOFT STUDIO SRL

PATRICIA'S HANDMADE

Handmade creations

I

Author:Patricia Nelega

Patricia's Handmade is a concept based on creativity, sensitivity, passion for everything that art means. The products, unique, are designed for an avant-garde look. Diversity is the strong point of Patricia's Handmade creations from brooches, earrings, decorations to projects for special events: weddings, christenings, anniversaries etc.

All products are customized according to by the preferences of those for whom they are created.

Contact: ***+40721 603 933*** ***https://www.facebook.com/moftstudio/***

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Mihaela Fashion's

Mihaela's Wonderful Beads

I

Bead Embroidery Project

Author: Mihaela MARARU

Bead embroidery has been my passion for more than 20 years, at first I embroidered simple things like bracelets, then I perfected my technique and made accessories for clothing items. Over time, I sewed icons, paintings, purses, bags, backpacks. The most spectacular creations of mine are the clothes sewn with embroidered beads, in some cases I used over 80,000 beads. The bead can be attached by a simple stitch of material, but a smaller bead can also be used to obtain a small column, for a more voluminous column, a column of two or more beads can be sewn.

The beads of different colours and sizes, sewn separately next to each other, look very nice, they can be placed inside a metallic outline, in the middle of an outline sewn with contrast beads or they can be scattered chaotically on the canvas, creating bright spots on the embroidery.

SCAN ME

Contact: https://www.facebook.com/profile.php?id=100063499954796

ECOCROMA

Sustainable Fashion Inspired by Nature

Innovative Fashion Collection
Author: Nicoleta Sofronovici
Fashion designer Chișinău, Republic of Moldova

I

Ecocroma is a fashion collection that embraces sustainability by replacing synthetic dyes with natural pigments derived from plants, fruits, and roots. Using the eco-print technique, fabrics are uniquely decorated with organic imprints, creating one-of-a-kind, nature-inspired designs.

This collection promotes a conscious and responsible approach to fashion, advocating for slow and sustainable design that minimizes environmental impact.

By integrating natural dyeing methods, mordanting, and innovative textile techniques, Ecocroma highlights the beauty of eco-friendly craftsmanship. The name Ecocroma is a fusion of "*Eco*" (ecology, sustainability) and "*Croma*" (from Greek *chrṓma*, meaning color), symbolizing "*ecological color*" – a perfect representation of fashion that respects both nature and creativity.

Contact: e-mail: sofronovicinicoleta@gmail.com, tel.: +373069489315

The National Research and Development Institute for Textiles and Leather

STRUCTURED BIOEMULSIONS BASED ON A MIXTURE OF SURFACTANTS-VEGETABLE EXTRACTS CONCENTRATED THROUGH MEMBRANES AND PROCESS FOR OBTAINING THEM

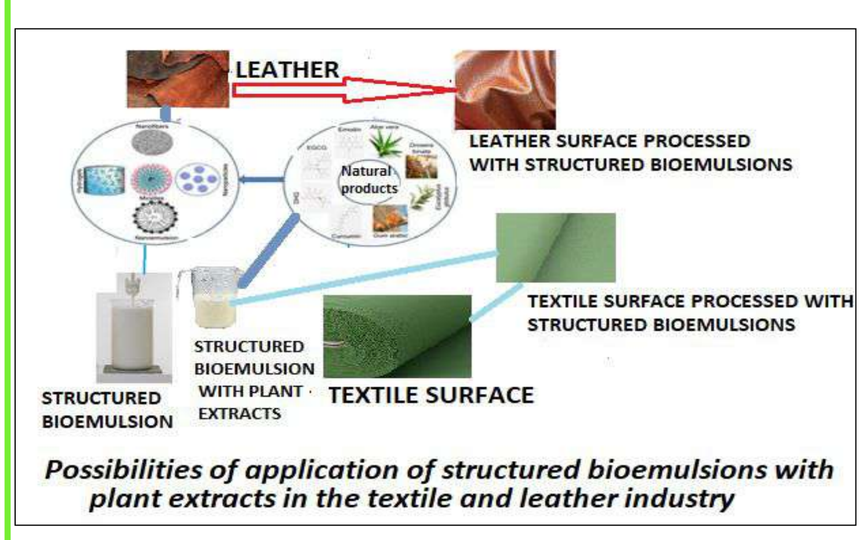
Patent/project number: A/00293 from 04.06.2024/ Core Program TEX-PEL-CHALLENGE 2026, Project number PN 23 26 01 04, acronym Tex4Age

Authors: Demetra SIMION, Alexandra Gabriela ENE, Alina POPESCU, Carmen GAIDAU, Laura CHIRILA, Cristina Mihaela LITE

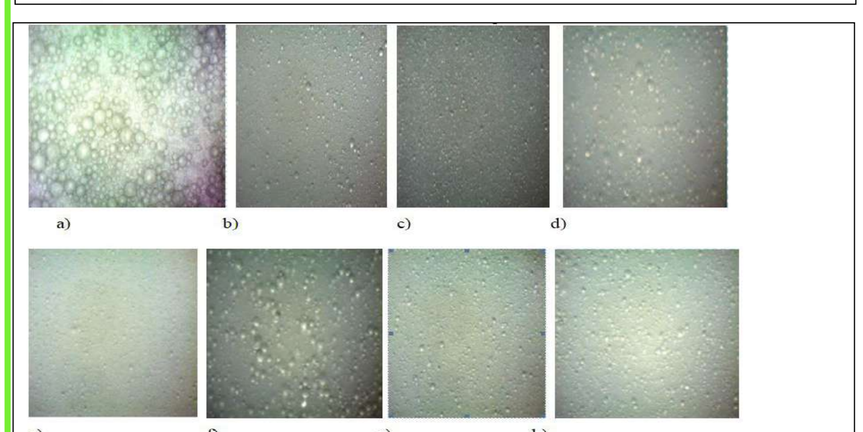
The structured bioemulsions were made through a process based on a mixture of surfactants Lauryl glucoside & Tween 20 & Tween 80 and one of plant extracts from: sage & geranium & lemon (or separate). The structured bioemulsions based on a mixture of surfactants-membrane concentrated plant extracts can be successfully used as new additives, non-polluting, non-toxic auxiliaries in the textile and leather industry, to improve antibacterial, antifungal, self-cleaning, color fastness properties.

Structured bioemulsions obtained for treating textile or leather surfaces are made up of surfactants in a proportion of 15% and plant extracts concentrated by membrane technology, from the mixture: sage & geranium & lemon of 6%, which contain 0.6-0.9% vitamin C, preferably 0.7-0.81%; conditioned in liquid form, in plastic containers. The solubilization (encapsulation) method of mixture from three plant extracts, concentrated by membrane technology in structured bioemulsions was compared. A mechanism for solubilization of plant extracts in a mixture of: sage, geranium, lemon, concentrated by membrane technology, in surfactant micelles: Tween 80, Tween 20 and Lauryl glucoside was proposed. The plant extracts in the mixture and concentrated by membrane technology are hydrophilic and attach to the hydrophilic groups of the surfactant chains. The influence of temperature and solubilization of the concentrated plant extracts by membrane technology, separately or in a mixture of the three: sage&geranium&lemon, in mixed micelles of surfactants: Lauryl glucoside&Tween 20&Tween 80, determined the different structuring of the obtained bioemulsions and was observed by optical microscopy. Structured bioemulsions created for different ratios of plant extracts and surfactant concentrations can improve the properties of the surface on which they are applied and can be successfully used in the textile or leather industry. In the finishing process of textiles or leathers treated with structured bioemulsions made in comparison with untreated samples, the aim was to obtain "smart" supports, to improve properties such as: antifungal, antimicrobial, softness, self-cleaning, color fastness to water (dynamic light diffusion, microbiological tests).

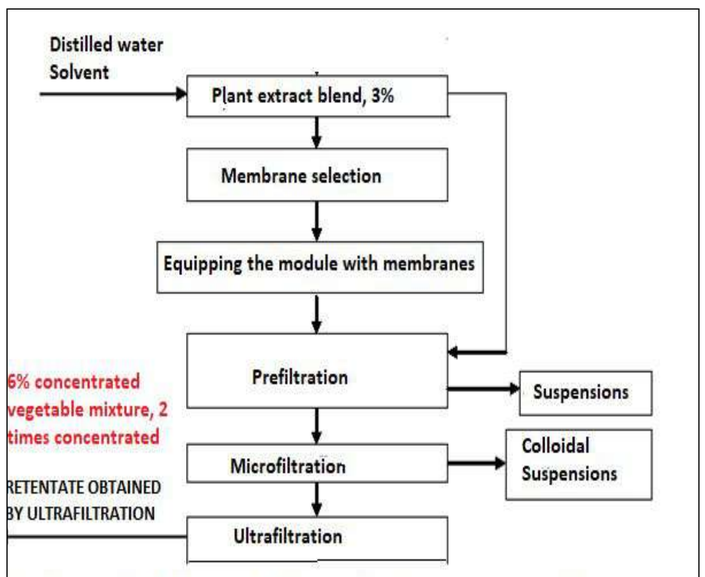
The invention capitalizes on the bioactive plant potential (sage, geranium, lemon) and non-toxic surfactants (based on sugar-lauryl glucoside) by making structured bioemulsions, achieving an important objective of creating bioproducts with a complex structure, with beneficial effects on the surfaces (textiles or leather) on which they are applied.



Possibilities of application of structured bioemulsions with plant extracts in the textile and leather industry



Optical microscopy images taken on an ELTA 90 Medical Research S.R.L microscope, magnification x5000 for: a) Multiple emulsions based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and a mixture of vegetable extracts from: sage&geranium&lemon concentrated through membranes, at room temperature; b) Multiple emulsions based on a mixture of surfactants: Tween20&80& Lauryl glucoside and a mixture of vegetable extracts from: sage&geranium&lemon concentrated through membranes, at 50oC; c) Multiple emulsions based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and an aqueous vegetable extract from geranium concentrated through membranes, at room temperature; d) Multiple emulsions based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and an aqueous vegetable extract from geranium concentrated through membranes, at 50oC; e) Multiple emulsions based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and aqueous vegetable extract of lemon concentrated through membranes, at room temperature; f) Multiple emulsions based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and aqueous vegetable extract of lemon concentrated through membranes, at 50oC; g) Multiple emulsions based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and aqueous vegetable extract of sage concentrated through membranes, at room temperature; h) Multiple emulsions based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and aqueous vegetable extract of sage concentrated through membranes, at 50oC



Technological flow for obtaining the mixture of vegetable extract from: lemon & sage & geranium (or separately), concentrated through membranes

Sample	Results	R%	$Log_{10}red$
Concentration of inoculum	T_0=1,5x10^{6}UFC/ml		
Control	T_0=1,5x10^{6}UFC/ml T_{24}=6,58x10^{3}UFC/ml	93,48	1,18
Sample treated with bioemulsion based on a mixture of concentrated plant extracts from: geranium&lemon&sage	T_0=1,5x10^{6}UFC/ml T_{24}=4,18x10^{3}UFC/ml	95,00	1,20
Sample treated with bioemulsion based on a mixture of concentrated plant extracts from geranium	T_0=1,5x10^{6}UFC/ml T_{24}=3,78x10^{3}UFC	95,10	1,31
Sample treated with bioemulsion based on a mixture of concentrated plant extracts from lemon	T_0=1,5x10^{6}UFC/ml T_{24}=3,70x10^{3}UFC	95,00	1,30
Sample treated with bioemulsion based on a mixture of concentrated plant extracts from sage	T_0=1,5x10^{6}UFC/ml T_{24}=2,50x10^{3}UFC	97,40	1,59

Results of microbiological tests on samples processed with the 4 types of bioemulsions, when attacked with Staphylococcus aureus ATCC 6538

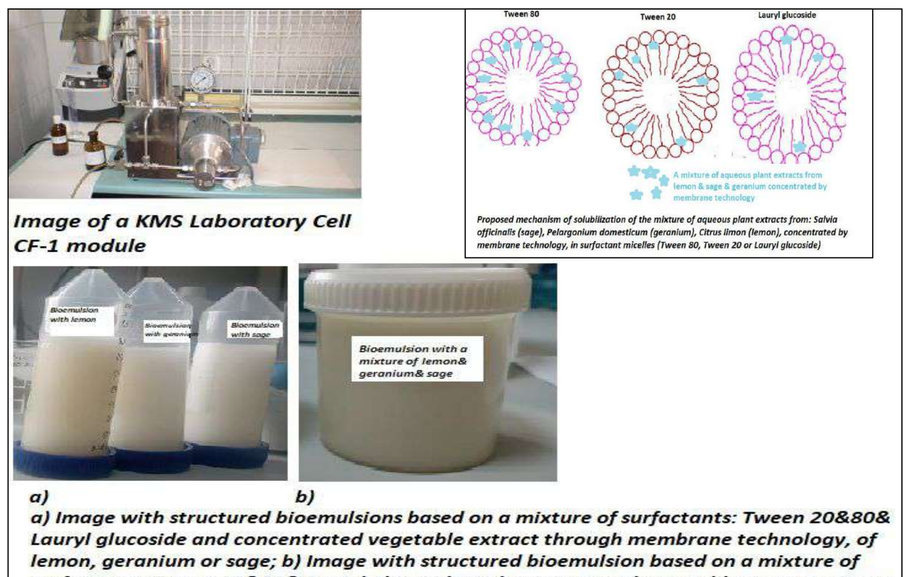


Image of a KMS Laboratory Cell CF-1 module

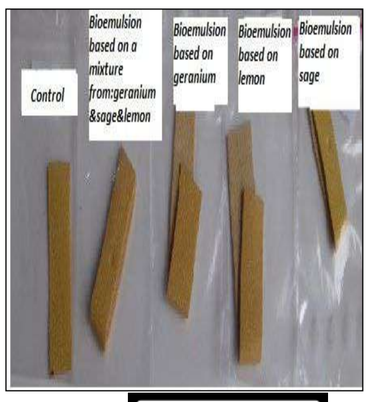
Proposed mechanism of solubilization of the mixture of aqueous plant extracts from: Salvia officinalis (sage), Pelargonium domesticum (geranium), Citrus limon (lemon), concentrated by membrane technology, in surfactant micelles (Tween 80, Tween 20 or Lauryl glucoside)

a) Image with structured bioemulsions based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and concentrated vegetable extract through membrane technology, of lemon, geranium or sage; b) Image with structured bioemulsion based on a mixture of surfactants: Tween 20&80& Lauryl glucoside and concentrated vegetable extract mixture through membrane technology, of lemon&geranium&sage

Sample1-Treated 100% cotton sample with a bioemulsion based on a mixture of concentrated plant extracts from:geranium&lemon&sage

Sample2-which contains: 80% cotton fibers/ 20% functionalized regenerated cellulose fibers with Vitamin E content, treated with a bioemulsion based on a mixture of concentrated plant extracts from:geranium&lemon&sage

Sample 3- which contains: 53% polyester fibers / 43% wool fibers / 4% elastane treated with a bioemulsion based on a mixture of concentrated plant extracts from:geranium&lemon&sage



SCAN ME

Contact: demetra.simion@incdtp.ro, +40749464645

https://incdtp.ro/nucleu.html

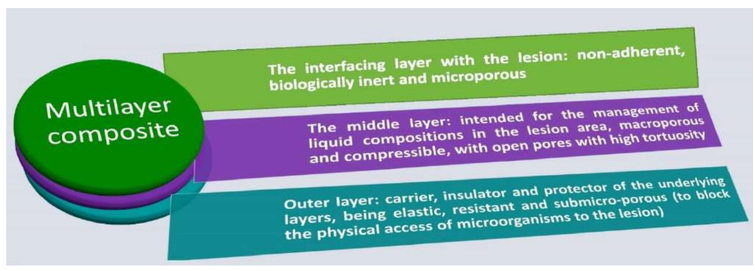
Procedure for obtaining layered dressings, usable for assisting medical interventions performed in emergencies

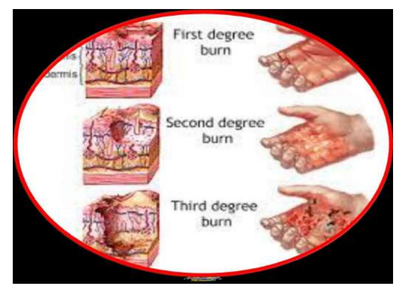
Authors: ***Visileanu*** *Emilia,* ***Ene*** *Alexandra Gabriela,* ***Popescu*** *Diana Mihaela,*
Maier *Stelian Sergiu,* ***Tihauan*** *Bianca Maria,* ***Marinas*** *Ioana Cristina*

I

Patent no. A/00612 / 06.10.2022

The invention refers to a process for obtaining layered dressings, usable for assisting medical interventions carried out in emergencies, characterised by the fact that they provide microorganism-free compresses or bandages, with temporary application, for the management of non-infected wounds, as well as minor burns, with thermal and chemical origin, and low and medium severity, occurring at the level of the integuments.

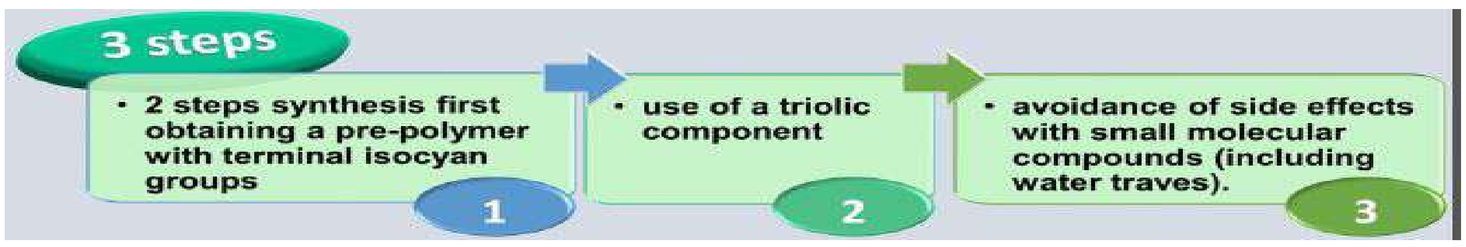




Technological stages:

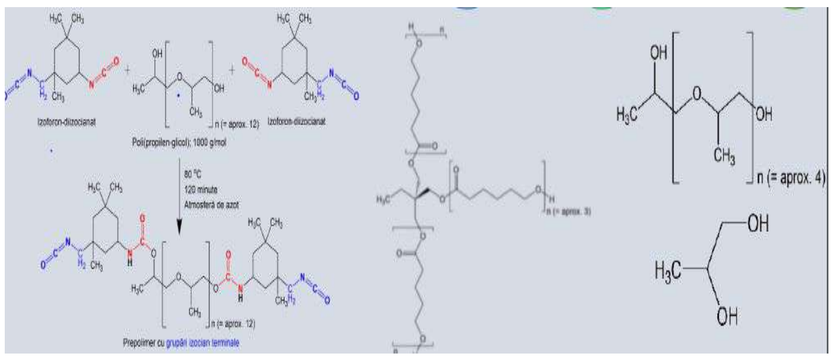
- preliminary decontamination of previously functionalised textile materials;
- cutting out the landmarks from textile materials according to the

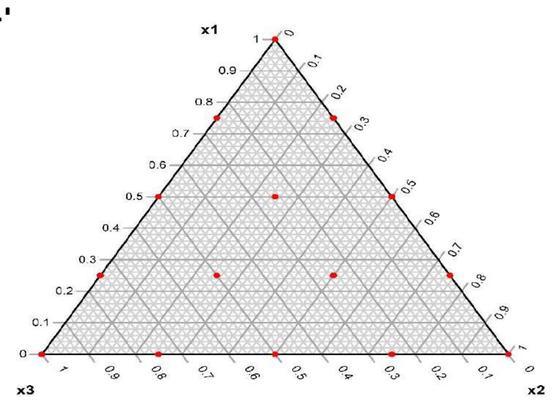
sort-type-dimensional requirements of the dressings or compresses to be manufactured;

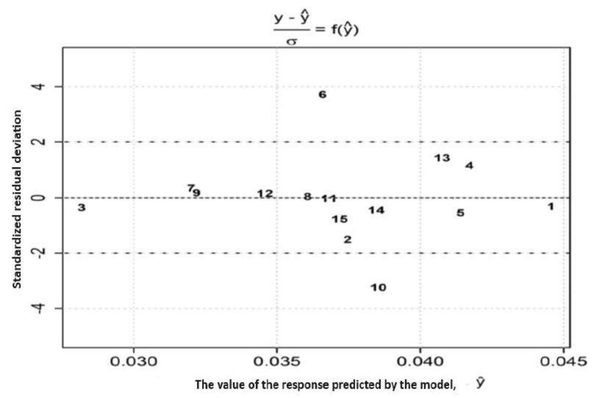


SECTION I

- dimensional stabilisation and conditioning of textile materials;
- cutting out landmarks from loosely cross-linked polyurethane hydrogel, previously manufactured in the form of a flat layer;
- post-processing of the landmarks of the polyurethane hydrogel layer to load them with pharmacologically active compounds;
- conditioning of polyurethane hydrogel landmar'

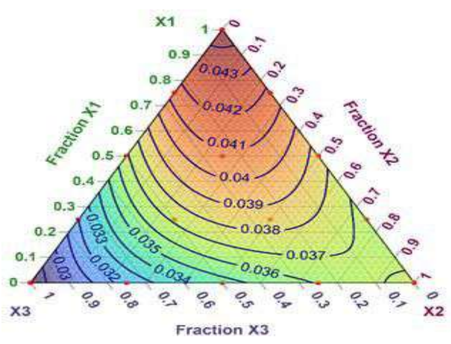


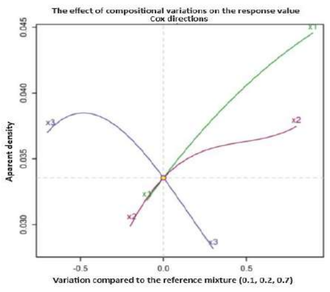


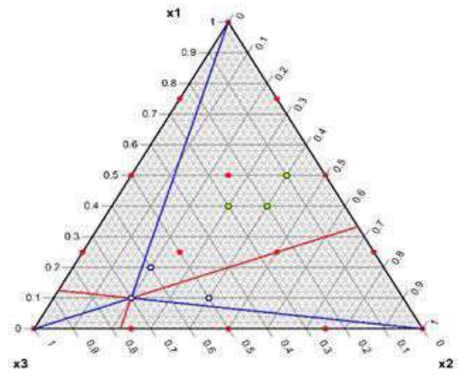


- assembling the dressing/compresses by flanking the polyurethane hydrogel landmarks with the textile landmarks;
- conditioning of assembled parts;
- dimensional adjustment of

manufactured dressings/compresses;







Results

The biocompatibility of the multilayer structure performed by in vivo studies showed a rate of rapid healing and at 7 days of treatment, it was observed the closure of the wound was approximately 60% with areas of tissue regeneration.

Contact: The National Research & Development Institute for Textiles and Leather,
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Contact person: e.visileanu@incdtp.ro **+40722542851**

The National R&D Institute for Textiles and Leather, Romania

ASSEMBLY PROCESS OF NARROW TEXTILE MATERIALS FROM THE COMPONENT OF THE ANCHORING SYSTEM OF THE MULTI-ROLE COLLAPSIBLE MODULE FOR PEDOLOGICAL DROUGHT

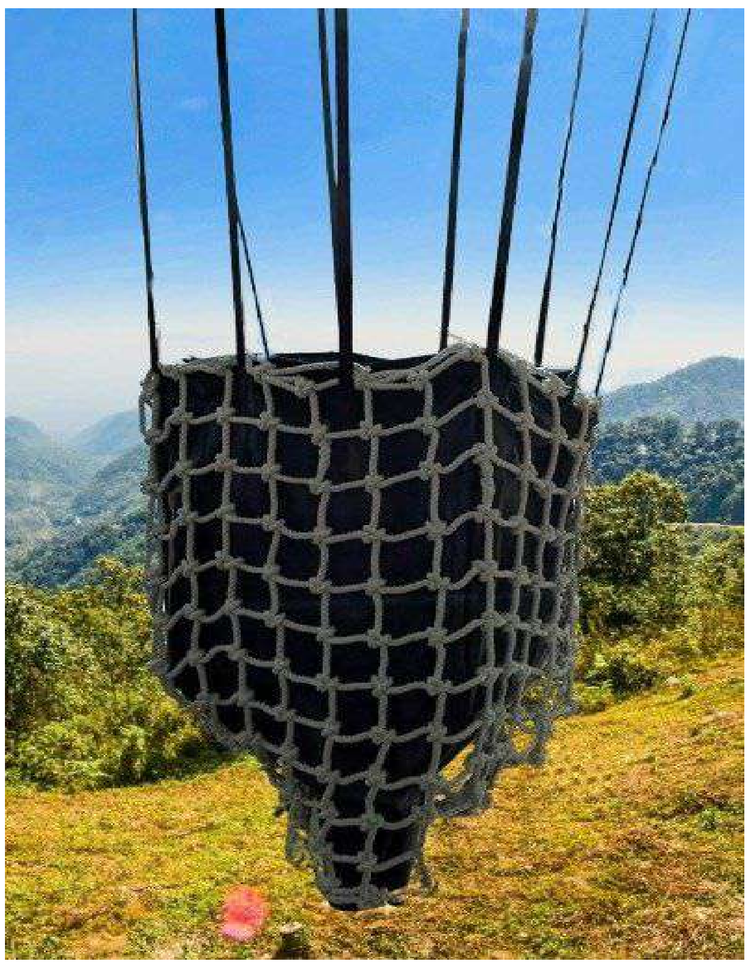
I

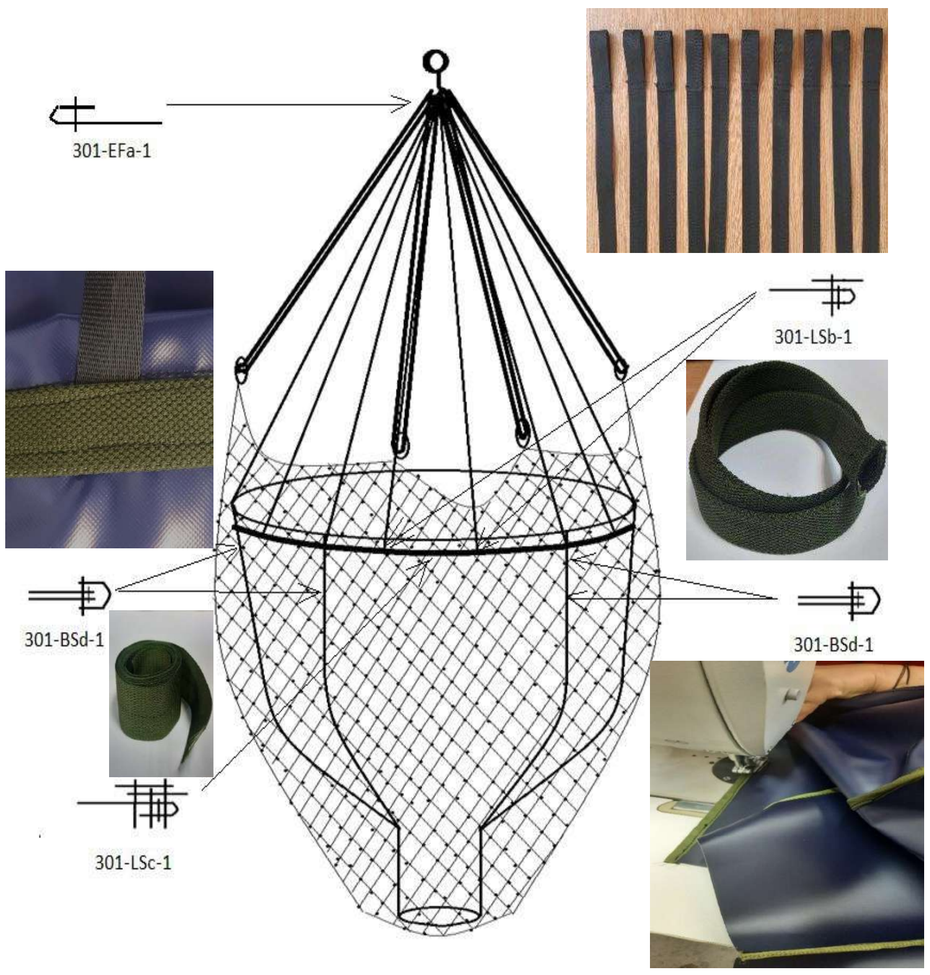
Patent application: A/00504/ 02.09.2024
Core Program TEX-PEL-CHALLENGE 2026, PN 23 26 02 01 (THORR)

Authors: Cristina GROSU, Adrian SALISTEAN, Adriana-Iuliana POPESCU

The invention refers to a process for assembling narrow textile materials, a fundamental part of the anchoring system, by sewing technology, with: ***additional reinforcement elements*** on the upper part of the hexahedron with square faces (100% PES reinforcement tape, 30 mm width and 3.5 mm thick, with filming surface treatment) ***and an assembly of 12 straps***, for the suspension-attachment-detachment by the hook of the helicopter's transport system (100% PES strap, 25 mm width, 2 mm thick, 1500 mm length), so that the multi-role collapsible aerian module for pedological drought ensures the following operational requirements: long technical resource (min. 4 years), seam abrasion resistance (min. 10000 cycles) and working load of the entire modular system (min. 3500 daN).

Claim The assembly process of the anchoring system, part of the multi-role collapsible module for pedological drought, by using a triple transport sewing machine, with 100% PES sewing thread, 150 tex fineness, 301 stitch type (301-EFa-1, 301-BSd-1, 301-LSb-1, 301-LSc-1), 3.5-4 stitches/cm, by edging the joining seams of the hexahedron with a 100% PES woven tape, 25 mm width and fixing the suspension-attachment-detachment assembly, made of 12 100% PES straps, 25 mm width, 2 mm thick and 1500 mm long, the reinforcement of the entire anchoring system being achieved using a 100% PES tubular strap, 30 mm width, fixed on the front, 25 mm from the edge of the hexahedron.





Contact: cristina.grosu@incdtp.ro Tel: +4.021.340.49.28

Presentation link: https://incdtp.ro/THORR/

HACKTEX - Innovative smart textiles & entrepreneurship

Research project

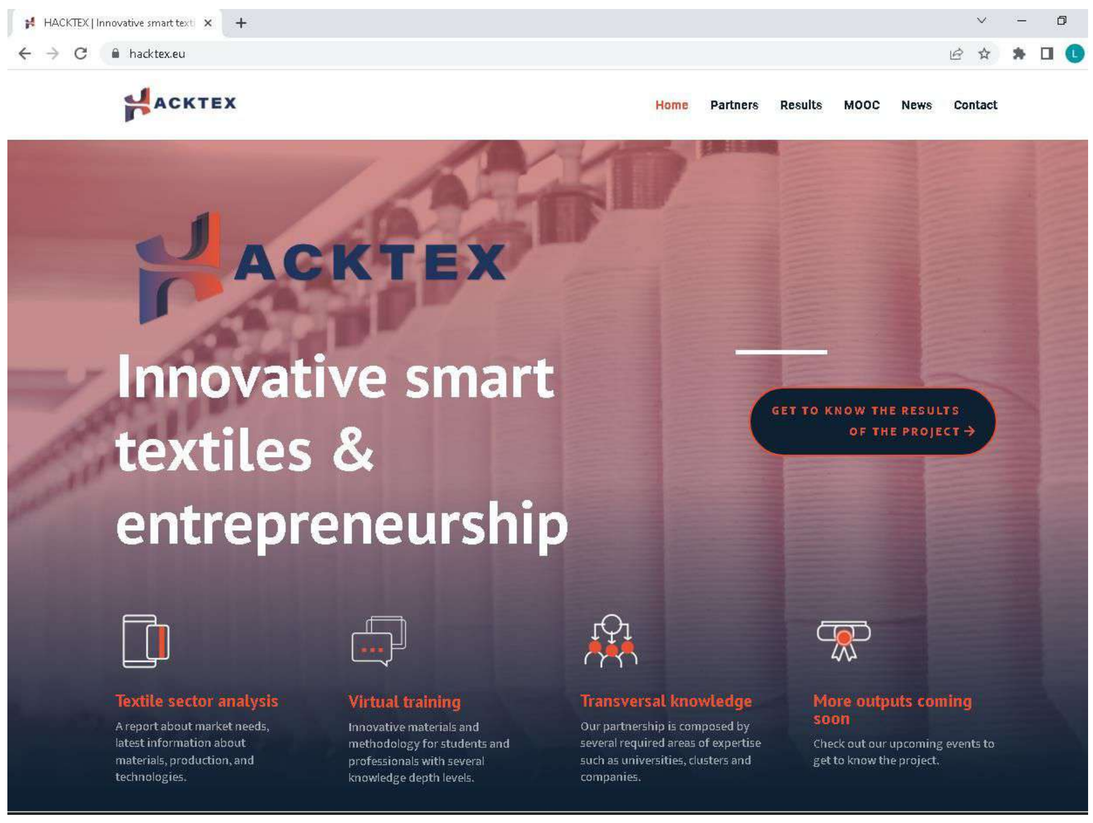
Authors: Luminița Ciobanu, Savin Dorin Ionesi, Lidia Alexa

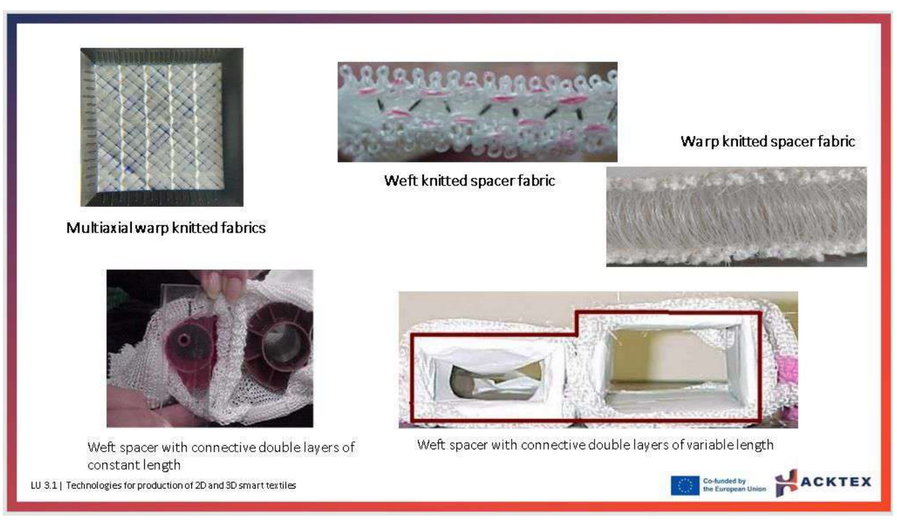
I

This is an EU-funded project, HACKTEX - Innovative smart textiles & entrepreneurship, no. 2021-1-RO01-KA220-HED-000027527. All information on the results of the project reflects the contributions of all partners – TUIASI - Romania, AEI Textils - Spain, CRE.THI.DEV. - Greece, CIAPE - Italy, Universitat Politecnica de Catalunya - Spain, University of West Attica - Greece, University of Borås - Sweden, TITERA - Germany.

Smart textiles represent a large group of advanced textiles with new functions obtained using high-performance raw materials and specialized treatments. The HACKTEX project develops the tools necessary for skills enhancement targeted to higher education in relation to innovation in order to obtain its objectives: support higher education students to acquire skills in transdisciplinary innovation based on smart textiles; foster student cooperation multidisciplinary approach in hands-on projects; provide knowledge, skills, and competences using virtual learning methodologies and tools; promote the application of good practices for the enhancement of innovative skills; strengthen collaboration between universities with the advanced textiles industry.

Using videos and reading materials, the MOOC on smart textiles discusses the basics of this domain, specific raw materials, textile processes required to produce smart textiles, characteristics and specific standards, as well as issues related to sustainability.





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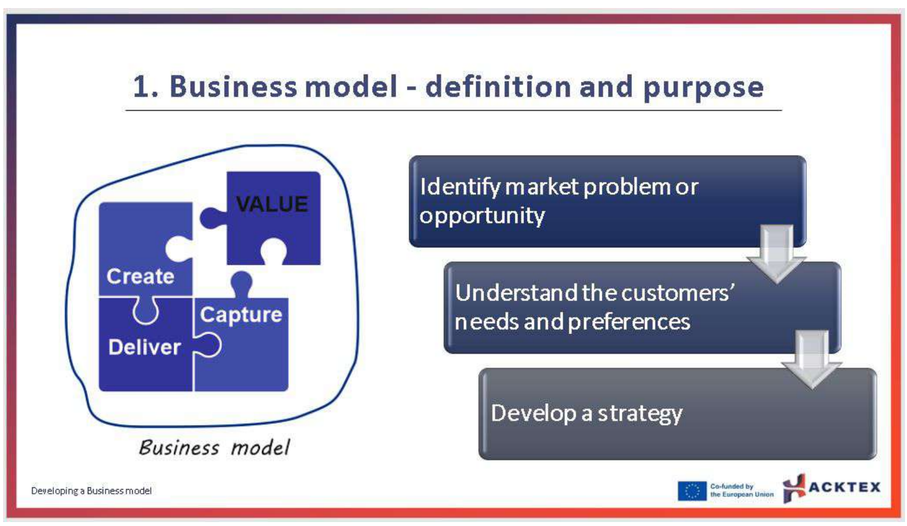


The guide on entrepreneurship covers the steps needed to develop a business model that will help research results transition toward the market. The virtual training materials are to be tested in a training session (Bootcamp), where 20 students from all 4 partner universities will participate in Boras, Sweden to classes, practical activities, visits to relevant companies, and a hackathon on developing business models adapted to smart textiles.

The MOOC on smart textiles and the virtual guide on entrepreneurship will be uploaded on a platform and are to be accessed for free by anyone interested in the field of smart textiles.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Contact: luminita.ciobanu@academic.tuiasi.ro, https://hacktex.eu/index.php/contact/

Posters Catalogue

7th International Exhibition INVENTCOR

2-4 April 2026 – Deva, Romania

J

Kids Corner

Games

Toys

Outdoor activities

JOY – The Digital Fingerprint of the Soul

Student Project

Authors: RoboMinds Team; Mentor Radu Ramona

J

About the Project

Joy is an interactive robot built on the LEGO Spike Prime platform. Its purpose is to help sensitive children manage their emotions through play, technology, and friendly feedback.

What Joy Can Do

Joy features an intelligent reaction system that includes:✓ Ultrasonic sensor – detects when a child approaches✓ Smart Hub – processes reactions in real time✓ Two motors – creates joyful tail and body movements✓ Positive sounds – expresses happiness and excitement✓ LED display – shows emoticons, icons, and visual emotions✓ Encouraging messages – offers emotional support

Why Joy Is Special

When a child comes near, Joy: reacts happily interacts with empathy displays positive emotions creates a friendly and relaxing atmosphere. Joy is not just a robot — it is a technological friend that brings smiles, confidence, and positive energy to the school environment.

Keywords Educational Robotics • Empathy • Emotional Support • Human–Robot Interaction

Slogan :“Emotions are lighter when you have a helping paw!”

https://www.youtube.com/@Robominds-Alpha

Kids Corner

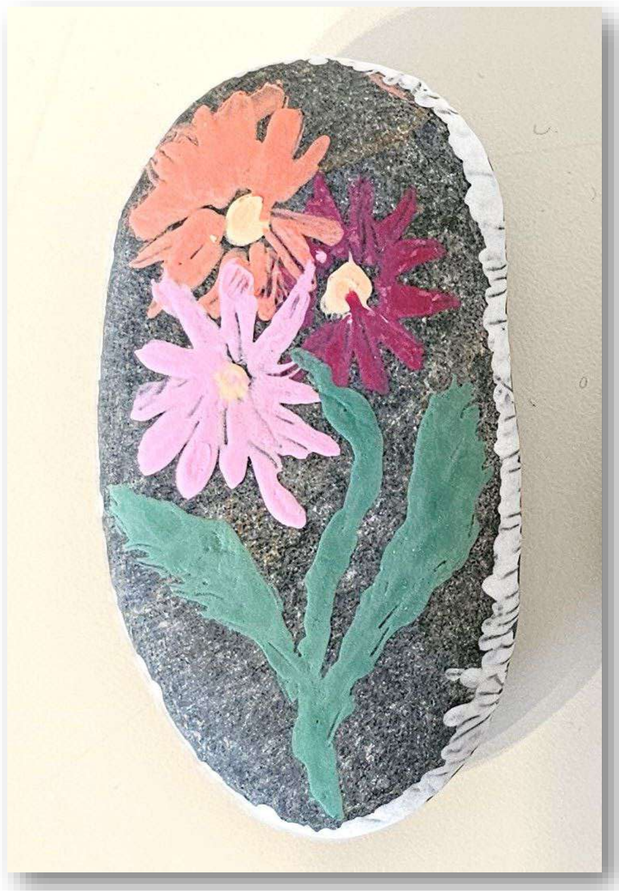
Flowers and animals from classical painting to AI

Kid Project

Author: Alessia Marie SALA

J

My name is Alessia Marie SALA, I'm 7 years old and my passions are dancing, painting but also nature walks. Through this project I want to make a comparison between the classic painting method and a new method that I recently discovered, namely painting with the help of AI.



Kids Corner

The Architecture of Play: Football, Manual Craftsmanship and LEGO

Kid Project

Author: Christian SALA

J

My name is Christian SALA, I am 7 years old and football is my passion. I like this sport a lot and after kindergarten I play football with my friends in the park near our house. I am registered at the Football Club of the locality where I live. Besides football, I like to build projects with Lego pieces and I do this activity after school and lessons. I also like the handwork projects that I prepare for school.

AIRSOFT
BY WOLVES SPORTS CLUB

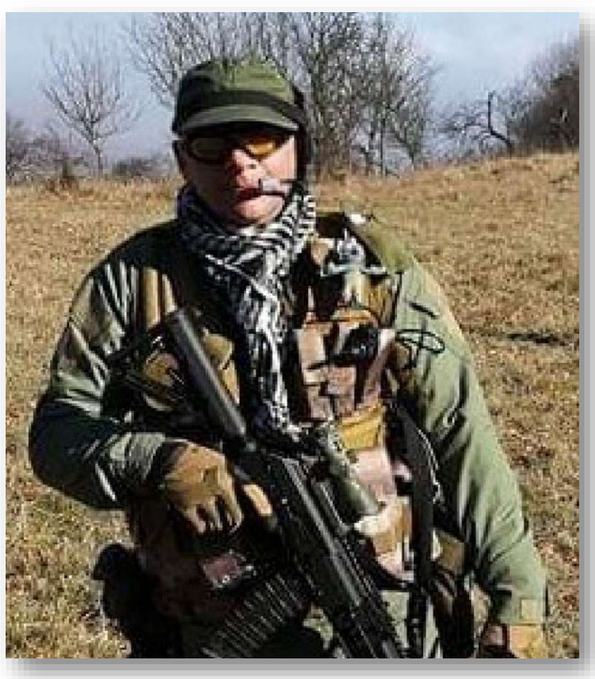
Airsoft project

Authors: *Florin TOPOR & Team*

The Deva Wolves Sports Club through the taekwon-do, archery and airsoft sections promotes movement and competitive spirit by participating and organizing games and competitions of these sports disciplines.

The Deva Wolves Sports Club organizes various demonstration events in which participants and visitors have the opportunity to witness a presentation of the combat tactics used in airsoft, of the equipment, but also of replicas of real military weapons and devices. Those who love this sport could sign up for the target shooting session in a controlled environment and in complete safety.

Airsoft is a sport that helps develop team spirit and fair play, building character!



Presentation link: https://youtu.be/QYdjh3YGD4g?si=4zfVpus7tgjgvbWG

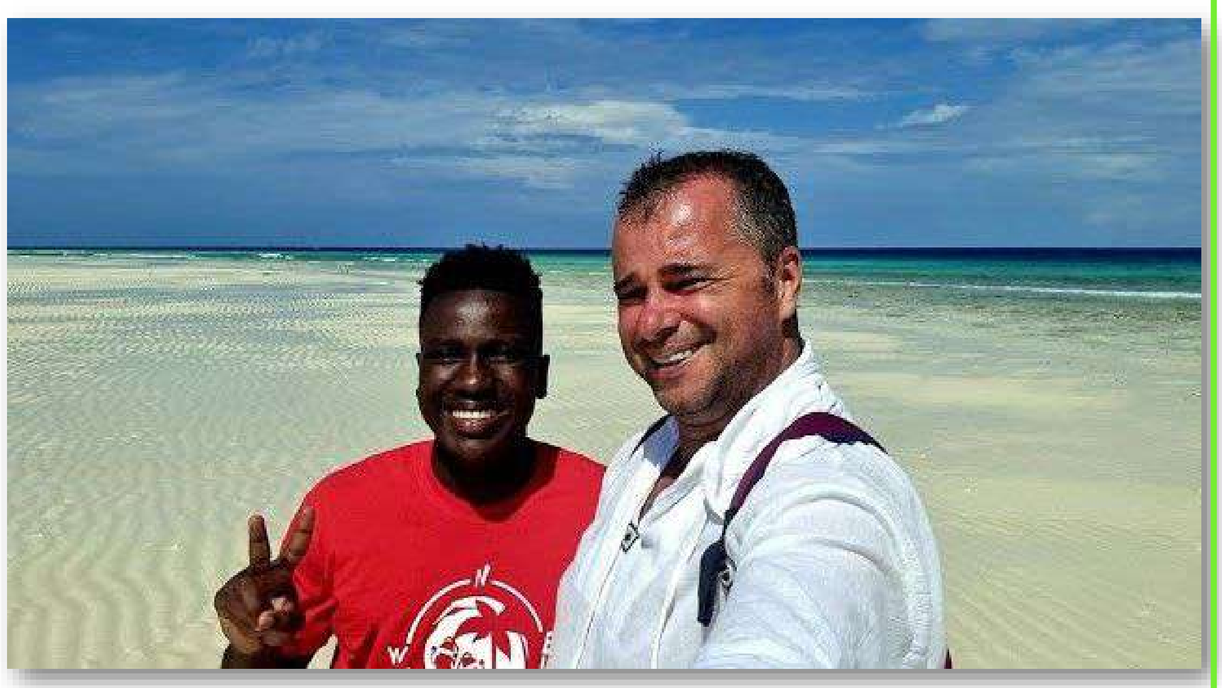
DISCOVER ZANZIBAR with MUDI

J

Travel Guide

Author: Muhammed Suleiman Yussuf

I'm Mudi and I am a tour guide here in Zanzibar. I only learned Romanian on the internet and on youtube, and now I have a school where I also teach other friends of mine.
If you choose to spend your holiday here you will have the opportunity to discover Zanzibar and its beauty with me. This is my website and the place where I can be with you, my whole story in one place, along with information for tourists about Zanzibar.



Zanzibar is an archipelago located off the east coast of Africa and consists of the main island of the same name, Zanzibar or Unguja as the locals call it, and Pemba. The word Zanzibar comes from the Persian language and translates as "coast of black people" and Pemba translates as "green island".

Zanzibar is located approximately 6000 kilometers from Romania, the islands being sought after both for the wonderful beaches and reefs, and for the exotic destination.

Contact: https://www.facebook.com/ghidturisticdespre.zanzibar
tshabalalajunior17@gmail.com +255 783 396 944

SCAN ME

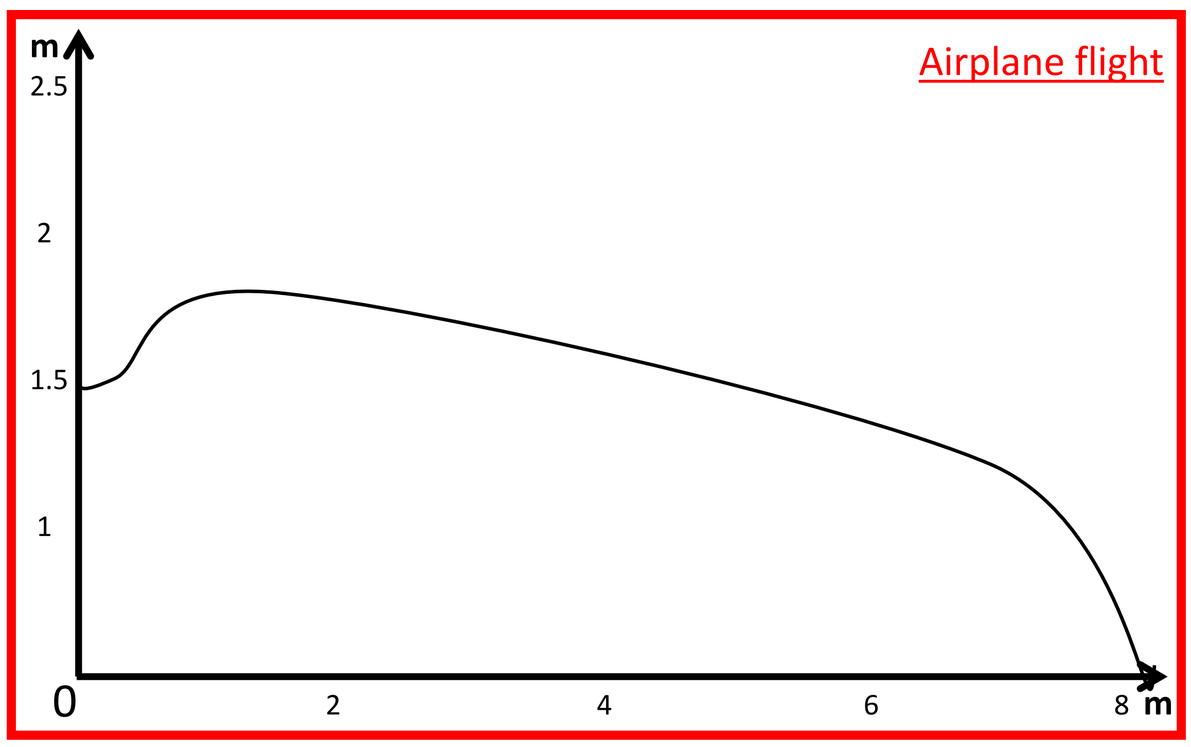
Beyond the Horizon: Innovative Aircraft Design and Manual Engineering

Student Project

Author: Sebastian ROTEA
Student in 8th grade

J

This project explores the manual design and assembly of an advanced flight model, utilizing ultra-lightweight polymers to optimize the weight-to-lift ratio. Through experimental modeling techniques, the work demonstrates how manual construction precision and wing geometry directly influence aerodynamic stability during flight. This initiative transforms a passion for modular design into a practical aeronautical engineering solution.



Components of the plane: the plane body, 2 long wings, 2 short wings, 2 screws.

How to make it: from a sheet of compact foam, the shape of the plane body is cut out, this after it has been previously drawn. The 2 long wings are trapezoidal and rounded at the top, they will be cut wide enough to keep the air under them for the plane to float. The other 2 small wings are positioned at the back side of the plane, at the tail, higher than the other 2 wings, they help maintain the straight trajectory of the plane. The wings are attached with hot glue. The 2 screws are positioned in front of the plane, on one side and the other, to give weight to the front part, to cut the air and to keep the plane in a straight line and to prevent it from turning over.

Contact: sebastianroteafh5@gmail.com

Opportunity
CORNELIUGROUP Research-Innovation Association
Creation
Realization
INVENTCOR
Power of Creative Mind
Deva ROMANIA

Kids Corner

Creative Drawing - Moods

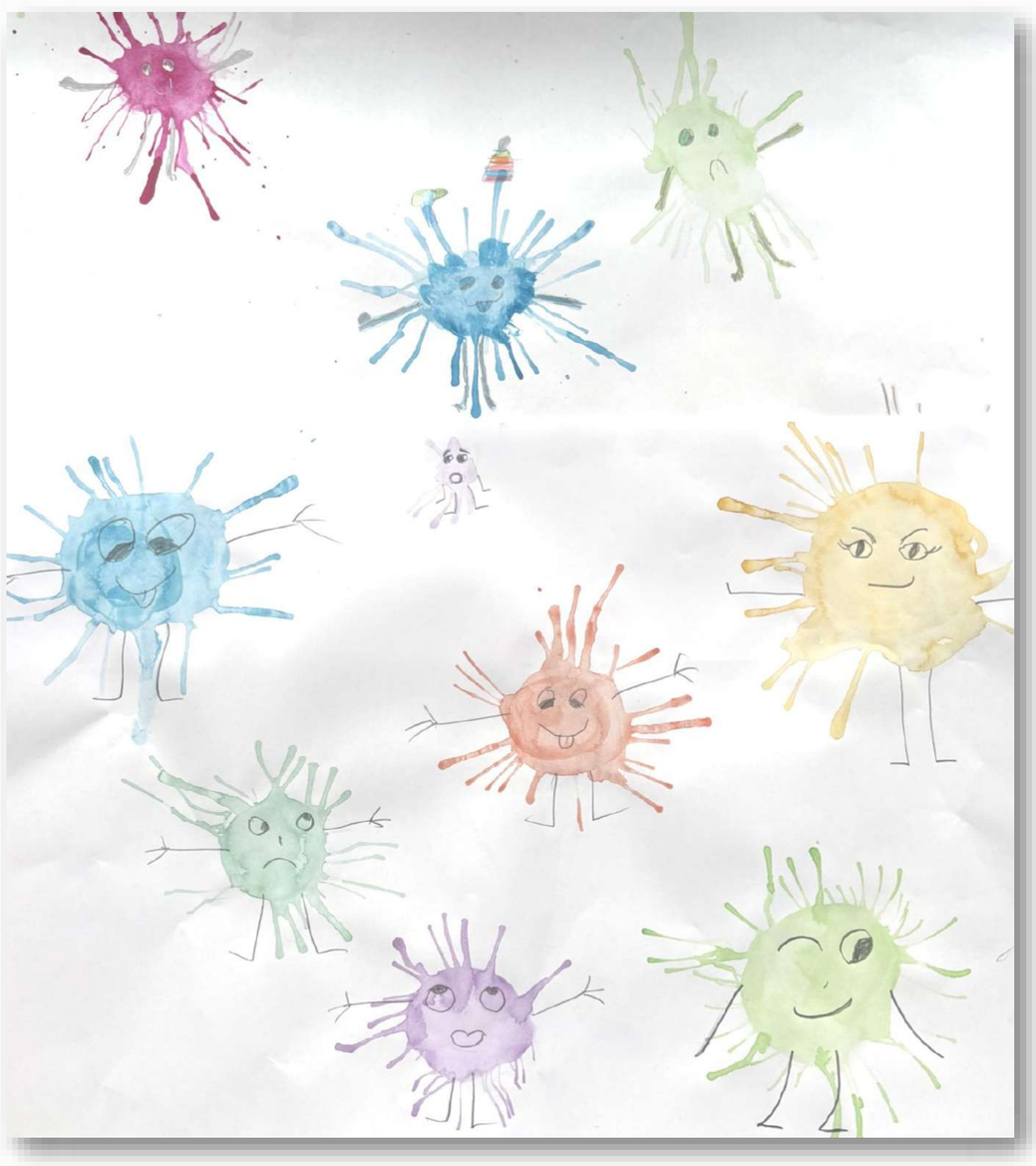
Kid Project

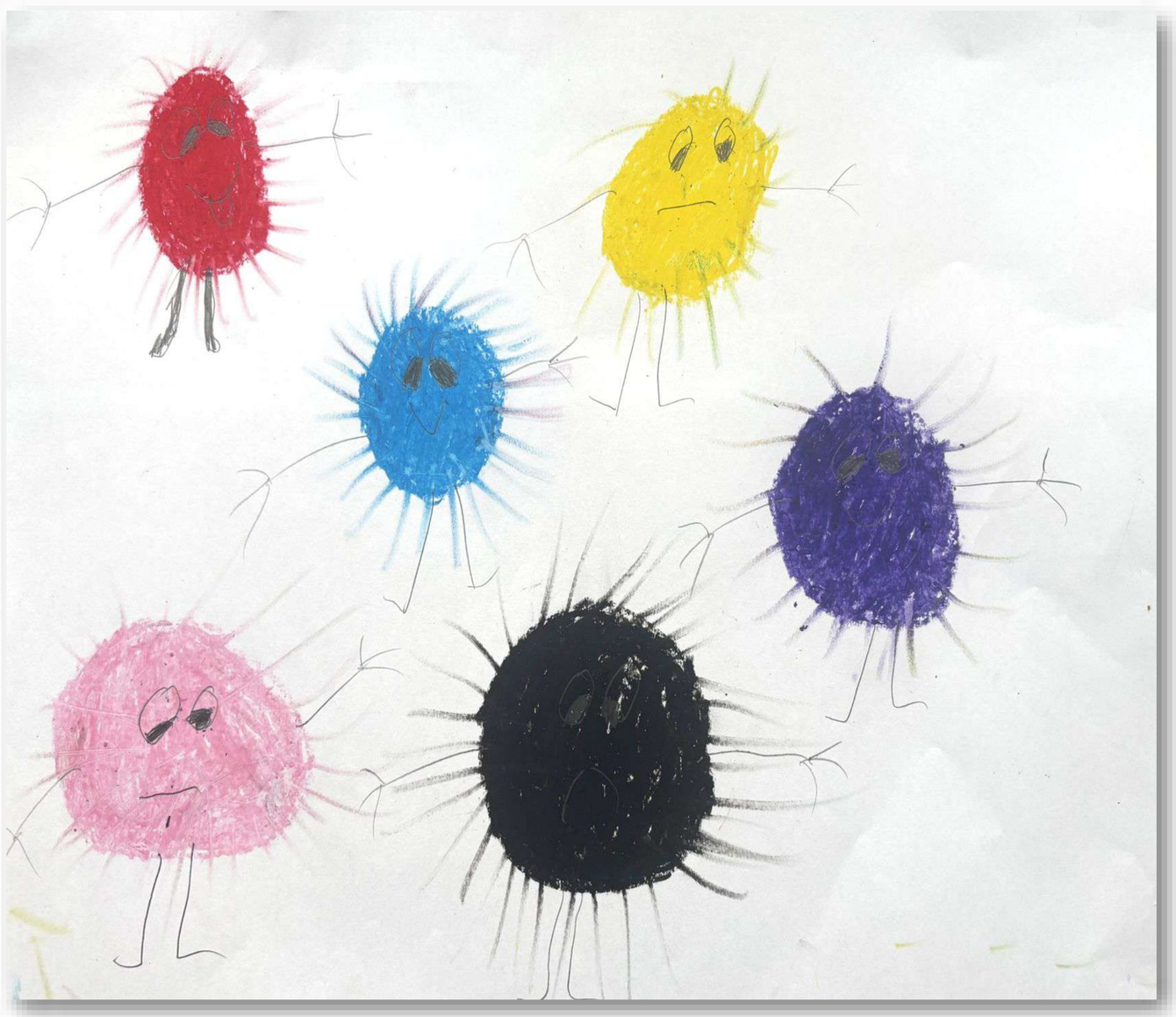
Author: Alexandru ROTEA

Student in 2ND grade

J

Drawing 1 made with watercolors: Tools used: water, watercolors, brush, white sheet, straw, pencil. It is done in the following way: with the brush, the desired color is taken, a round/oval shape is made, the brush is inserted into the glass with water and this time without being introduced into the color, only with water, the brush fills the created shape with water, quickly at this moment with the straw blow hard over the shape in all directions of the shape so that the colored water spreads in several directions creating linies. After it dries, with a pencil, each shape is giving a mood: of joy, of sadness, of amazement etc.





Drawing 2 made with wax crayons: Tools used: white sheet, wax crayons, cotton swab, pencil. It is done in the following way: with the wax crayon draw a round/oval shape on the white sheet, fill the shape well with the wax color, then with the cotton swab go from inside to the outside in all directions, thus creating lines. Finally, with the pencil, draw eyes, mouths, arms and legs of these shapes, giving them a mood: gratitude, love, joy, annoying, angry etc

Contact: deliiulia@gmail.com

King D. Bricks's Lego City

Student Project

Author: Crețan Eduard-Ioan

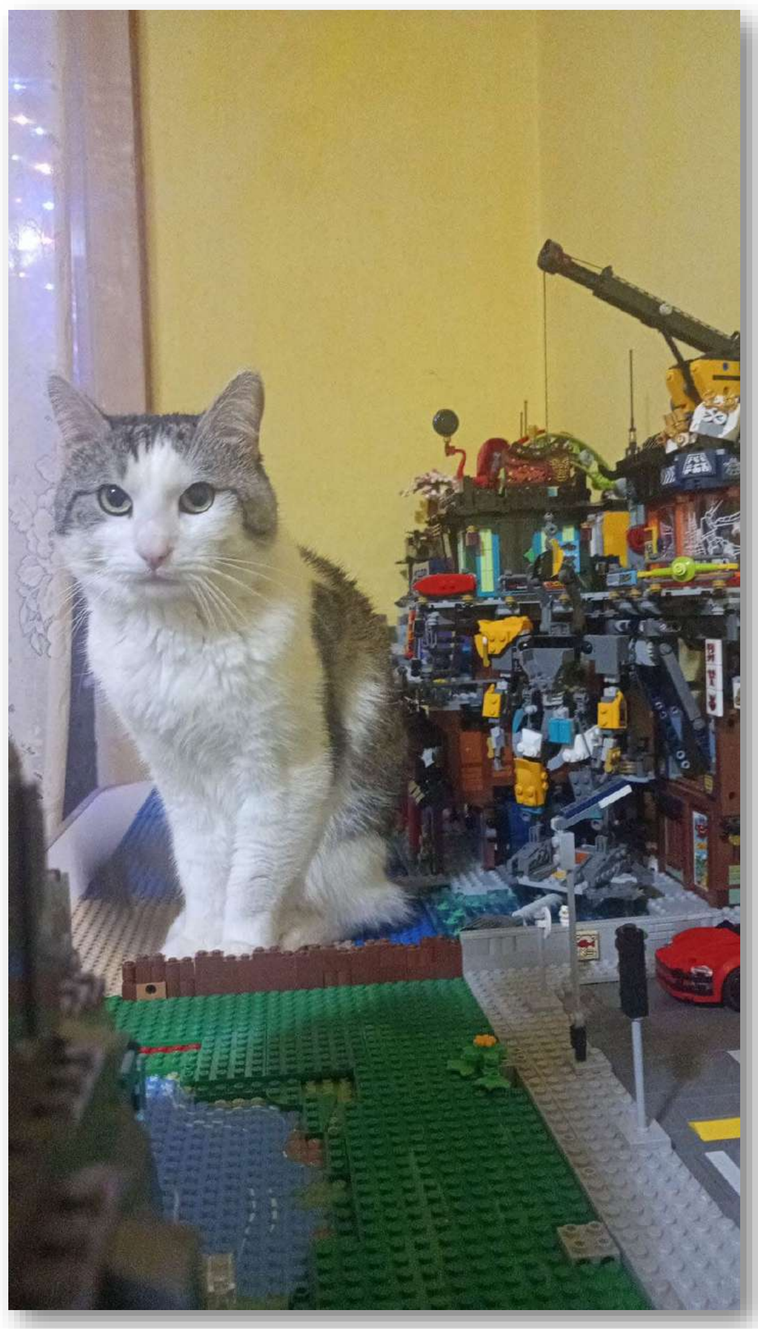
Mentor: Marius Dragomir

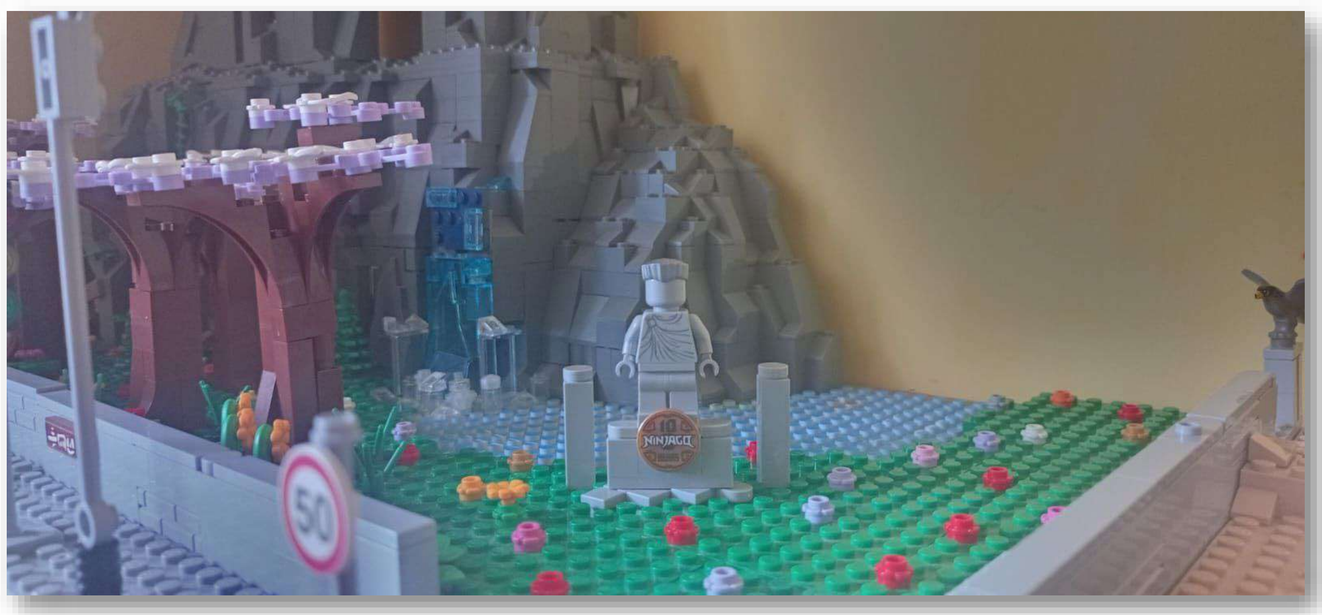
J

This Lego city is not like any other one, this one might be one of the biggest from Deva!

It could also be one of the most expensive ones so far, the city costs around 6k ron! I started this project in 2024 when I bought the Ninjago City Markets but it started to look close to the present one in 2025 when I bought the Ninjago City Workshops.

The plan for the city took like a month to make until I had one that looked good.





The city is split into 4 sections: the Ninjago city, the ocean, the forest with the mountain and the other side of the city that I tried to make it look like the New York from the Spiderman comics. The city has also a lot of easter eggs like: the Golden Weapons, Jabba's Palace, Zane's memorial and many others! The hardest thing that I have built in the city was the mountain that took 3 days to make and costs over 500 ron!

I also documented my progress on the city on the YouTube channel: @KingDbricks

Contact: cretan.eduard@gmail.com +40772207210

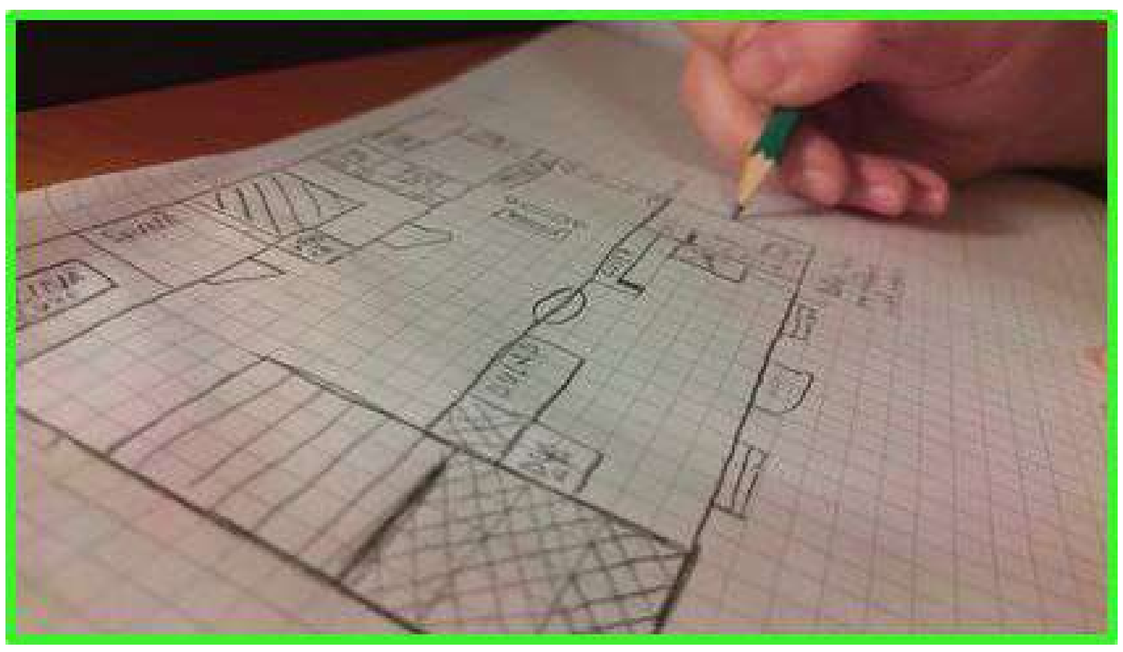
Kids Corner

I BUILD WITH THE AI
BETWEEN DRAWING AND COMPUTER GAMES

Author: Nicolae Ioan BLADA

I am a 13-year-old student from Deva, Romania, and I have a deep passion for construction, architecture, and computer games. My creative process begins on paper, where I draw detailed house plans by hand. To ensure my visions are technically sound, I use AI tools to verify their architectural correctness and construction feasibility.

Once the sketches are validated, I bring them to life in Minecraft, using my original pencil drawings as a blueprint. This workflow allows me to bridge the gap between imagination and reality, showcasing to my friends and peers the complete journey from a simple paper sketch to a fully realized 3D construction model.



In my work, I strive to integrate the principles of sustainable development into architecture, believing that the future of construction lies in creating smart, eco-friendly spaces that exist in harmony with our planet.

VIDEO

SCAN ME

Contact: sorin.blada@gmail.com

Presentation link: https://www.youtube.com/watch?v=RBlGcs2whjQ&t=28s

Goldfitt: Exercise Gamify for Elderly

Patent/project number:

Author/s: **Miss Titapa Simapichaicheth , Miss Celine Boonyanusasna**

J

Description

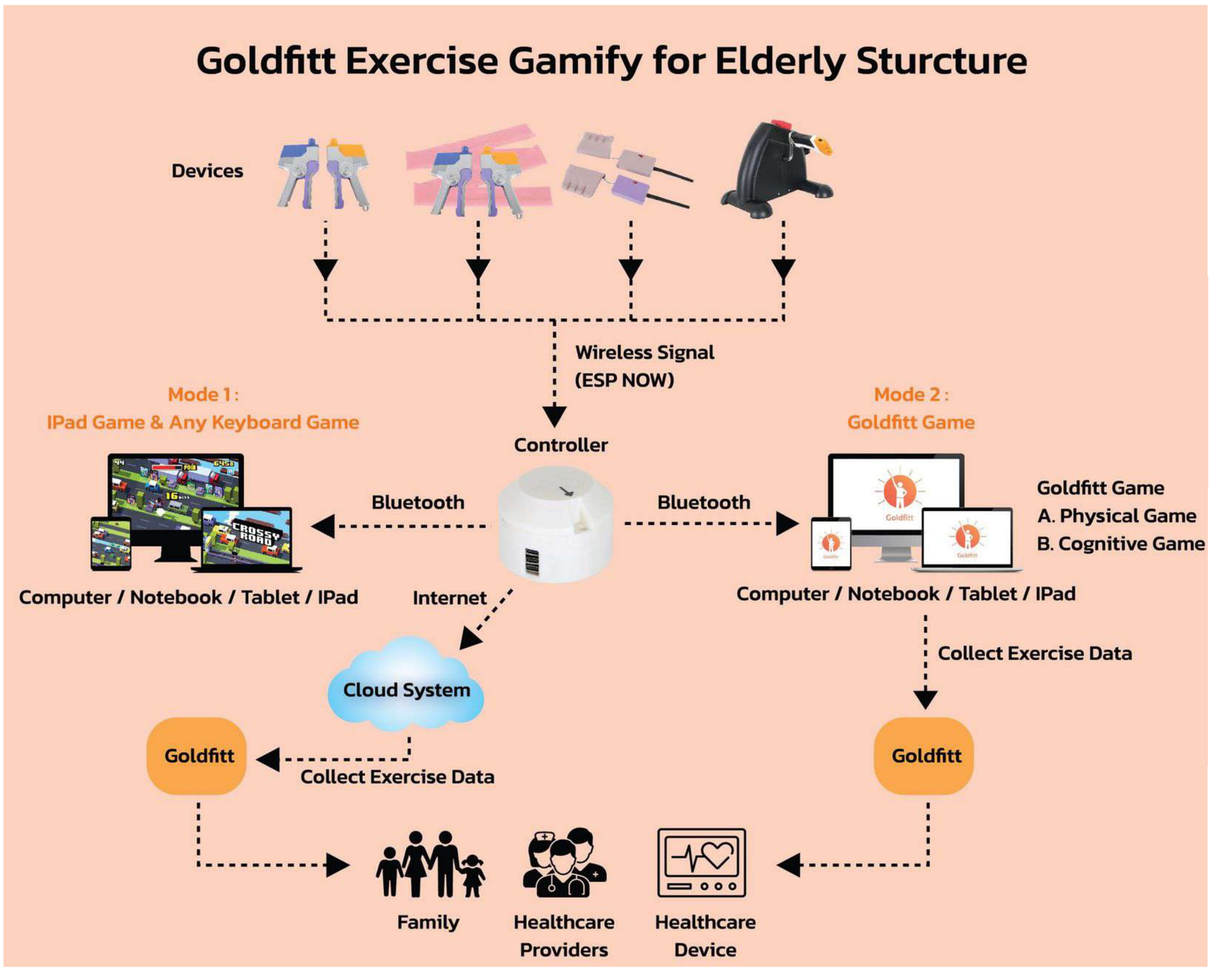
Goldfitt: Exercise Gamify for Elderly is an integrated gamified exercise system designed to transform resistance training into an enjoyable and motivating experience for older adults. The platform consists of three core components: adjustable exercise devices, a Bluetooth-enabled control box, and the Goldfitt Web Application.

The system includes four low-impact devices: hand compression trainer, string resistance device, finger dexterity trainer, and arm/leg bicycle. Each designed with adjustable resistance to accommodate varying physical abilities. Movements such as squeezing, pulling, or pedaling are translated into game commands through the control box, allowing users to exercise safely in a seated position while interacting with digital games.

The Goldfitt Web Application serves as the central intelligence of the system. Users can create profiles, set personalized goals, and adjust exercise intensity according to their physical level. During sessions, the application receives real-time movement data from the cloud database, including session duration, repetition counts, and progress comparisons against personal averages. This interactive dashboard provides immediate motivation for users and valuable monitoring insights for caregivers and healthcare providers.

By integrating physical exercise, real-time performance tracking, and engaging gameplay within a senior-centered interface, Goldfitt redefines exercise as accessible, measurable, and enjoyable for aging populations.

Pictures & graphics



Contact: 27claires@nist.ac.th, 2028bella.b@shrewsbury.in.th

MUVTIVATE

(Muscle and Movement Stimulation Versatility Tool – for Elderly)

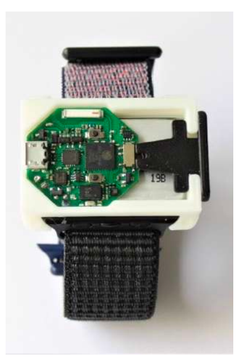
J

Authors:

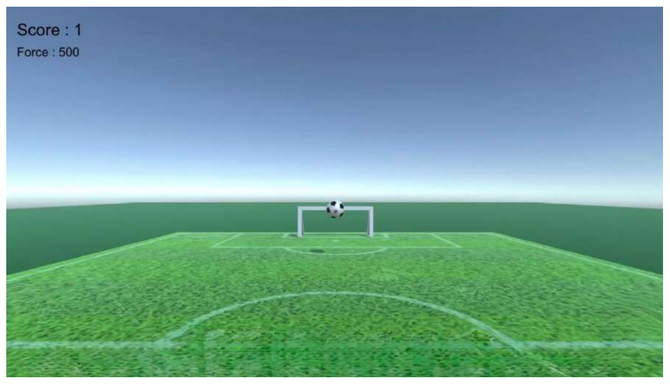
Chiratchaya Hemrungrojn ***Thipok Tungsiripat***

Siranat Tovikkai ***Nathasiri Tovikkai***

Muvtivate is a fun and portable exercise device focusing on bedridden patients and immobile elderly who mostly spend their time without movement until their muscles become fatigue. It aims to support elderly the chance to be able to stand up, continue to walk and overall improvement in health. Muvtivate features various biofeedback games and exercise programs targeting on different muscles that will be beneficial for the elderly. Muvtivate is practical to exercise anywhere and any times, even can be used in bed. The biofeedback games in Muvtivate intend to stimulate whole body joint and muscle movements with different actions and help users to exercise in various ways in order to do multi-task and control brain and muscles coordination to decrease the risk of falling. Health monitoring devices, i.e. heart rate monitor and pulse oximeter are installed on the biosensor to monitor users' health and safety and to keep track of users' progress and ensure the best results during practice.



Biofeedback Games for whole body exercise



Contact: Satit Chula Innovation Society, Bangkok, Thailand

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KING'S COLLEGE INTERNATIONAL SCHOOL
BANGKOK

KID PLEARN
(Kid Play and Learn)

J

Authors:

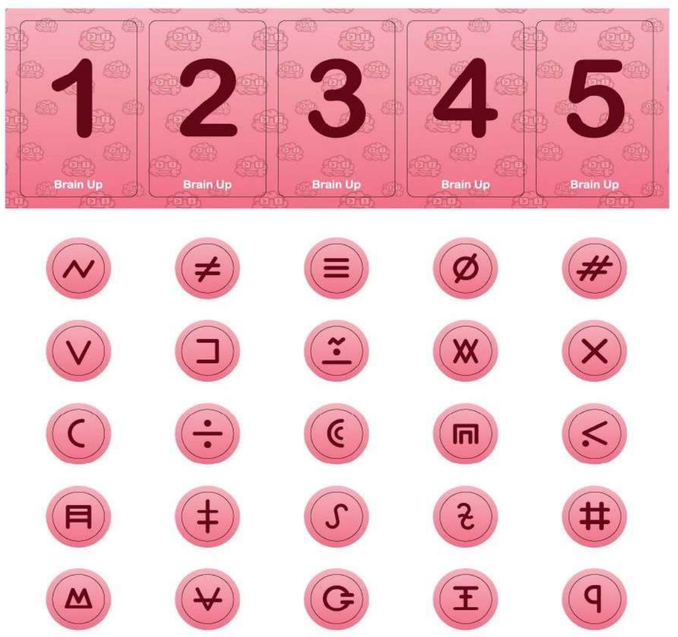
Chiratchaya Hemrungrojn ***Thipok Tungsiripat***
Siranat Tovikkai ***Nathasiri Tovikkai***

Kid Plearn is an innovative game for the new generation kids. It derived from traditional Thai folk children play combined with the neuropsychological science; the key aspects of the Stroop Test and the Digit Symbol Substitution Test. Kid Plearn consists of two games. The first game was designed to stimulate cognitive flexibility, processing speed and selective attention of the player by forcing the brain to override an automatic habit "reading the word, to instead name and the ink of color". The purpose of the game is to evaluate cognitive function, attention and the ability to resist distraction. The second game was designed for the players to remember the symbol corresponding to digits in order to measure and stimulate processing speed, attention, working memory and promote group playing.

To reduce children's issues on addiction to smart phone and online games is the main goal of this innovation because it caused several health problems, i.e. Pseudo attention deficit (ADHD), mental effect on violence, lack of EQ and social skill. Kid Plearn promotes various cognitive skills such as attention, memories, problem solving and social skill. Not only for Children, Kid Plearn can be adapted as a brain training exercise to enhance mental agility and help to prevent attention span loss from declining of cognition in elderly with fun activities.

Culture Game + Neuro Science + Technology = Kid Plearn

Pick the color
Do not read the word



Digit Symbol Substitution Test

Contact: Satit Chula Innovation Society, Bangkok, Thailand

PINTO Scent

A customizable multi-scented inhaler, inspired by mom's traditional Thai Pinto food container

Pinto Scent is **a next-generation customizable multi-layer aromatherapy inhaler** that integrates personalization, sustainability, and commercial scalability into a modern wellness solution. Inspired by the traditional Thai "pinto" (tiered lunch container) used by the inventor's mother, the product transforms cultural inspiration into an innovative modular aromatherapy design for contemporary lifestyles

PATENT PENDING NO.00943

J

PROBLEMS

Pinto Scent addresses the limitations of conventional aromatherapy inhalers, which are typically single-scent, disposable, and lack personalization. Consumers often need to **carry multiple inhalers** for different purposes such as relaxation, refreshment, or focus, **leading to inconvenience**, higher costs, and increased plastic waste.

From prototype to real product

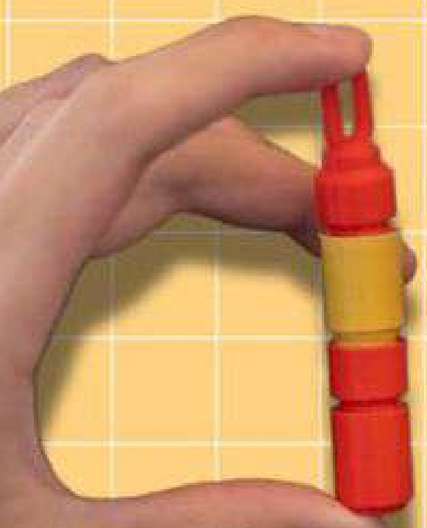
SOLUTIONS

INNOVATIVE IDEA INITIATION

The Pinto Scent is a stackable inhaler concept developed by Avi, inspired by the traditional **Thai Pinto food container** that her mother used to carry food offerings to the temple for monks.

Future Potentials

Pinto Scent demonstrates strong potential for global expansion in the wellness and lifestyle market. Future development may include eco-friendly materials, expanded scent collections, limited-edition collaborations, and scalable international distribution. The design patent has been filed, and the product is **commercialized in collaboration** with Multiply by Eight Co., Ltd. (X8), Thailand, under the name **"Pastel Creative Pinto Refillable Pocket Inhaler Case."**



Mix&Match

Awards

8 International awards

2 National awards

SUPPORTED BY:

FOR MORE INFORMATION

SCAN ME

Commercial Scalability

INVENTOR

Contact: Satit Chula Innovation Society (SCIS)

BOLD FIT ECOSYSTEM

Bold Fit Ecosystem transforms school environments into active fitness ecosystems by integrating exercise infrastructure, AI motion analysis, and data-driven health monitoring.

Thipok Tungsiripat, Thiraphat Srichit, Jiratchaya Hemrungrojn, Tin Tuchinda, Pantach Tuchinda, Setthapong Mahattanak*
*Pataraphol Vanichvatana, Thavinn Uttamoat, Hanafee Yeesunsong***

ABSTRACT

Physical inactivity is a major global health challenge and a leading risk factor for non-communicable diseases (NCDs) such as cardiovascular disease, diabetes, and obesity. Schools represent a critical environment for promoting lifelong healthy behaviors; however, traditional physical education programs often lack continuity and opportunities for daily engagement.

The Bold Fit Ecosystem is a school-based sport science innovation that transforms ordinary school environments into active fitness ecosystems. The system integrates functional exercise stations including pull-ups, push-ups, squats, and stair climbing with AI-based motion analysis and a digital fitness dashboard to enable real-time monitoring of student activity and performance. By combining accessible exercise infrastructure, data driven monitoring, and behavioral motivation, Bold Fit provides a scalable model for increasing youth physical activity, improving physical fitness, and contributing to the long-term prevention of non-communicable diseases.

GLOBAL HEALTH PROBLEM

Physical Inactivity & NCD Burden

74% of global deaths caused by NCDs - WHO (2020)

1 in 4 adults worldwide insufficient physical activity - WHO (2018)

Children and adolescents should perform **at least 60 minutes** of physical activity daily - WHO (2020)

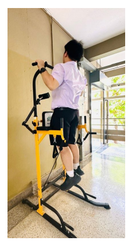
Active School Health Ecosystem are key environments for establishing lifelong physical activity habits among youth.

INNOVATION HIGHLIGHTS

- Ecosystem-based school fitness model
- Use of existing school facilities
- Integration of sport science and digital monitoring
- Data-driven tracking of student physical activity
- Behavioral motivation and student engagement

BOLD FIT ECOSYSTEM MODEL - Active School Environment

Exercise Stations



Pull Up

Upper Body Strength

Push Up

Muscular Endurance

Squat

Lower Body Strength

Stair Climbing

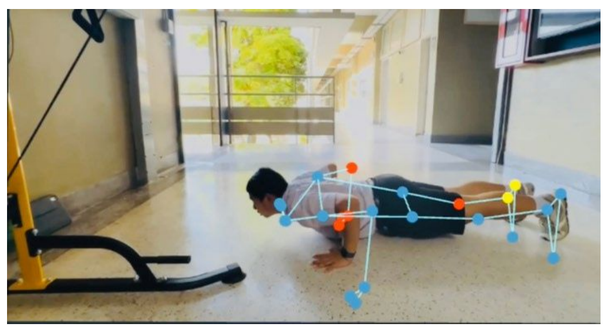
Cardiovascular fitness

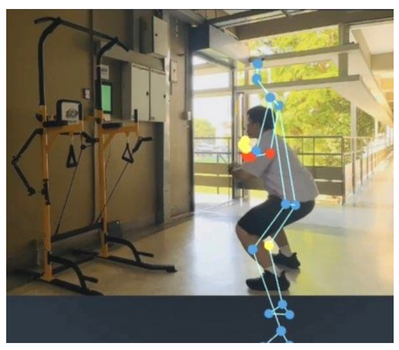
EXPECTED OUTCOMES

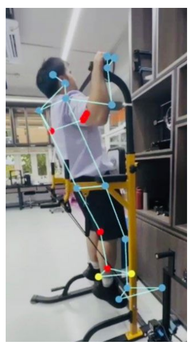
Daily physical activity
Improved physical fitness
Student Engagement - "Fit is Identity"
Long-Term NCDs Risk
Scalable school model:
Pilot 1 (School) → Expansion → Nationwide

AI Motion Analysis

Computer Vision & Skeletal Analysis







Data & Gamification Engine

Fitness Dashboard

- Progress visualization
- Physical fitness indicators
- Peer Motivation
- Regular activity participation

GLOBAL HEALTH IMPACTS

Please scan for more information

REFERENCE

World Health Organization. (2018). Global action plan on physical activity 2018–2030.
World Health Organization. (2020). WHO guidelines on physical activity and sedentary behavior.
Lee, I. M., et al. (2012). Physical inactivity and major non-communicable diseases worldwide. The Lancet, 380(9838), 219–229.
Centers for Disease Control and Prevention. (2020). Physical activity guidelines for children and adolescents.

Contact: *gaothipok@gmail.com, **Hanafee.Y@chula.ac.th

Epu-KAMi

J

Kid Project

Author: Bordan Kamelia; Mentor Silvia SCORTESCU

Epu-KAMi The innovative product, for bunnies made of natural fabric. Our family has a tradition of raising white bunnies, our grandparents inherited this business. Innovative is the slim, comfortable tank top.

Contact: silvia.scortescu@yahoo.com

KAPI-TANi

Kid Project

Author: ***Eșanu Tatiana; Mentor Silvia SCORTESCU***

J

KAPI-TANi children's pijamas based on storage and made of eco-friendly cloth, on the outside is with a pocket where the Kapibara toy sits in the pocket, in the toy is attached a medicinal magnet that treats blood pressure and headaches.

TouchA : Exploring Personal Boundaries and Safety with Fun

Patent Number: 000825060

Authors: Khansaa Mariska Dalis, Ladija Syifa Ichizuna, Hanahumaira Zafrani Hanan, Janita Lituhayu Rustono,
Indah Vintia Carissa (SMP Thursina IIBS)
Mentor : Risa Nur Fitriyana, S.Psi

TouchA is an inclusive multisensory memory-based game designed for children aged 4-8, with a special focus on teaching personal boundaries and safety. This wooden memory game integrates interactive activities with peg dolls, question cards, and colorful tokens to create a fun and engaging learning experience.

Developed using the ADDIE model, TouchA encourages children to explore safe and unsafe touch, personal space, consent, and trusted adults through hands-on play and structured discussions. The game is particularly beneficial for children, including those with Autism Spectrum Disorder (ASD), as it leverages tactile and visual learning to support comprehension and social interaction.

With a balance scale and reward system, TouchA reinforces positive learning behaviors while making education an enjoyable and meaningful experience. By combining playful learning with essential life skills, TouchA aims to empower children with knowledge and confidence to navigate social interactions safely.

Game Components

- 1 Wooden Box with 24 Peg Dolls
- 60 Cards in Six Categories:
  1. Personal Space Cards (Blue)
  2. Safe vs. Unsafe Touch Cards (Pink)
  3. Private Body Parts Cards (Yellow)
  4. Safety Rule Cards (Red)
  5. Consent Cards (Purple)
  6. Trusted Adults Cards (Turquoise)
- 24 Colorful Ring Tokens
- 1 Wooden Balance Scale
- 1 Sand Timer
- 1 Game Manual

4+

1 or 2

40min

Gameplay

- **Draw a Peg Doll :**
  The player draws a random peg doll from the box. The color of the peg doll determines the type of card they must draw (e.g., a blue peg doll corresponds to a Personal Space card).
- **Draw a Card :**
  The player picks a card from the matching deck and completes the activity.
- **Earn Tokens :**
  For correct answers, thoughtful participation, or completing the task, the player earns a colorful ring token.
- **Share and Learn :**
  After completing the challenge, the facilitator or other players discuss the lesson from the card.
- **Next Player :**
  Pass the turn to the next player.

strengths &limitations

• Multisensory learning • Structured gameplay • Reinforcement • Engagement	• Small sample size • Short-term observations • Need for simplification • Limited customization

Validated by Psychologyst

Validated by Table Game Expert

conclusion

TouchA is a promising educational tool for teaching personal boundaries and safety to children, especially children with ASD. It integrates play and sensory engagement, creating a positive learning environment.

Contact: thursina24.khansaa2@gmail.com

references

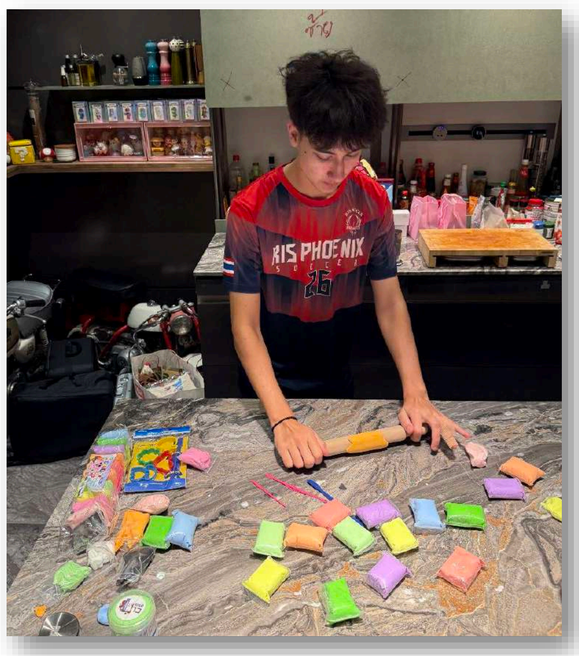
Dee Dough - “Clean, Safe, Creative Play”

Pornprapat Jirapojaporn
and Napisa Laipanya

J

DeeDough, clean, safe, creative-play is a unique, science-inspired modeling dough infused with benzalkonium chloride, making it both safe and innovative for creative play. The embedded benzalkonium chloride provides natural antimicrobial properties, helping to keep the playdough cleaner by reducing bacteria growth, making it a hygienic option for kids and adults alike.

Despite this infusion, the dough remains soft, malleable, and easy to shape, allowing for endless imaginative possibilities. Its antimicrobial nature also makes it ideal for educational activities, promoting a cleaner and safer play experience. Non-toxic, non-staining, and packaged for long-lasting freshness, Deedough is a perfect blend of creativity and safety, bringing a modern twist to a classic hands-on activity.



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SCIS SATIT CHULA INNOVATION SOCIETY THAILAND

Clairevi Bee

Personalized Modular Lipstick for Beauty on the Go

Patent pending number: 01044

Authors: Avieka Khlaisang, Patsarun Rawangban, Jeerasak Jitrotjanarak

J

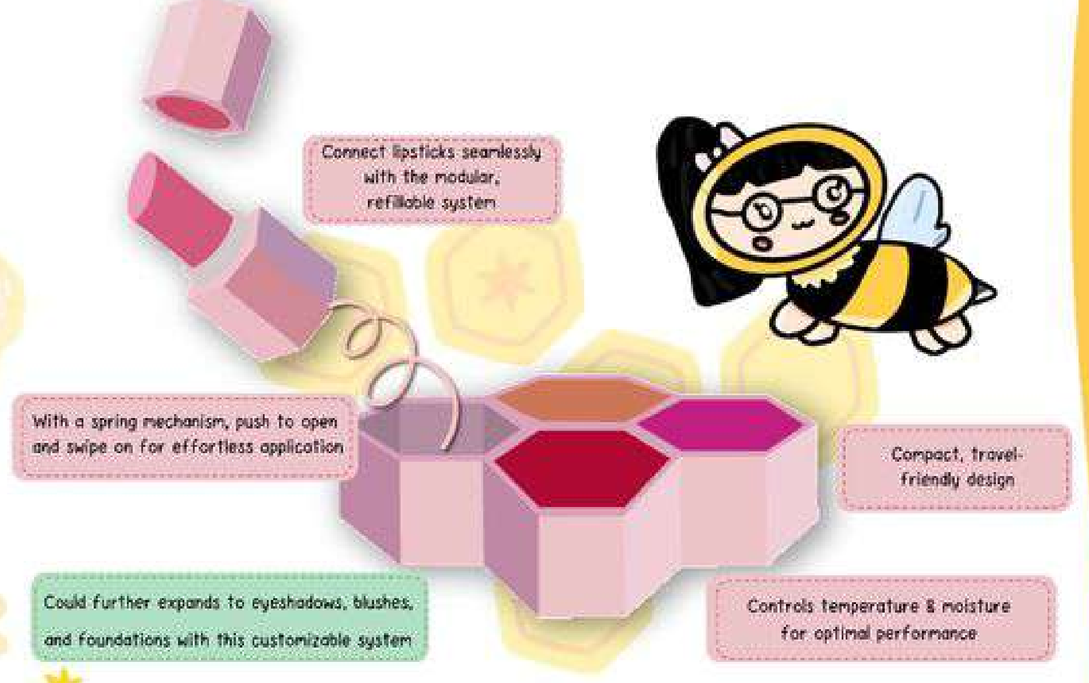
A **smart modular lipstick system** inspired by the **beehive**, designed for **on-the-go beauty lovers**. With **interchangeable, refillable packaging**, it enhances **organization, travel-friendliness, and sustainability**. Expanding to **eyeshadows and blushes**, it promotes **convenience, creativity, and eco-friendly** beauty routines.

Problems

Lipstick boosts confidence and self-expression, with **70% of women using it daily and 65% feeling more confident at work.** The market will hit **$11 billion by 2025**, but managing multiple shades causes **messy storage and extra spending.** Women need a **practical, organized, and travel-friendly** solution.

Solutions

Clairevi Bee is a **smart, modular lipstick system** for **on-the-go beauty lovers.** Inspired by the **beehive**, it enables **mixing, matching, and refilling** shades effortlessly. With **eco-friendly packaging** and plans to expand to **eyeshadows and blushes**, it offers **personalized, convenient, and sustainable beauty.**



Easy 4-Step Beauty Routine

FUTURE POTENTIALS

- **AI Shade Matching** – Recommends colors based on skin tone.
- **Upcycling Program** – Recycles used pods for discounts.
- **Sustainable & Inclusive Beauty** – Promotes eco-friendly beauty (SDG 12), clean beauty, women empowerment, and innovation (SDG 3, 5, 9).

INVENTORS

Avieka Khlaisang

Patsarun Rawangban

Jeerasak Jitrotjangrak

ADVISOR

SCAN ME

3 GOOD HEALTH AND WELL-BEING · 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE · 5 GENDER EQUALITY · 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Contact: Satit Chula Innovation Society (SCIS)

Email: scis.cud@gmail.com

Passion through color

Kids Corner

Kid Project

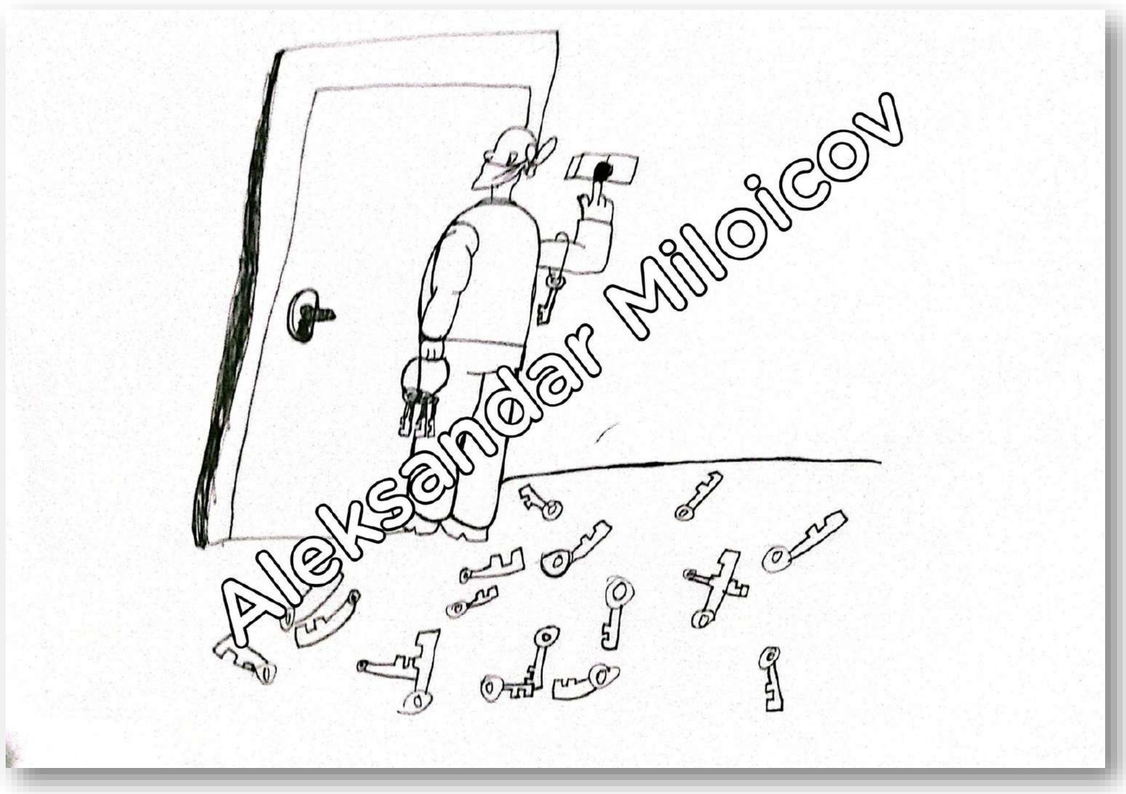
Author: *Aleksandar MILOICOV*

J

I am a first-grade student at the "Nikolaus Lenau" Theoretical High School in Timisoara, I express my creativity and imagination through drawing, transforming each work into a visual story full of emotion and color.
🎨 My passion for art was shaped under the guidance of the renowned master of caricature and graphic art, Professor/Mentor: Ștefan Popa Popa's, who inspires his love for detail and expressiveness.
💡 Talent, passion and vision - these are the words that define my artistic journey and imagination has no limits!

Techniques used:

- ***doodle-art/graffiti with thick outlines and intense colors. The techniques involve markers, watercolors or digital illustration with vibrant chromatic palettes.***
- ***black and white sketches, made in a minimalist style, with a fine-tipped pen or black ink. The composition plays on the idea of distorting shapes, inspiring surrealism and conceptual drawing.***
- ***markers or watercolors, using thick outline lines and bright colors, with a strong contrast between the background and the character.***
- ***surreal drawing, made with a fine liner or black ink pen. The unusual perspective suggests a conceptual game between reality and imagination.***
- ***made with markers and black ink, the thick outlines and the overlapping of elements creating an intense visual effect.***
- ***Illustration made with watercolors or markers, with a naive style and clearly delimited chromatically, probably symbolizing relaxation and nature.***



Kids Corner

HOME REPAIRS

J

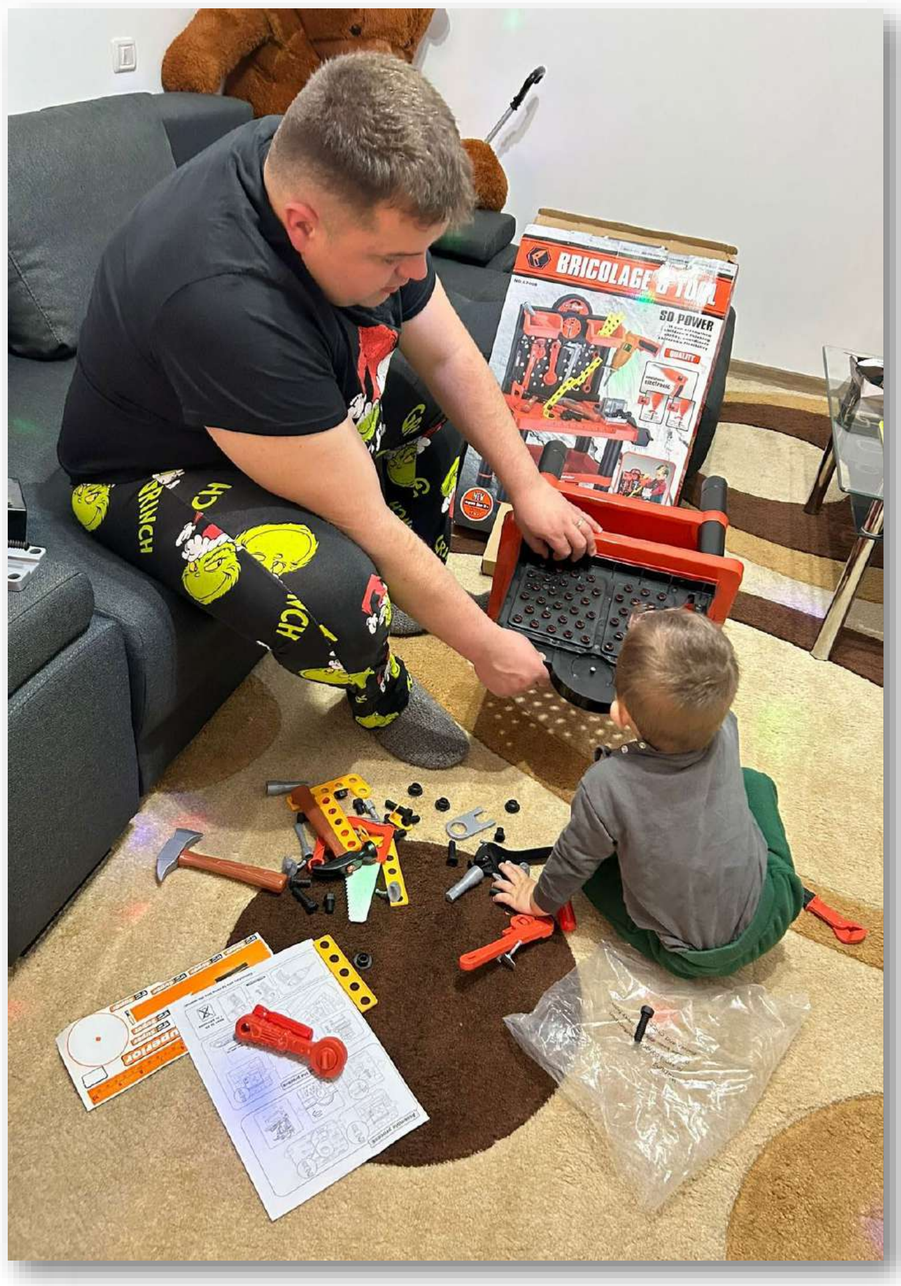
Kid Project

Author: *Sebastian Andrei ANGHELONI*

Sebastian Andrei is a little boy who just turned two years old! From an early age, his parents discovered his immense passion for cars and the tools needed to repair them.

We can see in the following photos his interest in everything that has four wheels. He stands next to his father when he repairs cars.

We, his parents, already know the field we will train him to follow!



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ST. PATRICK SCHOOL
of Quezon City

ECDO

Exploration and Clean up in the Deep Ocean

CARIE the Marine Patroller
A Solar-Powered,
Autonomous Marine Tracker

Student Project

Authors: St. Patrick School of Quezon City Robotics Elite Team
Cristina Gabrielle R. Cacho, Maridette Drannel M. Baylon,
Kyoshiro B. Mata, Jin Kyle B. Ventura

J

The ocean is one of the most prominent sources of transport, trade, food, and energy, but fast growth in human activities has caused massive stress in the marine ecosystems, resulting in overexploitation of biodiversity. In order to face up to this challenge, the Solar Powered Submarine Championing Advocacies to Reinvent the Seas (SPS - CARES), named Carie, offers a sustainable solution to several oceanic issues. Carie uses LEGO Spike Prime parts to portray how she will detect and respond to marine pollution, coral degradation, and even discover endangered and new species.

Carie the Patroller is a multi-purpose submarine that aims to help the ocean bounce-back by reducing its stressors through advanced technology. Carie is equipped with LEGO Spike Prime color sensors that help show how she can adapt and respond to her environment with actual Artificial Intelligence.

The study highlighted that CARIE the Patroller has great potential to improve marine conservation through sustainability, stewardship, resilience and innovation. By using CARIE in environmental education, students become more engaged and develop a sense of sustainability**.**

Oil Vacuum is a vac that sucks in oil spills. Carie's Oil Vacuum operates without releasing any absorbent material externally. Instead, it internally uses hair nets to absorb the oil spill as it is suctioned in.

Coral Frames Carie has the ability to release coral frames; artificial structures in marine environments to support coral fragments for growth. They should be constructed from materials like metal or PVC, to ensure these frames provide a stable platform for the corals.

The **Sea Net** is made of beams attached to one another. Four beams were used to hold the *Nylon net* in place. The Sea Net functions as a waste collector; especially plastic waste. After the utilization of the Sea Net, the waste will go to the sorting facility. The waste will be sorted and delivered to organizations that will put them into better use.

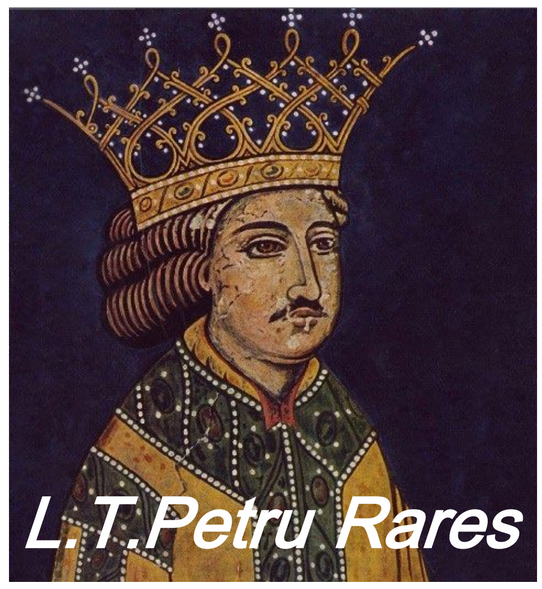
In demonstration for the **sorting facility**, we used LEGO parts and color sensors to present the detection and segregation of various types of waste. Each category of waste is associated with a specific color, and the robot is programmed to recognize these colors and sort the waste accordingly.

Our CARIE video presentation

SCAN ME

Contact: *angelmatasps@gmail.com*

Recycling of polypropilene pipes and new technologies



Author/s: Damian Covali, Neamtu Lilian
Mentor: physics teacher Ciuvaga Victor

J

The project involves creating two innovative products: a bicycle and a smart lamp, both made from polypropylene (PVC) pipes. The material was chosen because it is durable and has a lower environmental impact. The main goal of the project is to improve cyclist safety and reduce electricity consumption using Arduino technology.

This project was chosen because of the high number of accidents involving cyclists. The bicycle will include 360° sensors and a smart lighting system to increase visibility. The smart lamp will adjust its light intensity based on the surroundings, optimizing energy consumption and providing a sustainable solution.

Welding the frames: The PVC pipes will be welded together to form the frame for both the bicycle and the lamp.
Cutting plywood boxes for the Arduino circuit: Plywood will be cut to create boxes for housing the Arduino circuit and components.
Focusing on aesthetics: The final step involves adding design elements to make the products look appealing.

Pipe welding machine: To join the PVC pipes securely.
Arduino circuit system: For controlling the sensors and smart lighting system.
CO2 CNC laser: For precise cutting of plywood boxes and other components.

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Automatic Pill Dispenser with Modular Time-Trigger System

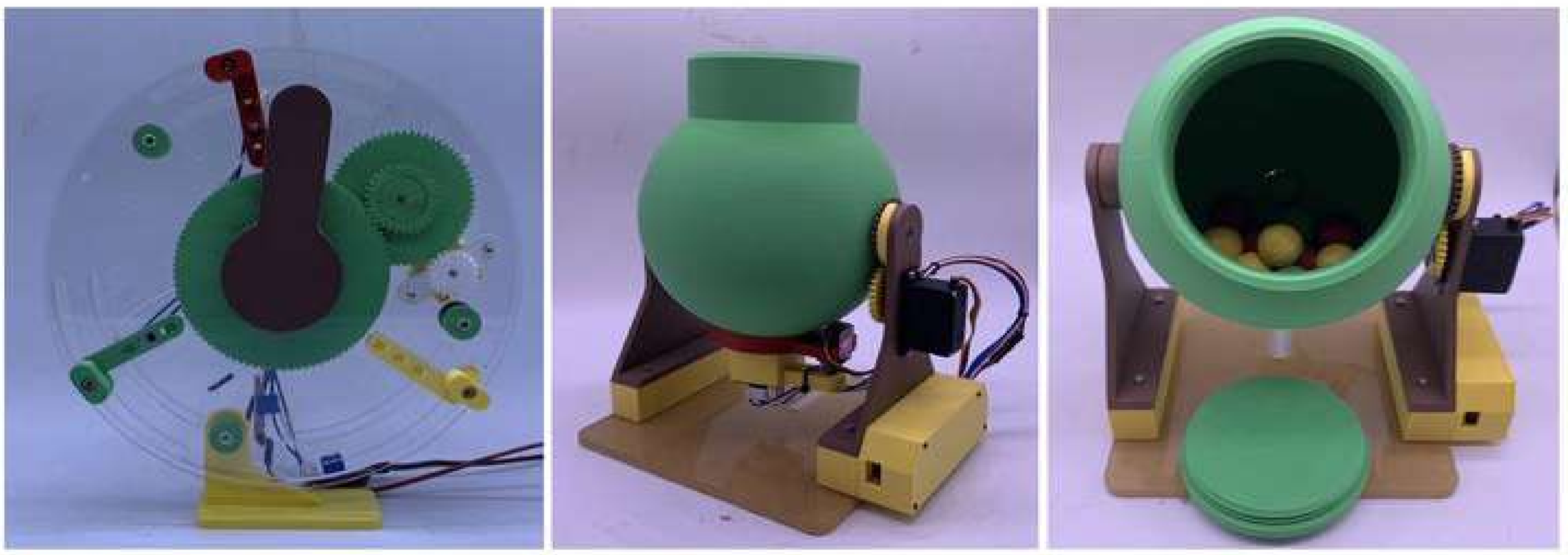
project number: 5

Varanpat Chuaysuk

Advisors: Parinton Jangtawee, Kaewkan Yambangyang, Jeerasak Jitrotjanarak

J

This project introduces an automatic pill dispenser designed for elderly users, featuring a simple mechanical clock that triggers at set times. Users set the schedule by placing three pins on the clock, eliminating complex programming. At the scheduled time, a color-coded pill ball, representing a specific meal, is ejected for easy access. The modular design allows the clock to control other automated tasks, such as plant watering or pet feeding. This system enhances medication adherence while maintaining simplicity and adaptability for various time-based activities.



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ISIM
TIMIȘOARA
National Research & Development Institute for Welding and Material Testing - ISIM Timișoara

SIGNALING KIT FOR THE POSITION OF A LOST OR DISTRESSED PERSON IN NATURE

J

***Patent application* No. A2024 00455 / 01.08.2024**
***Authors:* Nicușor-Alin SÎRBU and Aurelia-Ioana BIHOLAR**

It is a known fact that while carrying out activities or traveling in the wild, in remote and inaccessible areas, by people alone or lost, situations may arise that endanger the health or even life of the person concerned. Identifying the position of the person in distress in such situations so that emergency assistance and the necessary help can be given is a first emergency.

Object of the invention:

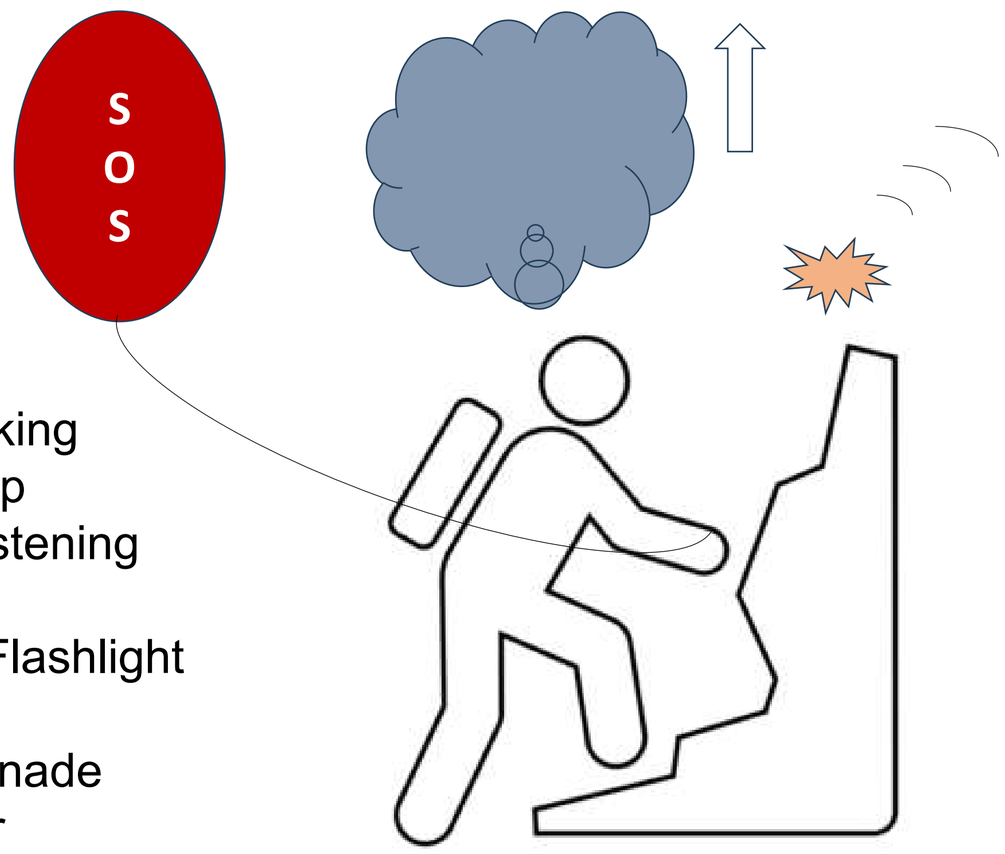
The invention relates to a portable kit attached to the belt or to the shoulder strap of a rucksack, useful to a person who is lost or in difficulty in nature due to exhaustion, disorientation or injury (in the mountains, in valleys, in difficult-to-access ravines, in bush areas, in deltas, lakes, the sea or stretches of water) and who has to signal his position in order to be helped. The kit shall be of simple, lightweight, versatile, inexpensive construction and shall comprise at least one means of long-lasting visual signaling with an inflatable balloon, one means of short-lasting smoke visual signaling, one means of loud audible warning, one means of repetitive audible signaling and one means of night-time light signaling.

The technical problem solved by invention:

The technical problem of the invention is to make a kit for signaling the position of a person lost or in difficulty in nature which is lightweight, easily attachable to the wearer's equipment and without embarrassment, easily accessible and maneuverable, allowing various visual and acoustic signals both day and night, and very affordable in price.

Kit overview, composition and how to attach and wear

1. Textile backing
2. Elastic strap
3. Hole for fastening
4. Whistle
5. Launcher-Flashlight
6. Cartridge
7. Smoke grenade
8. Firecracker



Schematization of the use of the elements of the kit by a person in difficulty

Advantages:

- is of the utmost simplicity, easy to attach to the harness and easy to wear;
- it is very versatile and easy to use;
- it is very cheap.

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Kids Corner

MODELSHIPS

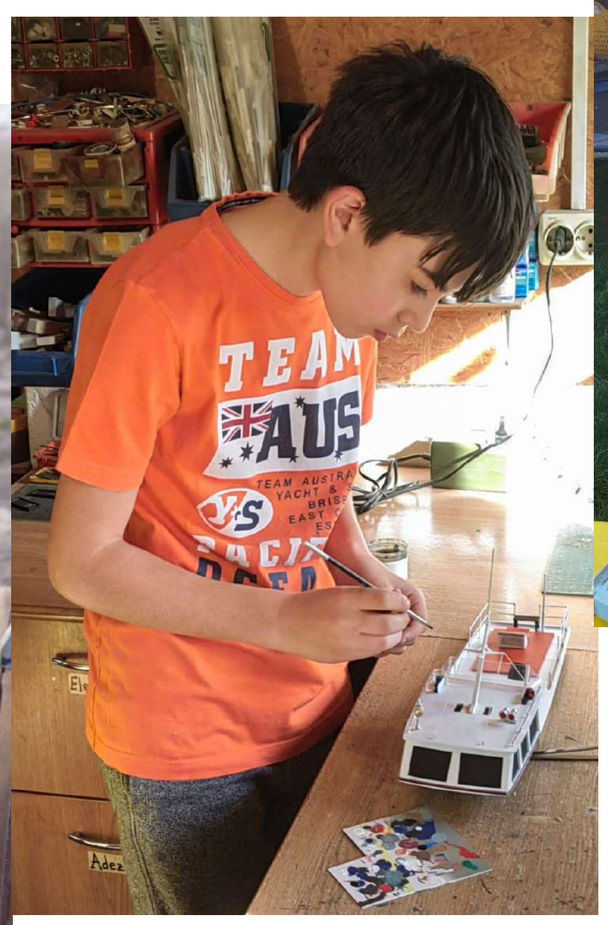
Authors: Calugar Sebastian, Calugar Damian,
Popa Albert,Popa Robert
Mentor: Coach Popa George

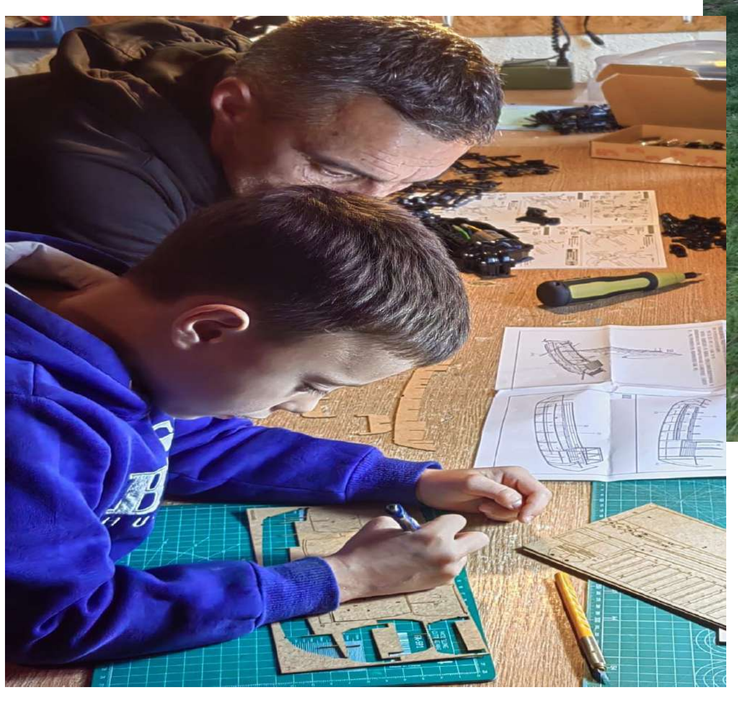
J

This sport raises juniors' technique abilities and skills by transposing into practice what they are learning during classes.

In 2023 the newly born section has brought very good results. Popa Albert and Popa Robert have won the National Champion titles in NS and C classes and one bronze medal at World Championship, class C at Jablonec, Czech Republic.

The model boats presented by them are remote controlled and they were built either from scratch or by using assembly kits, under the master's supervision, multiple national and world champion, Popa George.





Contact: https://www.facebook.com/geo.popa.754

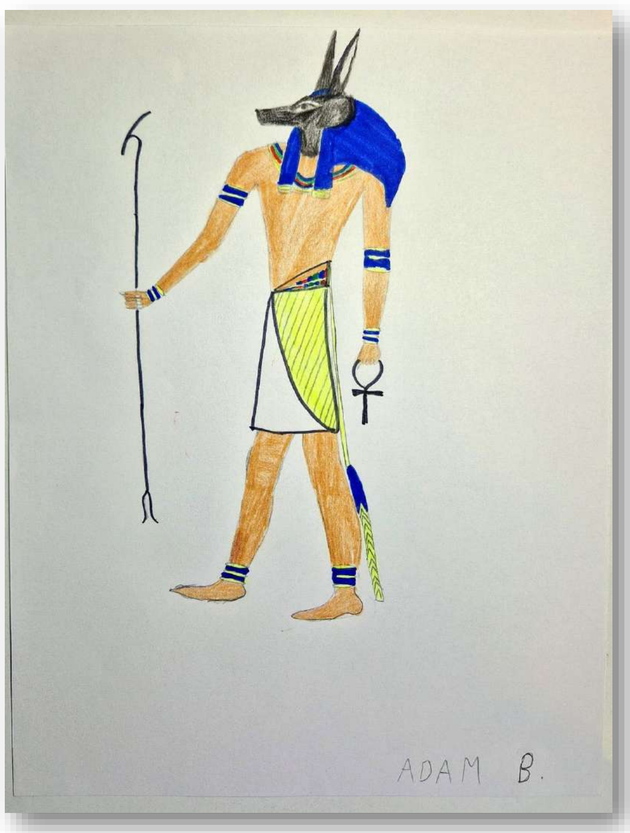
ADAM's COLORS

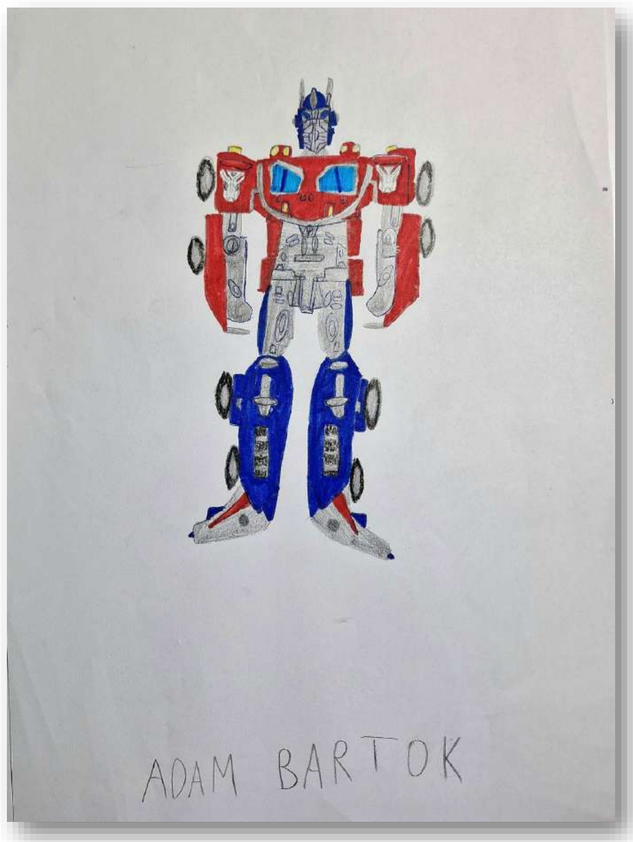
ADAM BARTOK

Adam is a 7 year old child who loves to draw. He draws almost anything that arouses his interest, but he prefers to draw movie or cartoon characters. Some of the drawings are made after a model seated in front of him and others are made from his imagination. He prefers to work mostly with colored pencils and he spends at least 2 or 3 hours drawing every day.

J

Drawing with colored pencils / Drawing on paper / Children's drawing





Contact: iulia.bartok@gmail.com

Kids Corner

On the wings of music

Kid Project

Author: Mihai FODOR

J

My name is Mihai Fodor, I am 8 years old and I am a student at the "Decebal" National College in Deva. I really like dancing and singing. I consider music to be a way of expression, but also of relaxation. Although I spend a lot of time training, because I always try to be better, everything is a pleasure for me. Music brings me joy every time. I feel like a real artist on stage and I want to learn as much as possible about dance and music.

Mă numesc Mihai Fodor, am 8 ani și sunt elev la Colegiul Național „Decebal” din Deva. Îmi place foarte mult să dansez și să cânt. Consider că muzica este un mod de exprimare, dar și de relaxare. Deși petrec mult timp pentru a mă antrena, deoarece încerc mereu să fiu mai bun, totul este pentru mine o plăcere. Muzica îmi aduce bucurie de fiecare dată. Mă simt ca un adevărat artist pe scenă și vreau să învăț cât mai multe despre dans și muzică.

Kids Corner

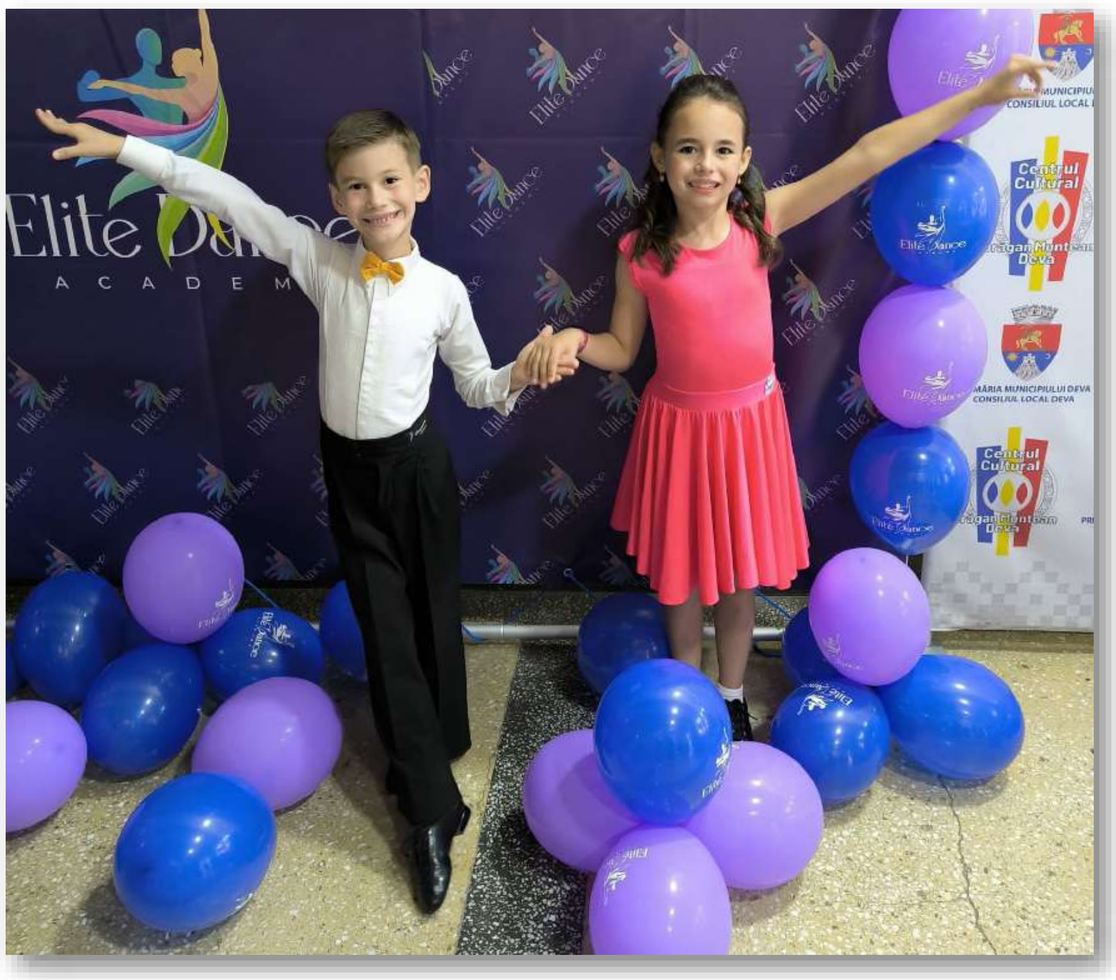
IN DANCE STEPS

Kid Project

Author: Maria FODOR

J

My name is Maria Fodor and I am 10 years old. I am a student at the "Decebal" National College in Deva and I am very passionate about dancing. I discovered the charm of dancing at the age of 5. With a lot of work and passion, I have evolved and I like to always improve myself. Alone or with other friends, on the dance floor I am always happy. I wish I could convey the same joy to those who watch me when I am on stage.



Mă numesc Maria Fodor și am 10 ani. Sunt elevă la Colegiul Național „Decebal” din Deva și sunt foarte pasionată de dans. Am descoperit farmecul dansului de la vârsta de 5 ani. Cu multă muncă și pasiune, am evoluat și îmi place să mă perfecționez mereu. Singură sau împreună cu alți prieteni, pe ringul de dans mă sunt de fiecare dată fericită. Îmi doresc să pot transmite aceeași bucurie și celor care mă privesc atunci când sunt pe scenă.

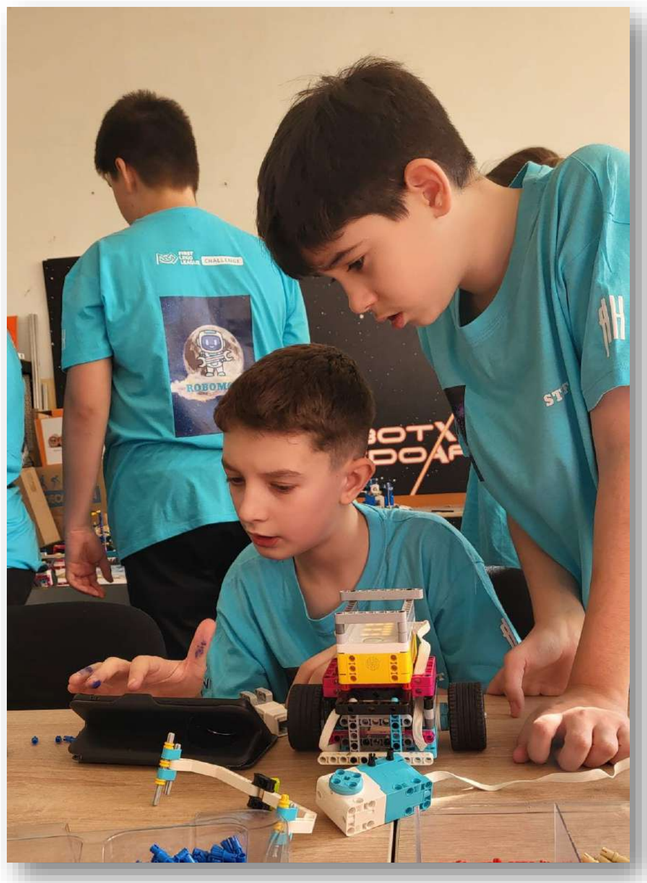
LEGO by ROBOMOON

Authors: ROBOMOON Team

Mentors: Sîrba Corina Larisa, Tripa Andrea și Miklos Cristina

J

The ROBOMOON Team is the FIRST LEGO LEAGUE Team from the "Traian Lalescu" Theoretical High School - Hunedoara and is aimed at children aged 9 to 14. It was founded in 2019 and promotes learning through play. Children come into contact with the world of science through play... The ROBOMOON robotics club promotes collaboration, team spirit, performance, learning through play, all because these children are the passionate young people of tomorrow! Our motto is "Only the sky is the limit!"... we play and we learn.



SCAN ME

Contact: larisahd2004@gmail.com

Presentation link: https://www.facebook.com/people/Robomoon-Hunedoara/100057210319548/

STORY SHEETS

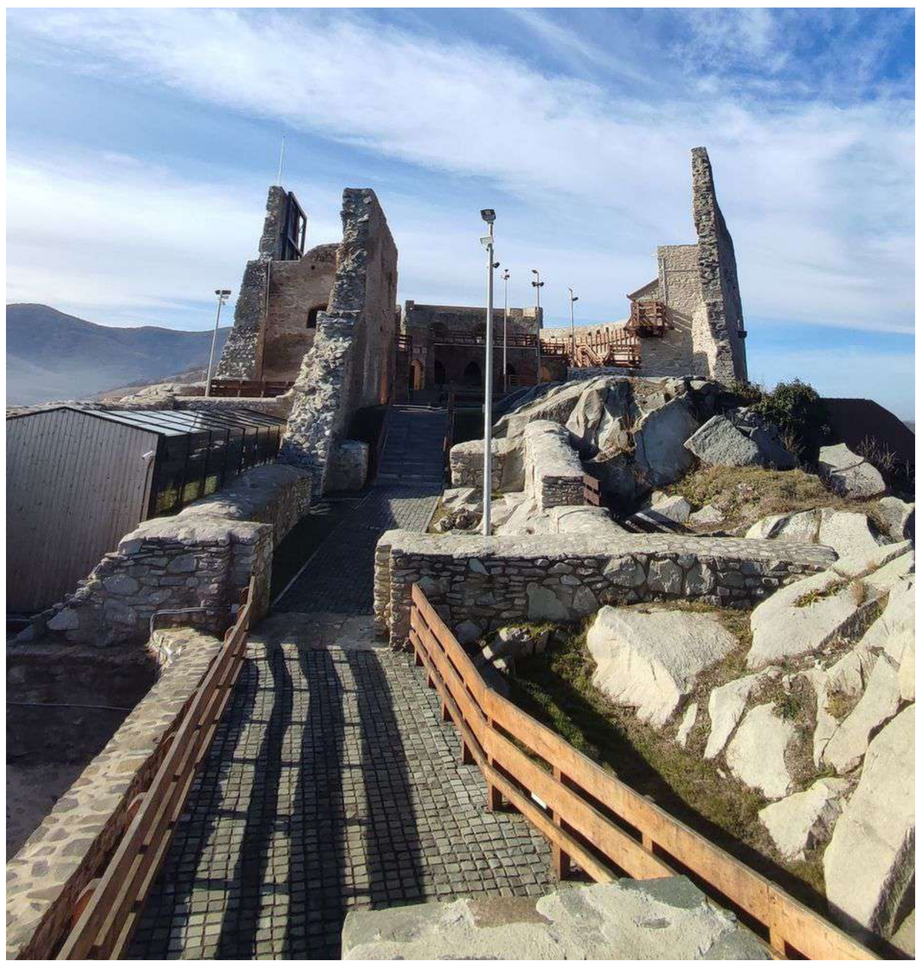
ȚINUTUL HUNEDOARA
FILE DE POVESTE

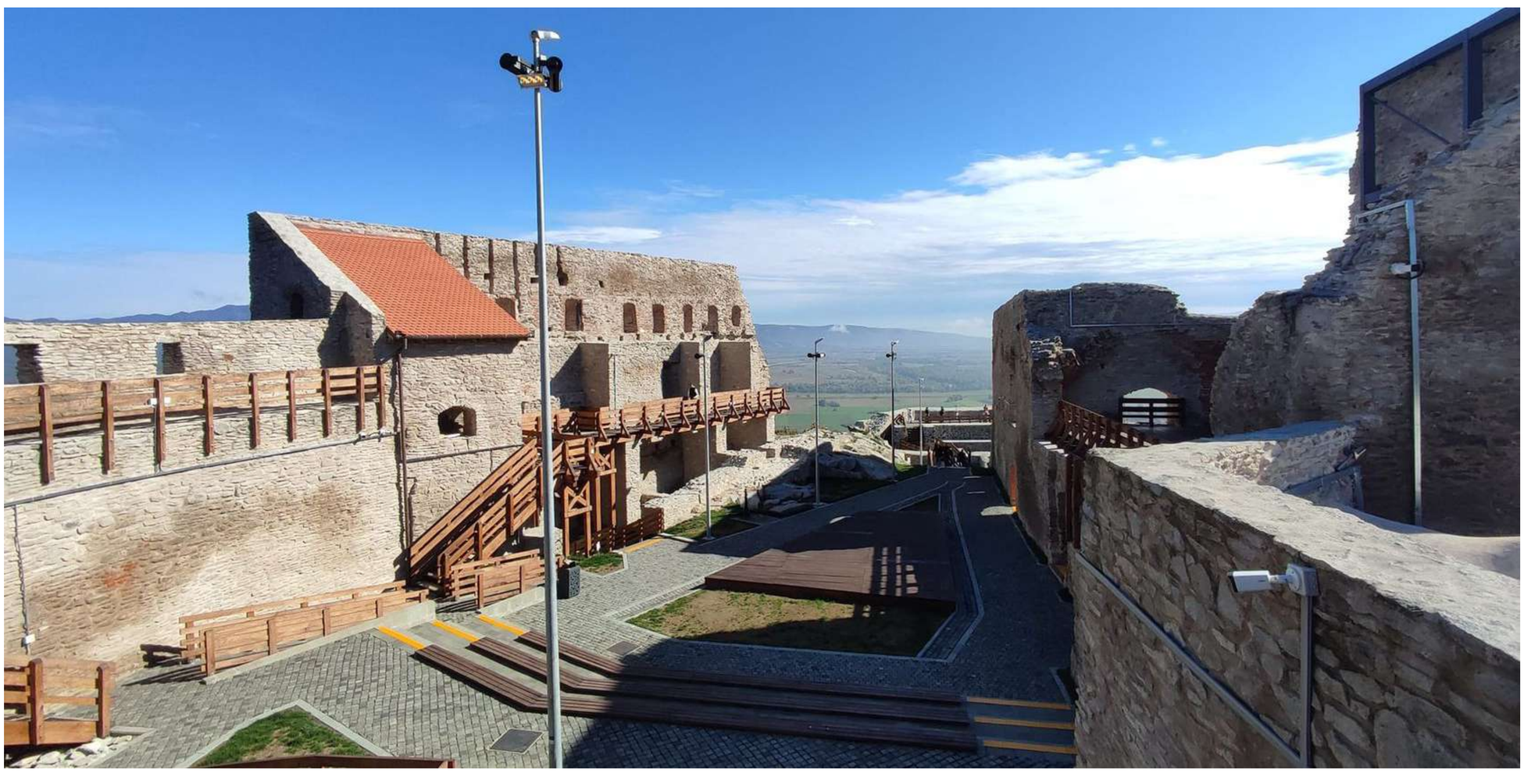
K

Author: Damiean Cristian

Association " ŢINUTUL HUNEDOARA - FILE DE POVESTE " The purpose of the Association is to promote and develop tourism activities, especially alternative tourism, while encouraging the conservation of natural, cultural, historical heritage and the harmonious interaction between the tourism sector and social and environmental factors, activities to protect traditions and customs, their support, their support.

By alternative tourism we understand any form of tourism that leads to harmonious cohabitation between the local population and their guests, protecting and enhancing the identity, cultural, historical and natural heritage of the host community.





SCAN ME

Contact: tinutulhunedoara@gmail.com

Presentation link: https://www.facebook.com/profile.php?id=61556709704327

CLUB EVOLUŢII cu Alexandra Marcu

Outdoor project

Authors: Alexandra Marcu & Team

J

Club Evolutii *is an organisation from Romania, providing personal development activities based on mountain and traveling education.*

We organize mountain hikes, expeditions, camps and educational courses for children who want to become explorers and enjoy many experiences and adventures.

Why do we love the mountain?!

Because it's an escape between the blocks, an opportunity to socialize and although it often challenges us to get out of our comfort zone, it seems at the same time it gives us the feeling of well-being and safety!

Club Evolutions - Personal development through mountain education!

Contact: *alexandraflaviamarcu@gmail.com* ***+4 0723 219 655***

Kids Corner

LEGO
My Passion for Building Cars

Kid Project

Author: Ștefan PENA

J

Building LEGO cars is a passion that inspires and challenges me. By now, I have built 40 LEGO car models, and 5 of them are much more complex than my age level. Each project gave me a new challenge and helped me learn more about mechanics and design.

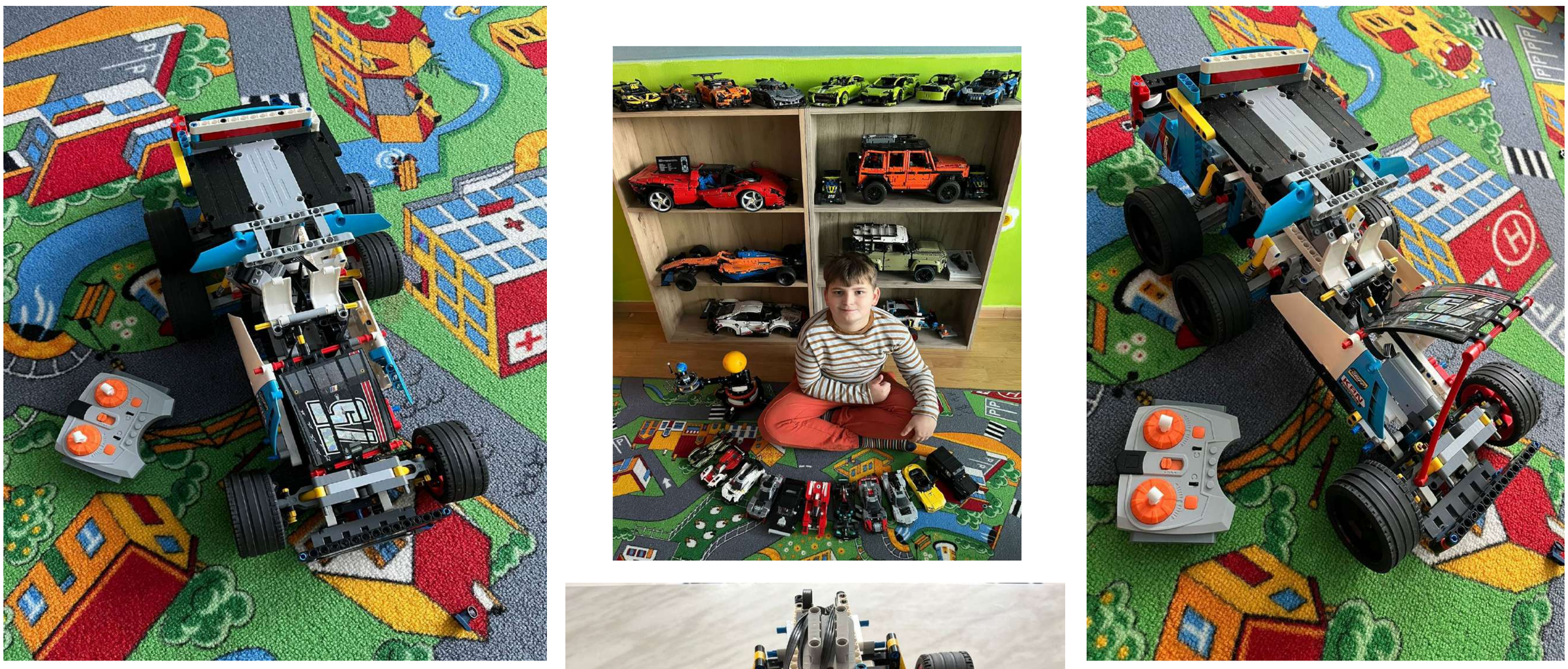
For this project, I created a remote-controlled car prototype, equipped with:

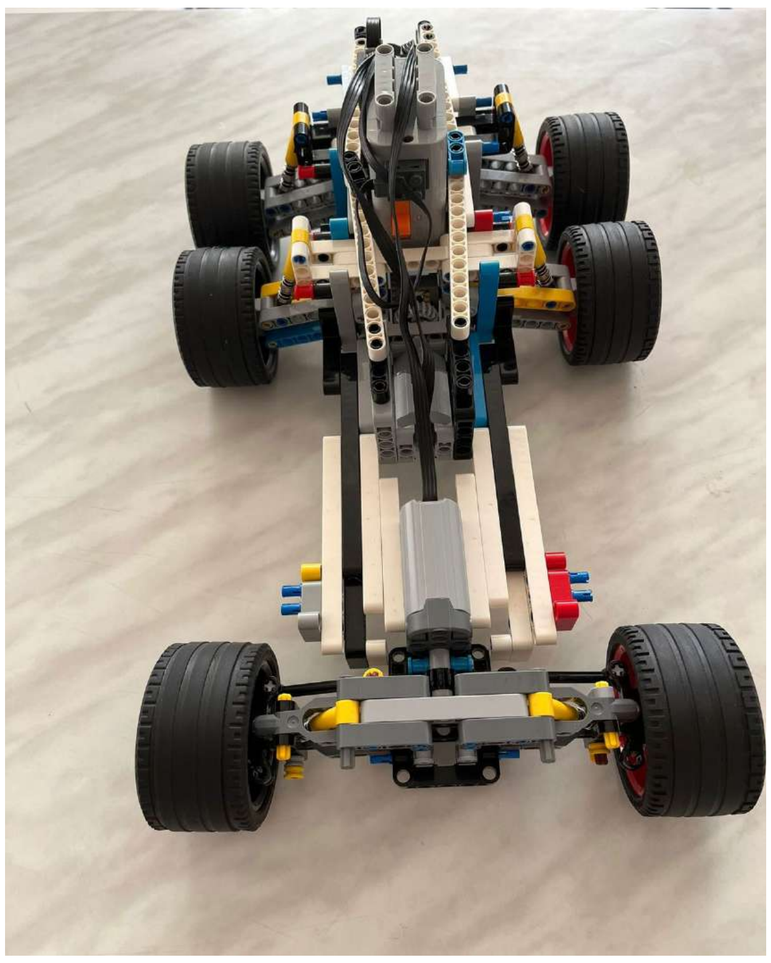
- **✓ 2 powerful motors for traction**
- **✓ 4x6 transmission for better stability and control**
- **✓ Remote control for distance operation**
- **✓ Steering control module**

SCAN ME

In addition, I included Roby the robot in my project. I assembled and programmed it myself. It is controlled through a mobile app, giving it interactive and autonomous functions.

Building LEGO cars is not just fun, but a true passion.





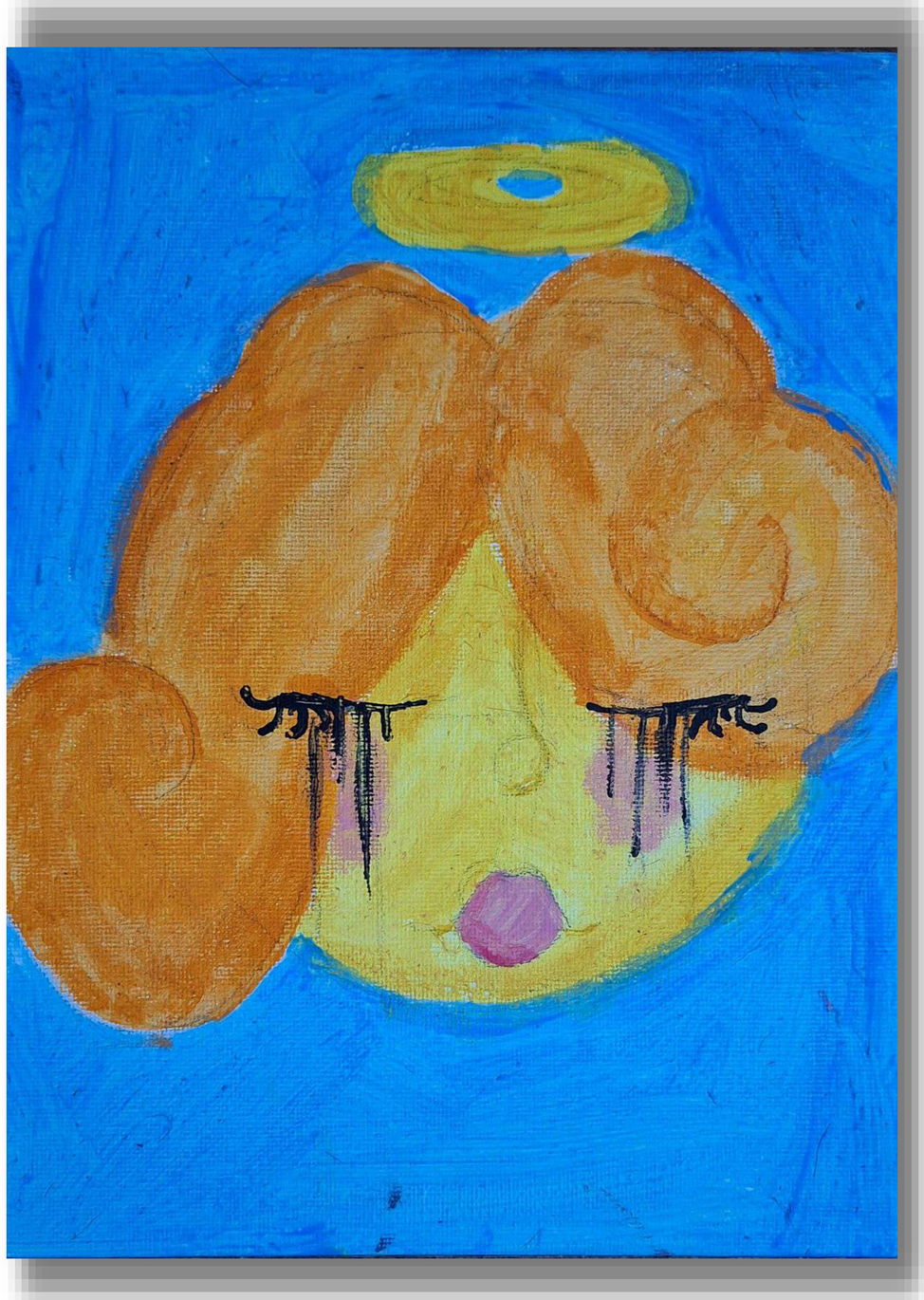
Maria's Art

MY UNIVERSE

Kids project

Author: Maria Nectaria MOCANU

Maria Nectaria Mocanu is a student in the 4th grade of the "Sigismund Toduță" Secondary School, a structure belonging to the "Anghel Saligny" Railway Technological High School in Simeria. Each element has a clear and distinct message, each painting is a balanced puzzle of color and words. My works are deeply expressive and full of symbolism, demonstrating a special artistic sensibility. Each painting conveys an inner story and strong emotion, highlighted by vibrant colors and symbolic elements.



Contact:

cosminaprata151080@gmail.com

Kids Corner

DELIA's LEGO CREATIONS

Author: Delia Ioana CINDEA

J

My name is Delia, I am 9 years old and I am a student at the "Matei Corvin" Technical College in Hunedoara, in the second grade, following the Step by Step program. One of my biggest passions is building LEGO models. I like this activity because it stimulates my imagination, creativity and patience. Through LEGO construction, I can create various structures and objects, explore new ideas and develop practical skills. It's a great way to learn and relax at the same time.

Each piece I add to the build helps me focus and enter a state of calm and relaxation. This activity gives me the opportunity to explore creativity, solve problems and see my ideas take shape.

LEGO teaches me to be patient and attentive to details, and the joy of completing a project gives me a special satisfaction.

SCAN ME

Stone Blade Trailer of Video Game

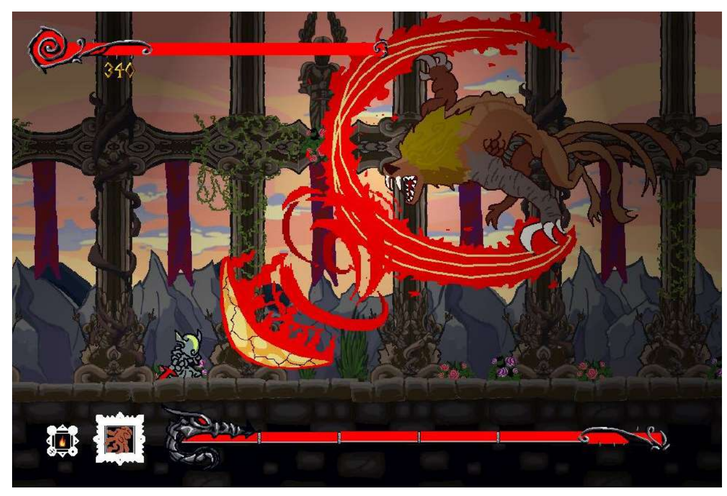
Game Art Project

Pavle Trišović

J

SMASH into Stone Blade. An epic action-adventure game, where you'll fight monstrous enemies, befriend strange and otherworldly travelers, journey through a brilliant and ancient world, and discover it's secrets - all in a hand drawn pixel art-style.

You play as a Stone Warrior, once acting as sword and shield for the Five Kings - now seeking vengeance against them for sacrificing his kin to win their war. To succeed in his quest the Stone Warrior must absorb the powers of his enemies and use them as his own.



The dash is a power up that is a valuable resource for the player. They can use it to cross a level quickly or get out of enemy fire. It's upgraded version, the Wolf Cloak dash, allows the player to avoid all damage while dashing.

Wall jumping is essential in order to cross any level or discover hidden areas. It's upgrade - the Beast Claws - allows the player to stick to a wall.

The double jump will be obtained from the Grasshopper Legs - you gain the power of the elegant grasshopper and of course you can select any spell to use in combat.

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Presentation link: https://youtu.be/UIvM_BmZzMw

SCAN ME

Posters Catalogue

7th International Exhibition INVENTCOR

2-4 April 2026 –Deva, Romania

Opportunity
CORNELIUGROUP Research-Innovation Association
Creation
INVENTCOR
Realization
Power of Creative Mind
Deva ROMANIA

K

Innovative ART

Music

Video

Photography

Publicity

ADVANCES IN COMPARATIVELY EVALUATION OF OPERATIONAL ACOUSTIC PERFORMANCES OF TONE-WOODS FROM ROMANIA AND S-E ASIA WITH PRACTICAL APPLICATIONS ON VIOLIN RESONANT BODY DESIGNING

K

This research was funded by the National R&D Programs:
- *project PN-III-P2-2.1-PED-2019-2148, no. 568PED/2020 MINOVIS, http://minovis.unitbv.ro*
- *project PN-III-P4-PCE-2021-0885, no. PCE61/2022 ACADIA, http://acadia.unitbv.ro*

Authors: Silviu Marian NASTAC[1,2], Mariana Domnica STANCIU[2], Maria Violeta GUIMAN[2,1], Long WAY[3]

[1]Dunarea de Jos University of Galati, Research Centre for Mechanics of Machines and Technological Equipment
[2]Transilvania University of Brasov / Romania
[3]National Pingtung University of Science and Technology / Taiwan

Description: The research explores the dynamic behavior of different wood species in the form of violin boards, based on experimental modal analysis using various practical response evaluation configurations. The purpose of these studies was to investigate the acoustic and dynamic properties of tropical species from South-East Asia (*Taiwania*, *Japanese cedar* and *Chinese parasol*) and other European wood species (*poplar*, *willow*), with potential in the construction of stringed musical instruments, especially the violin, instead of the traditional ones (*spruce* and *maple woods*). The novelty of the study consists in the analysis of the physical, acoustic and dynamic characteristics of violin boards made of wood species from tropical and temperate areas, compared to the traditional ones (*spruce* and *maple*).

Figure 1. *Violin soundboard specimens used in experimental investigations: tropical soundwood (left image) and Romanian soundwood (right image)*

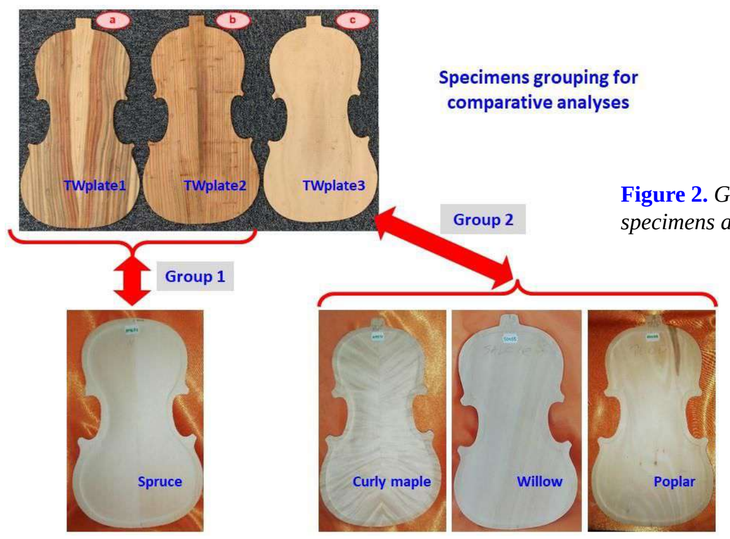

Figure 2. *Groups of specimens analyzed*

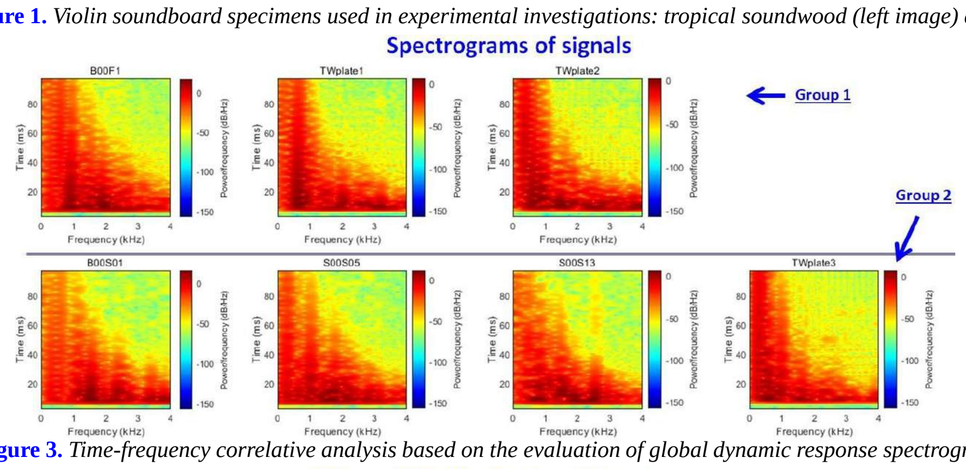

Figure 3. *Time-frequency correlative analysis based on the evaluation of global dynamic response spectrograms*

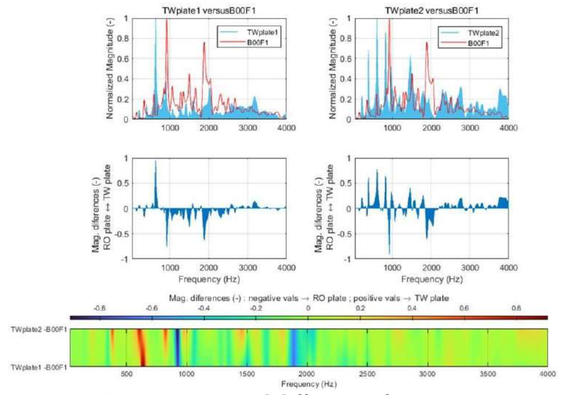

Figure 5. *Spectral differences for Group 1*

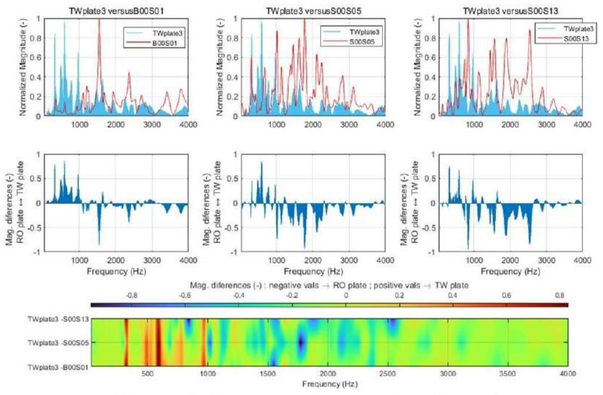

Figure 6. *Spectral differences for Group 2*

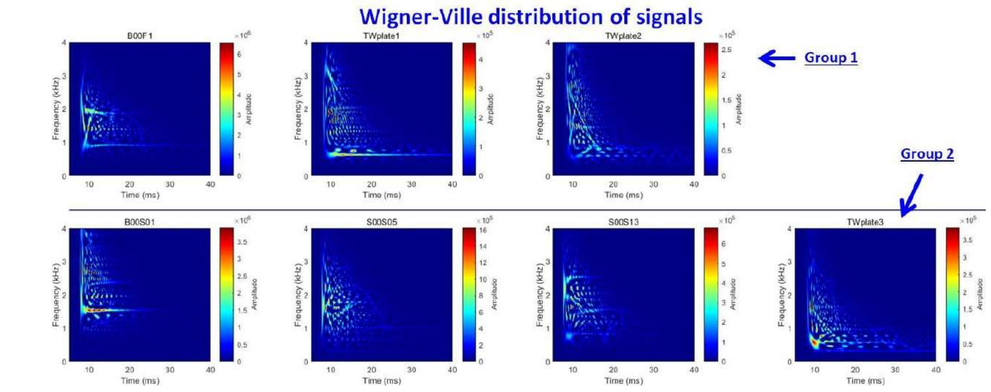

Figure 4. *Complex correlative analysis of the global dynamic response of investigated plates based on the evaluation of the Wigner-Ville distribution*

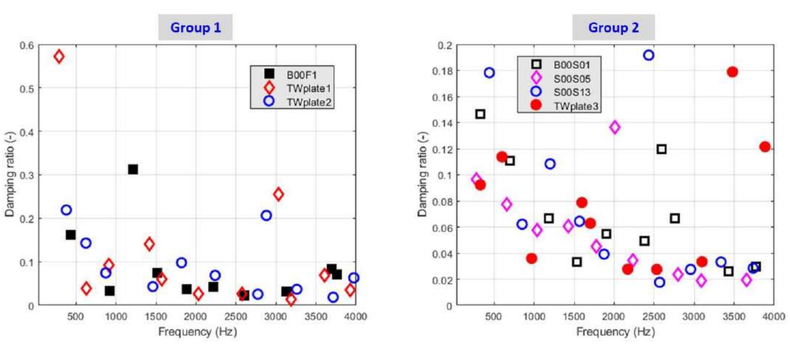

Figure 8. *The results of the spectral analysis for the considered plates categories (dominant frequencies and spectral damping)*

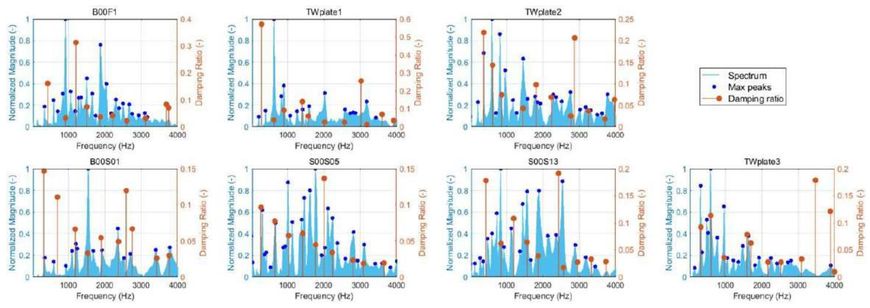

Figure 7. *Results of spectral analysis for the considered plates categories (dominant frequencies and spectral damping)*

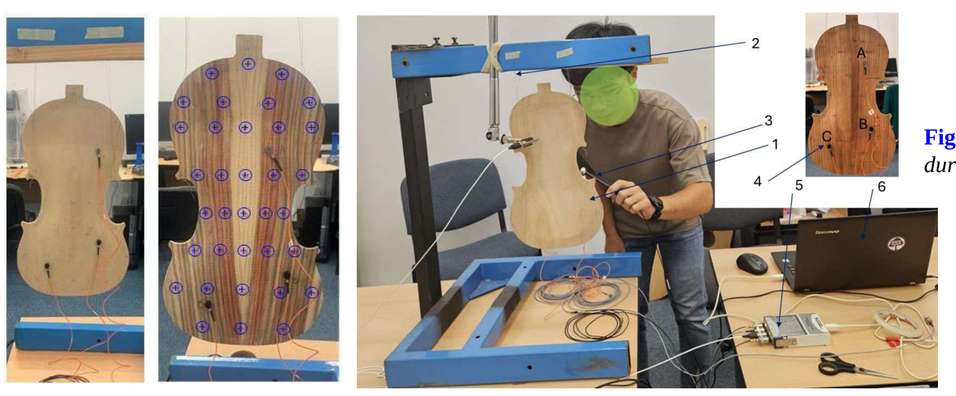

Figure 9. *Aspects during experimental research*

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Nyx Crafts
Home Decor

Old-world aesthetics in home decor

InnovativeArt

Author: Alexandra-Maria Nicoară

K

My work is an exploration of historical grandeur and the meditative process of layering. Heavily inspired by the Baroque and Victorian eras, I aim to evoke a sense of timelessness through rich, contrasting palettes and intricate ornamentation. While my journey began with the delicate art of decoupage, it was the limitless freedom of mixed media that allowed me to fully realise my maximalist vision.

The core of my practice lies in the harmony between texture and surface. I specialize in transforming wooden canvases—a material I find uniquely receptive to the bonding of multiple layers into ornate objects of home décor. By combining structural elements like air-dry clay moulds and stencils with the depth of antiquing pastes, waxes, acrylics and rice paper, I bridge the gap between contemporary craft and old-world aesthetics.

For me, the act of creating is a deliberate slowing of time. Each jewelry box, glass container, wooden chest, and canvas is treated with meticulous care, ensuring that every detail contributes to a sense of "marvelous" complexity. My work is a celebration of maximalism, history, and tranquility, inviting the viewer to rediscover the beauty of highly detailed, passionate craftsmanship.

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https://www.instagram.com/nyxcrafts23/

SCAN ME

Public Institution "Mihai Viteazul"
Theoretical High School

DEVA - The city of old times

Author: Felicia MUNTEANU

city Chișinău, Republic of Moldova

The project "Deva - The city of old times" is an emotional journey into the history of the city, created by animating old photographs from the period 1823–1940. Each photograph preserves a part of the city's story: quiet streets, elegant buildings, busy people, or simple moments from everyday life.

Through the use of digital technology, these historical images are carefully animated so that their details seem to come to life again. People appear to walk through the streets once more, carriages hurry somewhere, and clouds slowly pass over the city. In this way, the photographs are no longer just static images, but become small windows opening to a world from long ago.

By watching these scenes, we can more easily imagine what life in Deva was like more than a hundred years ago: what the places looked like, how people lived, and what atmosphere the city had in those times. The project aims to bring the past closer to the present and to awaken a feeling of nostalgia and curiosity in the viewer. At the same time, this initiative is also a way of keeping the memory of the city alive. Old photographs are silent witnesses of history, and through animation they gain a new life, continuing to tell the story of Deva to today's generations. Thus, the past does not remain only in archives or dusty albums, but becomes a warm and emotional visual experience.

VIDEO

SCAN ME

Presentation link: ***https://youtu.be/ElAH167r-sY***

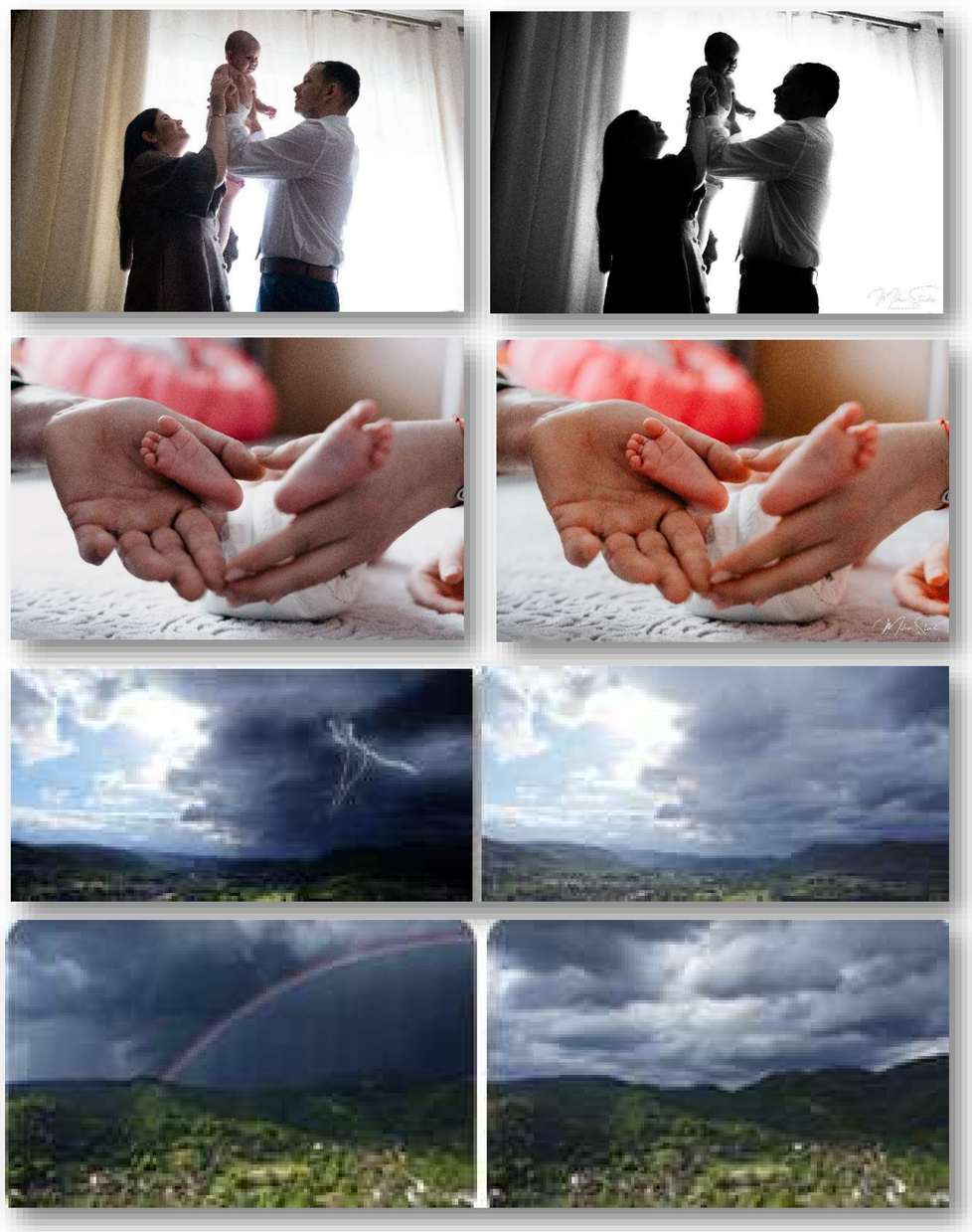
Contact: goretz19@gmail.com

Artificial intelligence (AI)
Mihoc Studio

Author/s: Mihoc Mădălina, Mihoc Mihai

K

Mihoc Studio is a company offering photo-video services for various events, both public and private. Due to today's technology, clients' desires to improve their photos have increased. In order to do everything in the shortest possible time, we use the help of artificial intelligence in various dedicated editing programs. Artificial intelligence (AI) in the photo field has many advantages namely increased efficiency, AI can process and edit images and videos much faster than a human can. Improved quality, for example by reducing digital noise or improving sharpness. Automated content creation, such as editing videos or creating synthetic images. Personalization, AI enables customization of photo and video experiences, adapting to customer preferences.



Artificial intelligence (AI) can be an extremely useful tool in improving photos, with a variety of features and applications that facilitate the editing process. For example, color and exposure correction, AI can analyze your photo and automatically adjust colors, contrast, and brightness to achieve optimal balance. This can help with photos that are too dark or too bright. Image noise reduction, AI lgorithms can remove image noise from photos taken in low-light conditions while keeping details sharp.Image restoration and repair,If they are old or damaged photos, AI can help restore them by reconstructing lost details or removing scratches and other imperfections. Beautifying portraits, AI editing tools can enhance portraits by smoothing skin, adjusting facial lighting, correcting imperfections and even tweaking features to make them look more appealing. Improving resolution, AI can increase the size of an image without losing detail, using advanced upscaling techniques. Remove unwanted objects, AI can identify and remove unwanted objects or people from a photo, such as hairs, dust or other distracting imperfections. Creative effects and stylization, AI can transform the photo into an artistic style, like a painting or drawing, providing quick and exciting results for those who want to create unique images. Focus error detection and correction, in some cases, AI can help correct focus, especially when an important subject has gone out of focus.

Contact: madalina@mihocstudio.ro **+40767 333 661**

Chulalongkorn University Demonstration Secondary School
Bangkok, Thailand

KHAENOVA

Engineering a Sustainable Future for a Traditional Musical Heritage

Patent No. 2502006674 Authors: Khaenova Team
Pataraphol Vanichvatana, Thavinn Uttamoat, Nisha Luangvaranunt,
Napat Luangvaranunt, Thee Uttamoat

Category

K – Innovative ART, Music, Video, Photography, Publicity

BACKGROUND

Traditional musical instruments represent **valuable cultural heritage,** yet many face structural limitations that restrict their **accessibility, durability, and long-term sustainability.**

The Khaen, a traditional Thai **free-reed mouth organ,** is still played today but faces **declining adoption,** especially among younger generations. Its **fragile bamboo construction, complex repair requirements,** and **lack of manufacturing standardization** limit durability, accessibility, and scalability.

INNOVATION CONCEPT

Khaenova is an **engineering-driven redesign** that integrates **modern materials, modular architecture,** and **digital fabrication** while preserving the traditional sound of the Khaen.

ENGINEERING INNOVATION

- **Acrylic structural pipes** replace fragile bamboo
- **3D-printed modular clamshell chambe**r enables inspection and repair
- **Precision airtight connections** eliminate **traditional termite-wax sealing**
- **Ergonomic strap and upright base** improve usability
- **Prototype tested** to verify sound quality preservation and structural durability.

INNOVATION IMPACT

- Increased **structural durability**
- **Simplified repair and maintenance**
- **Improved tonal consistency and reliability**
- **Efficient and scalable production** through digital fabrication

GLOBAL RELEVANCE

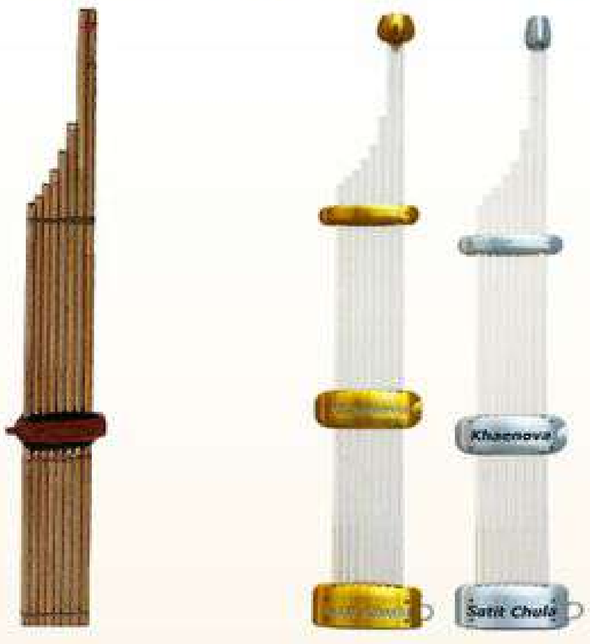
- The Khaen belongs to a broader family of Asian **free-reed instruments,** including the **Chinese Sheng, Japanese Shō,** and **Korean Saenghwang,** whose ancestral roots extend back more than **3,500 years.**
- Khaenova demonstrates how **engineering innovation** can help **preserve and modernize traditional instruments worldwide.**

Khaenova transforms a fragile traditional instrument into a modular, repairable, and digitally manufacturable system, enabling traditional musical heritage to remain accessible, sustainable, and relevant globally.

PICTURES & PRODUCT PROTOTYPES

TRADITIONAL VS KHAENOVA

Traditional Khaen → Khaenova



ENGINEERING SYSTEM

Traditional Khaen	Khaenova
• Bamboo pipes	• Acrylic structural pipes
• Termite-wax sealing	• Precision airtight structure
• Difficult repair	• Modular repair system
• Inconsistent tuning	• Stable tonal reliability
• Handmade production	• Digital scalable production

Innovation Impact

↓ Engineering Redesign

↓ Durability + Repairability

↓ Scalable Production

INNOVATION IMPACT

Engineering Redesign → Durability + Repairability → Scalable Production

↓

Global Preservation of Musical Heritage

CONTACT

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Opportunity
CORNELIUGROUP
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Creation
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Realization
Power of Creative Mind
Deva ROMANIA

Corvinorum Ordo Association

Pipers of Transylvania Rock

music project

Authors: Mircea Goian, Gerhard Stempel, Alin Bălescu, Stefan Milutinovici, Peter Moynahan

K

The first and only band in Romania that plays ROCK music with medieval instruments. The group was founded in 2008, by Mircea Goian together with Cornel Jitariu and approaches medieval and traditional music, in an original way, in a way designed especially for the performances that take place in the city squares or in the open spaces next to fortresses or castles.

The oldest songs in the repertoire are in Gaulish (Celtic language) most of the songs from the medieval period, in languages with limited circulation or extinct languages (Galeo-Portuguese, Breton, Sephardic, Tatar)

Gerhard Stempel – *tobe medievale, tapan*

Alin Bălescu – *cimpoaie, blockflöte, pocket clarinet*

Mircea Goian – *manager grup - violoncel, hurdy gurdy, percuții*

Stefan Milutinovici – *cimpoaie, fluiere, rauschpfeife, blockflöte voce, bouzuki*

Peter Moynahan – *voce, chitară*

Judas Priest medley

In addition to the authenticity of the musical pieces, the group uses copies of historical instruments such as: bagpipes, hurdy gurdy, rauschpfeife, fidula, medieval drums, tapan, blockflöte, archaic percussion instruments - bolla. The costume is made taking into account specific elements from that period. Since the summer of 2019, the band has undergone several changes and presents itself in a new formula, with a richer, more dynamic "sound", a refreshed repertoire and new sets.

In 2020 a new project appears: Pipers of Transylvania Rock.

The newest record material "Minnesang" was released in August 2021 along with an impressive collection of promotional materials / souvenirs "merchandise". Medieval instruments used to play rock music reproduce sounds specific to the medieval period on melodic rock lines, thus showing that the music is universal and timeless. We are thus witnessing a project that unites the medieval culture of the VI - XV centuries with that of the XX - XXI centuries.

Contact: goianmircea@yahoo.com

FLOART DECOR

K

Author: Florentina Livia SPANIOL

FloArt Decor passion for decoration! The FloArt Deco company makes floral decorations, birthday decorations from balloons for the most beautiful events in everyone's life, if you have scheduled a coming of age, baptism, wedding or you want to inaugurate a store with a decoration from balloons, I can help you.

Your story can be a special one with the most unique designs from flowers and balloons.

SCAN ME

Contact:

spaniolflo23@yahoo.com

https://www.facebook.com/share/157jspGfpP/

FACE PAINTING BY ANDREEA, A GLAMOROUS STORY

Author: Andreea Elena DRUTA

K

I'm Andreea and at the age of 22 I'm talented at drawing and painting, I've had this passion since childhood, and I've turned it into a job full of color and magic. It all started when I do face painting as a volunteer at events such as the Light Festival and Children's Day. My talent and dedication were quickly noticed and the referrals were not slow in coming. I am part of the wonderful Glamorous Story team, with whom we bring smiles and joy to events in Timișoara. What inspires me the most is the reaction of the children, the excitement and happiness on their faces when they see their paintings transformed into works of art.

We are waiting for you with the little ones to give them an unforgettable joy - face paintings made with love by Andreea!

SCAN ME

Contact: *andreeaaaelenaa@gmail.com*

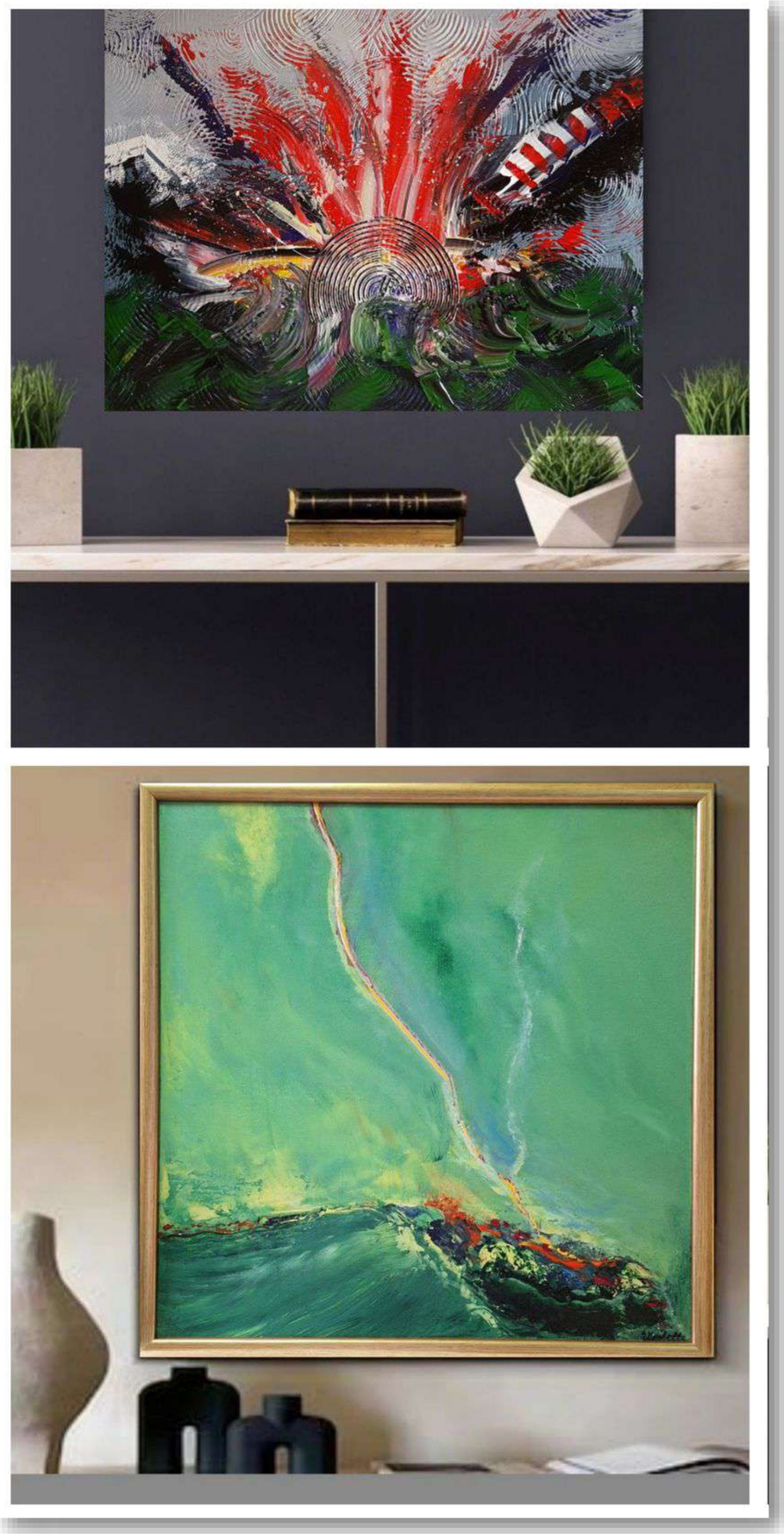
Violeta Art

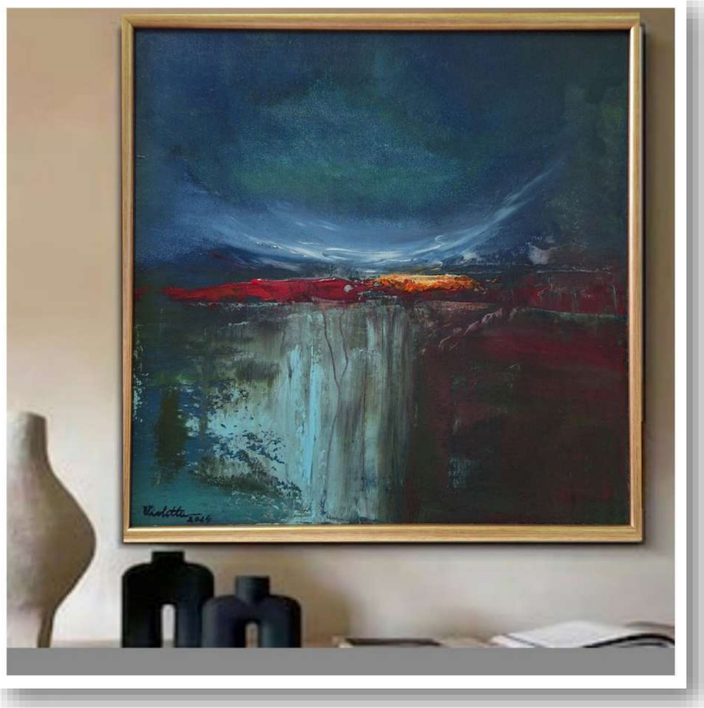
ART
ESCAPE IN AUTHENTIC

Author: Violeta COPROS

K

Art is, in essence, the deepest expression of human creativity. My passion for painting, above all else, means peace and relaxation. I was born with a love of art and I love it in all its manifestations. Although I work in medicine, my passion for painting, which came later, turned out to be very intertwined good with medicine, it being also an art, that of healing people. Great art is the outward expression of an inner life of the artist, and this inner life will lead to his personal worldview.





SCAN ME

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foltutvioleta71@gmail.com

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Mariana Art

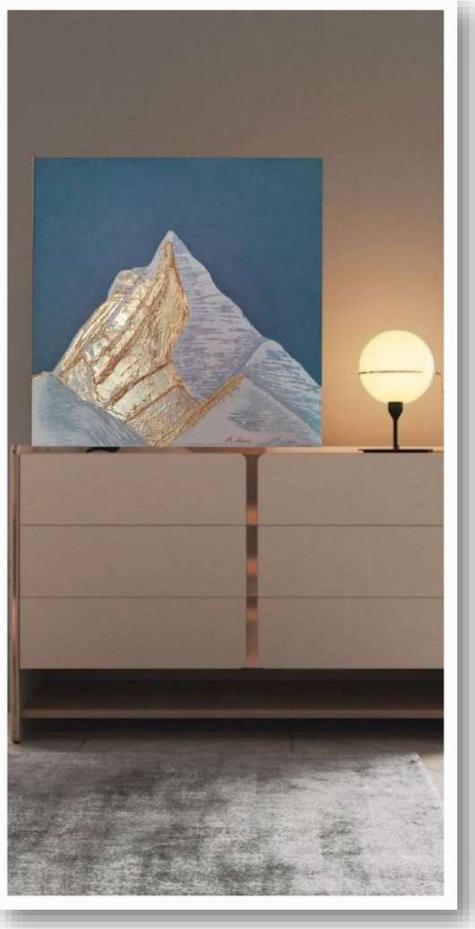
THE INTROSPECTION OF RECOVERY

Author: Mariana MAGLAS

K

A sensitive and emotional nature, I have been attracted to art since childhood, in its many forms: drawing, music, literature and theater. After a very long period of break and time dedicated to family and other aspects of life, I had a moment of introspection, an acute need to find myself, to know who I really am, what I most want to undertake, on short, what makes my soul vibrate. That's how I found painting and contemporary art, with which I fell irreparably in love.

SCAN ME



Contact:
maglasmariana@gmail.com

FLORAL EMBRACE

Photography project

Author: Stoica Adrian

K

"Floral Embrace" captures the delicacy and elegance of femininity in a timeless artistic composition. The model, with a soft gaze and half-closed eyes lowered, gently embraces a few calla lilies-symbols of purity, refinement, and inner transformation. Set against an abstract background in warm brown tones, the subtle lighting delicately sculpts her features, creating a harmonious interplay of light and shadow that enhances the fragility of the moment.

The atmosphere is contemplative, almost dreamlike, inviting the viewer to immerse themselves in a state of deep serenity and to appreciate a beauty that is both fragile and full of inner strength. A vision of grace, emotion, and balance, transforming the ephemeral into an eternal visual expression.

SCAN ME

Contact: *adistoica21@gmail.com* *www.adistoica.ro*

imPerfection

Photography project/Innovative art

Author: Diana Miruna Armioni

K

"imPerfection" is a photographic exploration that challenges conventional notions of beauty by celebrating the imperfect, the fragile, and the vulnerable. It seeks to find elegance in the cracks, the weathered, and the transient, inviting viewers to reconsider their perspectives and appreciate the unique character and authenticity that imperfection brings. Through a curated collection of images, "imPerfection" delves into the profound beauty that resides within the fleeting nature of existence, the interplay of light and shadow, and the resilience of life. Inspired by the delicate details of a withering flower and the dramatic contrast of a blossom illuminated in darkness, the project aims to capture the hidden beauty that lies beneath the surface, inviting viewers to look beyond the obvious and appreciate the strength to find hope in the face of adversity. By embracing vulnerability and recognizing the beauty in decay, "imPerfection" seeks to inspire a deeper appreciation for the unique and imperfect moments that make life truly meaningful.

Contact: armionimiruna@yahoo.com

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Handmade Concept

Author/s: Chereches Alexandra
Epure Cana-Roxana

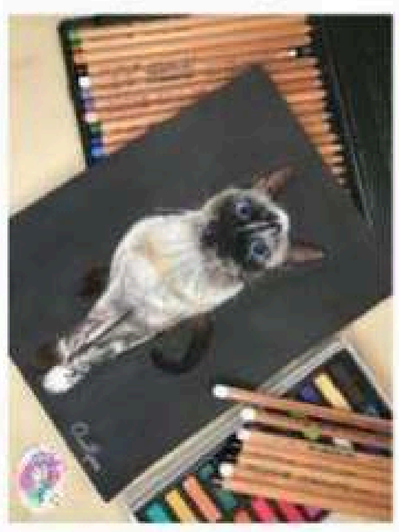
"INSPIRED BY THE FEAR OF BEING AVERAGE"

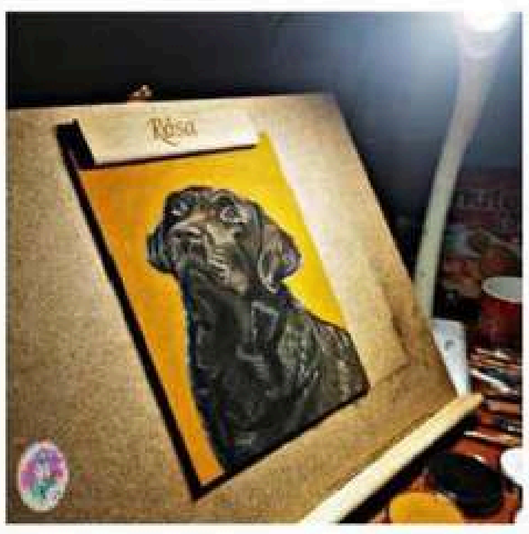
Welcome to our world of creation, passion, and innovation! We are two energetic and creative girls who have turned our dream into reality - we have founded the Handmade Concept brand, where art and design come together in a symphony of color, textures, and unique ideas.

WHAT WE DO

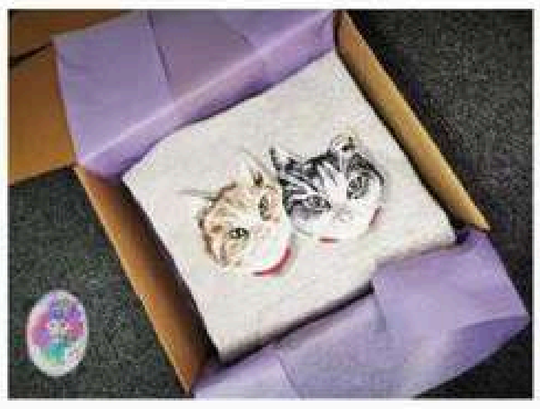
1. *Mural Paintings:* We transform the walls of your spaces into living works of art. From abstract landscapes to personalized illustrations, each wall becomes a story of its own.

2. *SoulfulArtwork* Our canvas artworks tell stories and evoke emotions. You can choose from our collection or we can create personalized paintings tailored to your tastes and dreams.





3. *Unique Fashion Pieces:* We provide personalized fashion options. From hand-painted jackets and sneakers to original print t-shirts and delicate embroideries, your wardrobe will become an authentic expression of your personality.



WHATSETS US APART ✨

- Limitless Creativity- Meticulous Quality- Innovation in Every Project- Custom Creations

Join us on our artistic journey and discover the power of art and design to transform your world!

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Handmade concept
handmade.concept.artist
handmade.concept
+40767885187

Television News Discourse

Communication and Social

Bachelor's thesis

Author: Iziumov Maria-Magdalena

„Vasile Alecsandri" University of Bacau, Romania

The bachelor's thesis is the result of research and was written by the author at the Faculty of Letters, "Vasile Alecsandri" University of Bacau, Romania, in 2023. The thesis has never been presented, either partially or in full, at any other higher education institution in Romania or abroad. The thesis contains information and analysis on communication and social influence, news discourse, including news as information and communication, radio and television news, case studies, and more.

Television news discourse represents a form of mass communication with a significant impact on society. Every day, millions of people connect to their televisions to receive information about events in the surrounding world. This thesis outlines how television news discourse affects communication and social influence. Television news consistently constructs and promotes a social image of events, groups, or individuals. This can lead to stereotyping, discrimination, or even exaggeration of certain aspects.

Thus, the influence of television news discourse can contribute to the polarization and division of society, especially in the current digital era and the rise of media consumption. It is essential to educate ourselves and be aware of the power and responsibility of the media in shaping human perceptions and behavior.

Televiziunile Pro TV, Antena 1, Kanal D, România TV și Antena 3 CNN au avut cele mai mari audiențe la nivel național, în luna octombrie 2024. Citeşte întreaga ştire: Cinci televiziuni țin de zece ani în „prizonierat" mai mult de jumătate dintre telespectatorii români

By promoting responsible communication and through the active involvement of citizens, we can contribute to more balanced development and more truthful information in television news discourse.

In an era where information sources are numerous and access to information is easy, it is important to develop critical skills and be aware of media influence. It is necessary to be able to assess information, recognize manipulation, and form our own perspective on events and societal issues.

Thus, from the analysis of television news discourse in this thesis, we can conclude the importance, power, and responsibility of the media in contemporary society, as well as the need to develop critical skills in information consumption.

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Bradean's Channel

ALL IS GAMING

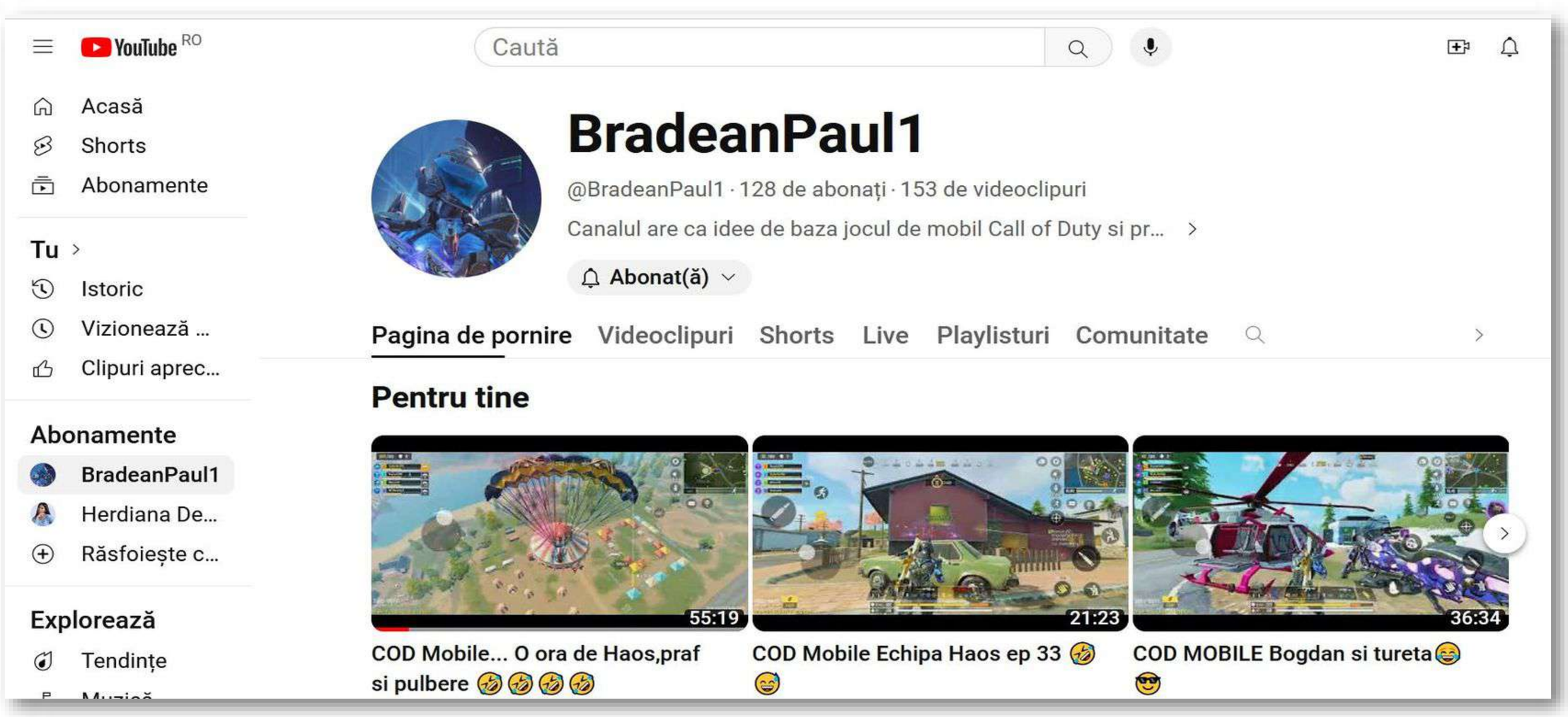
Game Project

Author: Paul BRADEAN

E

The channel has as its basic idea the mobile game Call of Duty and presents to the followers the head-to-head matches of the players from the clan, (Team Chaos), trying to remind the gamers that the games are made for fun and to take into account fair play.

At the same time, it will be gradually introduced (Etiquette Lesson) where we will present restaurant etiquette from both points of view, both of the employee and of the Horeca customers.



COD Mobile... O ora de Haos,praf si pulbere

Contact: *bradean_paul@yahoo.com* ***TikTok paulbradean1***

Presentation link: *https://www.youtube.com/watch?v=RSiAxsAp67Q*

SCAN ME

DANSANDRA DANCE STUDIO

Author: Andreea RUSAN-MOTIU

K

Dansandra Dance Studio dance club represents and is represented by a large dance community in Deva. Dance enthusiasts from young to seniors, Dansandra Dance Studio offers everyone who wants to learn and practice one or more dance styles a multitude of options in modern or ballroom dance!

Since 2011, we started on this path, always learning and perfecting ourselves, so that today our dance studio has prizes won at local and national dance competitions as well as participation in various events!

Free your mind and dance!

We are enthusiastically preparing two major annual events, each already in its fourth edition, namely: "Viennese Waltz Ball" and "Annual Christmas Show".

There are two events for which we prepare several months a year and for which we make every effort to celebrate dance, health, friendship!

Contact: ***+40 744 953 427*** ***andreea.florentina@gmail.com***

SCAN ME

MASHUPS by DJ RobyX

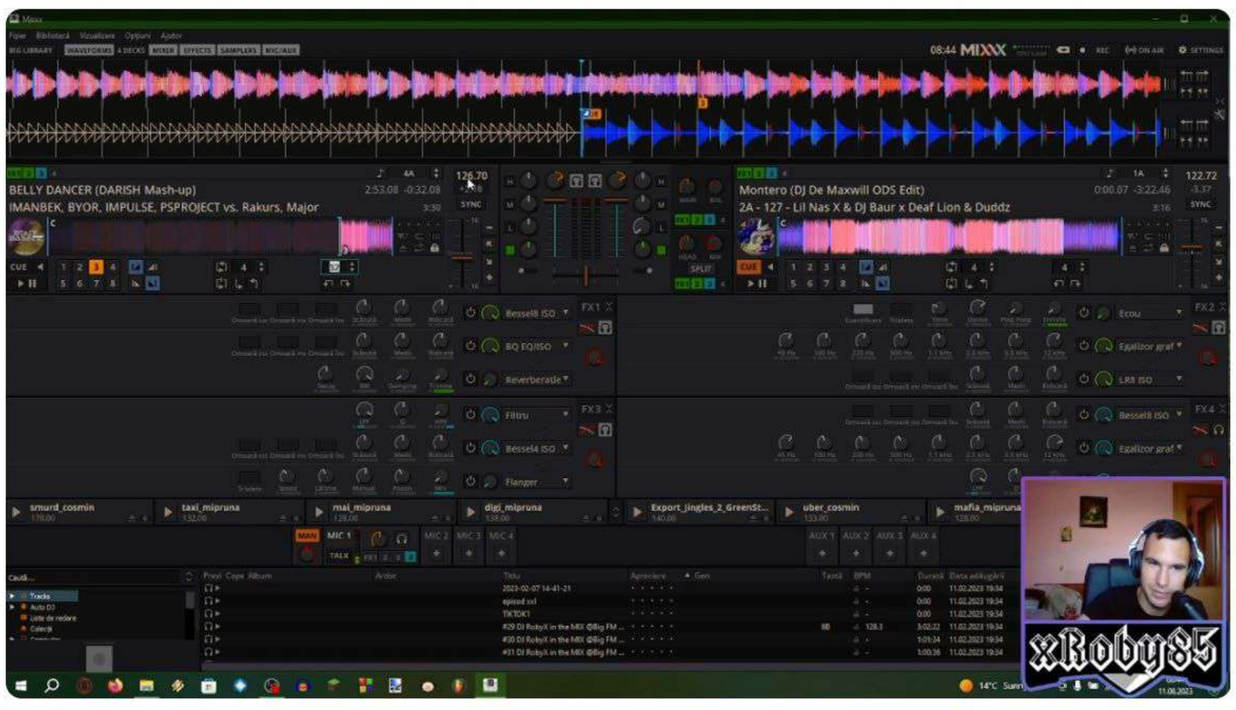
Student project

Author: Robert SĂCUIU

K

One of my passions, which is music, started when I discovered the radio. In general, I mix the commercial music that has become popular with us because I am otherwise tired of those songs compared to some underground (non-commercial) songs, because I grew up with them and because there are more people who listen and because otherwise you are more attracted. Besides that, since I also had a passion for video games, I'm thinking of mixing music and songs to make you think about what is related or appropriate to video games, and if you can feel like you're in a cool place. I generally mix tracks from the 90s to today and from the following other non-commercial genres in parts: Electro House, Future House, Big Room Techno, etc.

SCAN ME



@djrobyxro

DJ RobyX

At the moment I'm doing mixes for some shows on some radio stations that I post on Hearthis.at, I'm doing mashups (meaning a combination of two songs), mix shows (combination of 3 or more songs), I was motivated to I do it after I saw a Romanian friend doing mashups.

Contact: robisacuiu@gmail.com

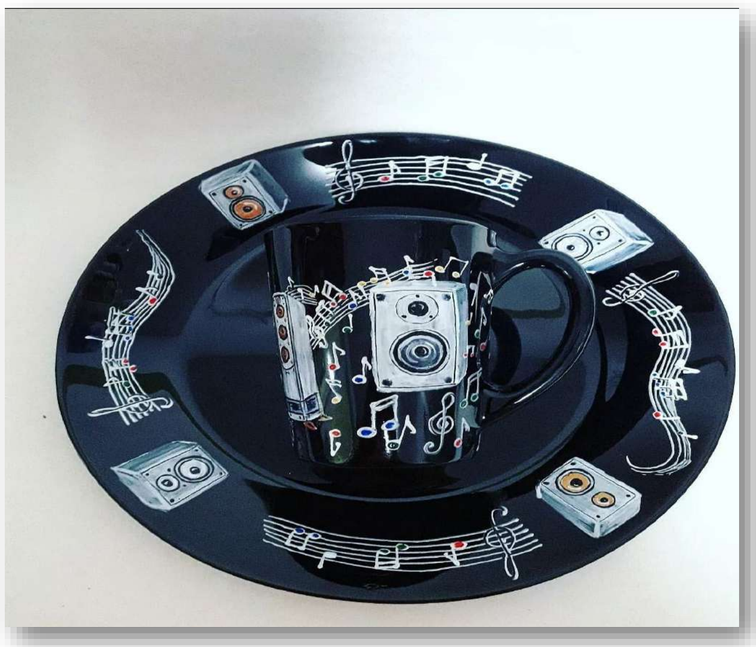
ART & PAINTING OF COLORS

AUTHOR: IULIA BARTOK

Painting is my passion and I do it with great enthusiasm and seriousness. Through painting I can express my imaginative and creative side which offers me the chance to delight people's eyes.

Most of my paintings are personalized and made according to clients requirements, representing: favorite activities, pets, portraits, favorite locations, flowers, favorite music. I paint on textiles, ceramics, glass and leather using proper and quality materials.

Customized products: Glass painting / Ceramic painting / Leather painting / Canvas painting



Contact:Instagram @iuliabartok iulia.bartok@gmail.com

MOMENTS
Craft Art

Author: IULIA BARTOK

K

This passion for making decorative products it started for me 10 years ago, from the desire to express my creativity and my abilities. Most of my inspiration comes from nature. To create the products I use different work techniques: decoupage technique, painting and handcrafting.

Some of the materials used to make handmade and handcraft products are: textiles, paper, rise paper, foam sheets, acrylic paints, varnishes, wood, candles and dried plants.

Creativity and inspiration in unique handmade and handcraft products made with love!

Contact: iulia.bartok@gmail.com

Caretta's Art

Angeles Made from organic Materials

Innovative ART Project

Author: Maria Liliana ZAGREAN

K

Mărțișor is Romanian tradition that marks the beginning of spring, celebrated on March 1st. Its origins are linked to ancient customs, associated with symbols of fertility and renewal. It believed that the mărțișor, a red and white string, brings luck and health. In the past, people would give mărțișoare to their loved ones as a sing of apreciation and to wish them a joiful spring.

Gifts from Nature!

With greate love and attention, we have handcrafted these mărțișoare in the shape of angels, each made from organic hemps. Each angel features a small tricolor flag, simbolizing our country's pride. The string is olso handcrafted from organic coton, adding an extra touch of autenticity and naturalness. Inspierd by the beauty of spring, these mărțișoare reflect the rebirth and joy that this season brings. We hope that each mărțișor wil bring happiness and remind us of our connections to nature and our traditions.

We invite you to discover the magic of spring through these unique creation.

Contact: caretta.foita@ gmail.com

SCAN ME

Caretta's Art

LAMPSHADES WITH SOUL

Innovative ART Project

Author: Maria Liliana ZAGREAN

K

I restore old lampshades and also create new ones, drawing inspiration from the beauty of our planet. During my walks in nature, I am captivated by the trees and diverse vegetation of the forest. Sunlight timidly filters through the dense woods, and the colors of the flowers are a soothing balm for the soul.

Wanting to bring the sunlight and the moon's shadow in to people's homes during quiet evenings and early mornings, I have created these small works of art. I hand-sew them using organic textile materials and handmade lace that is over 100 years old. These pieces not only provide light but also transform the space into an atmosphere full of mystery.

SCAN ME

,,Forest magic" is a lampshades inspired by the natural beauty of forest. With an elegant design and warm colors, it brings a touch of nature in to any room. Its delicate details evoke images of tall trees and light filtering through green leaves, creating a relaxing and mysterious atmosphere.

The ,,Marine Reflexions" lampshade brings a touch of the ocean in to any room. Inspired by the beauty and mystery of the deep sea, this lampshade combines shades of blue and green, evoking the waves and the light dancing on the water's surface. Its elegant design fit perfectly in to any decor, providing a relaxing and inspiring atmosphere.

Contact: caretta.foita@ gmail.com

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Jam's Art

IN LOVE

Innovative ART Project

K

Author: Jamina RIEDEL

This is the story about two different pieces. They come together, late in their life. The black stone, beautyfull, shining, strong but broken. The plasticfilm, more than hundreds, heated and colded, pressed and bented but empty inside.

They met on an iron base, in intimate embrace, life is created in all colours of the rainbow!

Contact:
jaminaa12@gmail.com

Presentation link:
https://www.saatchiart.com/account/artworks/1104419

SCAN ME

Ema's Art

EQUILIBRIUM by EMA

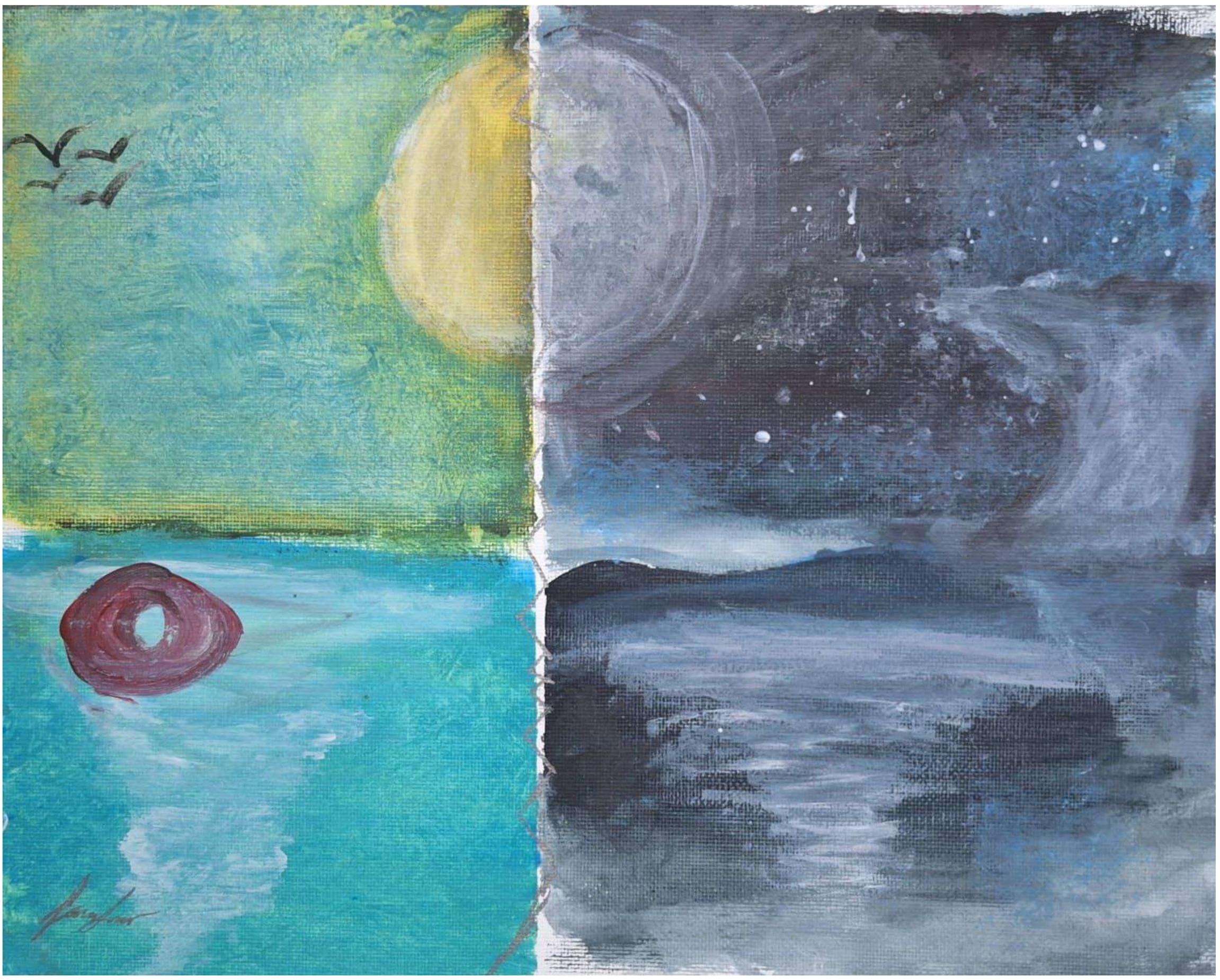
ART Project

Author: Emanuela Paula ENACHE

K

I am a student in the 4th grade of the "Sigismund Toduță" Secondary School, a structure that belongs to the "Anghel Saligny" Railway Transport Technological High School in Simeria.

This painting suggests the balance between light and dark, between day and night. Emanuela Enache explores the beauty of contrasts and the connection between two seemingly opposite but complementary realities.



The work can be interpreted as a reflection on the passage of time, the cyclicality of life or the inner duality of every human being.

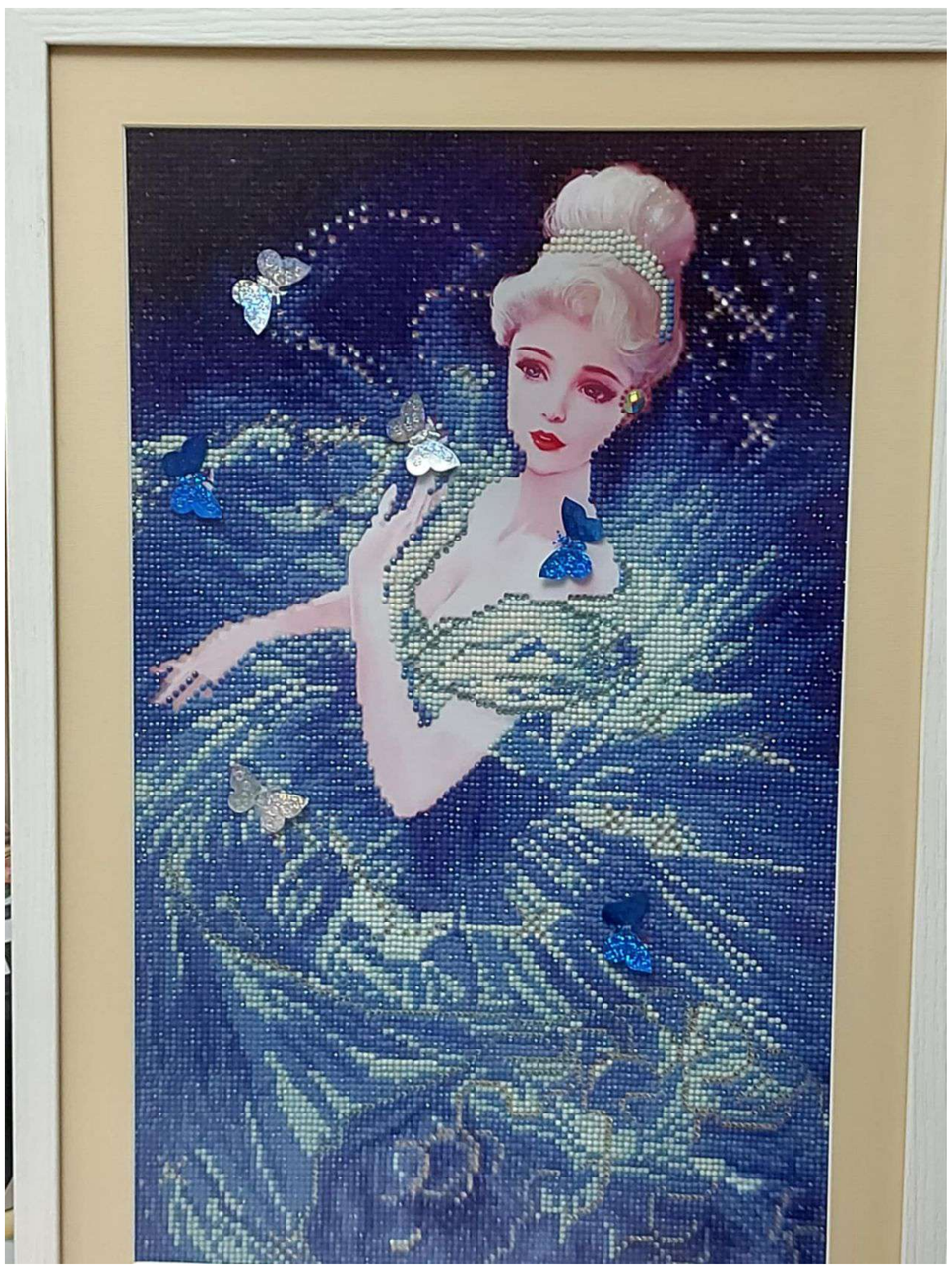
The painting impresses with the use of colors and the way the two parts merge, creating a strong visual effect and a harmonious composition. It is an invitation to introspection and to appreciate the beauty of every moment of the day and of life.

DIAMOND TAPESTRY

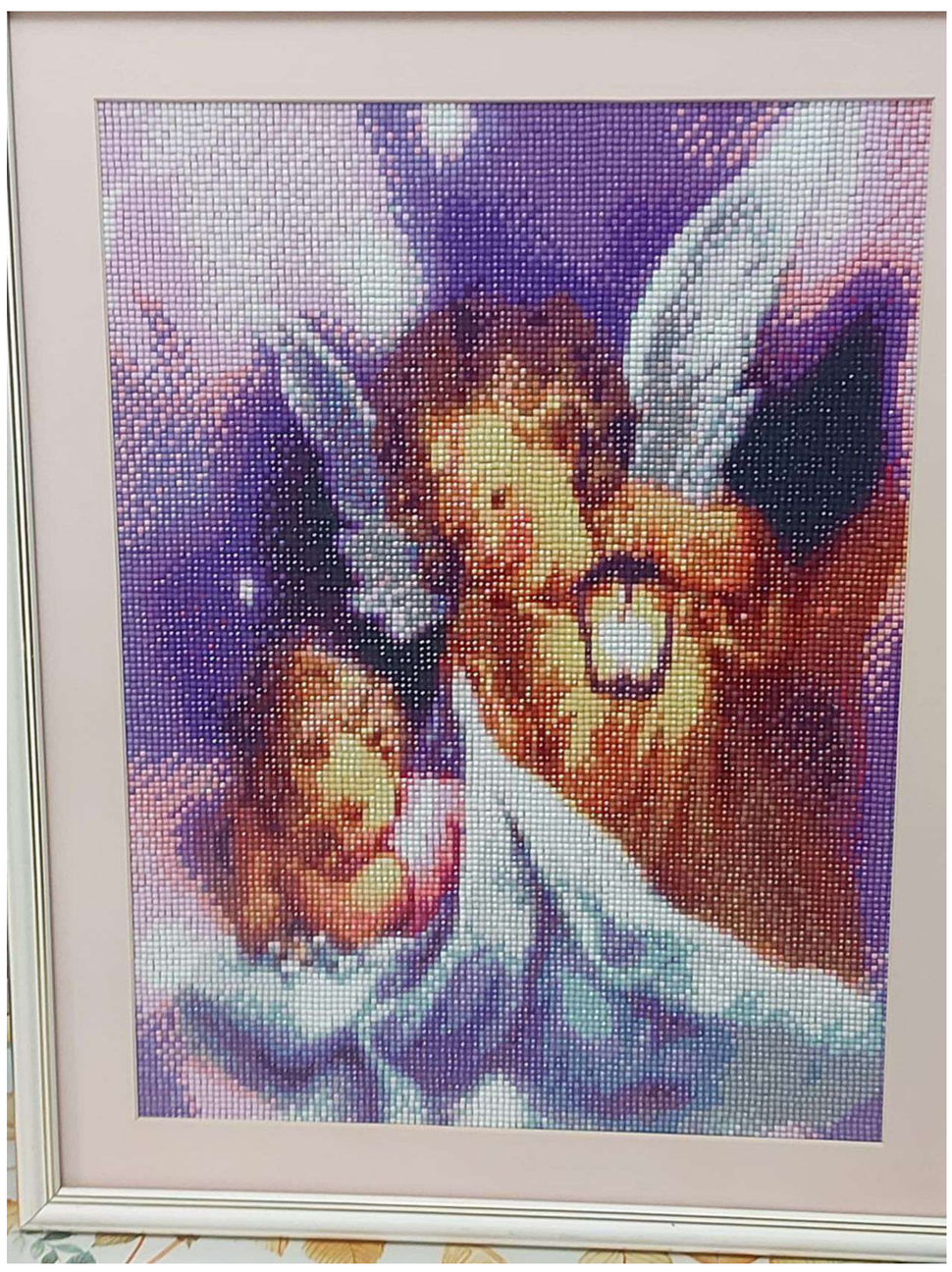
Author:
Zsiros Sándorné (Monor)

K

Diamond tapestry does not require a needle and thread. Examples include iron-on beads, pixel hobby, mosaic technique and the latest diamond puzzle. The essence of each is almost the same: the whole or parts of a picture are divided into small mosaics, and the pattern created in this way must be assembled from the small components. These novelties are modern versions of tapestry or cross-stitch embroidery.



Cinderella



Guardian Angel

Contact: otletclub.idea@freemail.hu
Presentation link: https://otletclub.5mp.eu/web.php?a=otletclub

ORIGINAL PAINTING REPRODUCTION HAND-STITCHED TAPESTRY

Author:

Mária Zsiros-Bokros (Monor)

K

Tapestry is a form of textile art, traditionally woven by hand on a loom. Normally it is used to create images rather than patterns. Tapestry is relatively fragile, and difficult to make, so most historical pieces are intended to hang vertically on a wall (or sometimes in tents), or sometimes horizontally over a piece of furniture such as a table or bed. Some periods made smaller pieces, often long and narrow and used as borders for other textiles. Tapestry, made with half cross stitches. Half or quarter stitches for the finest details. Made with divided embroidery thread.

Winter Farm tapestry

Riverside tapestry

Contact: otletclub.idea@freemail.hu

Presentation link: https://otletclub.5mp.eu/web.php?a=otletclub

Caretta's Art

TRANSFIGURATION

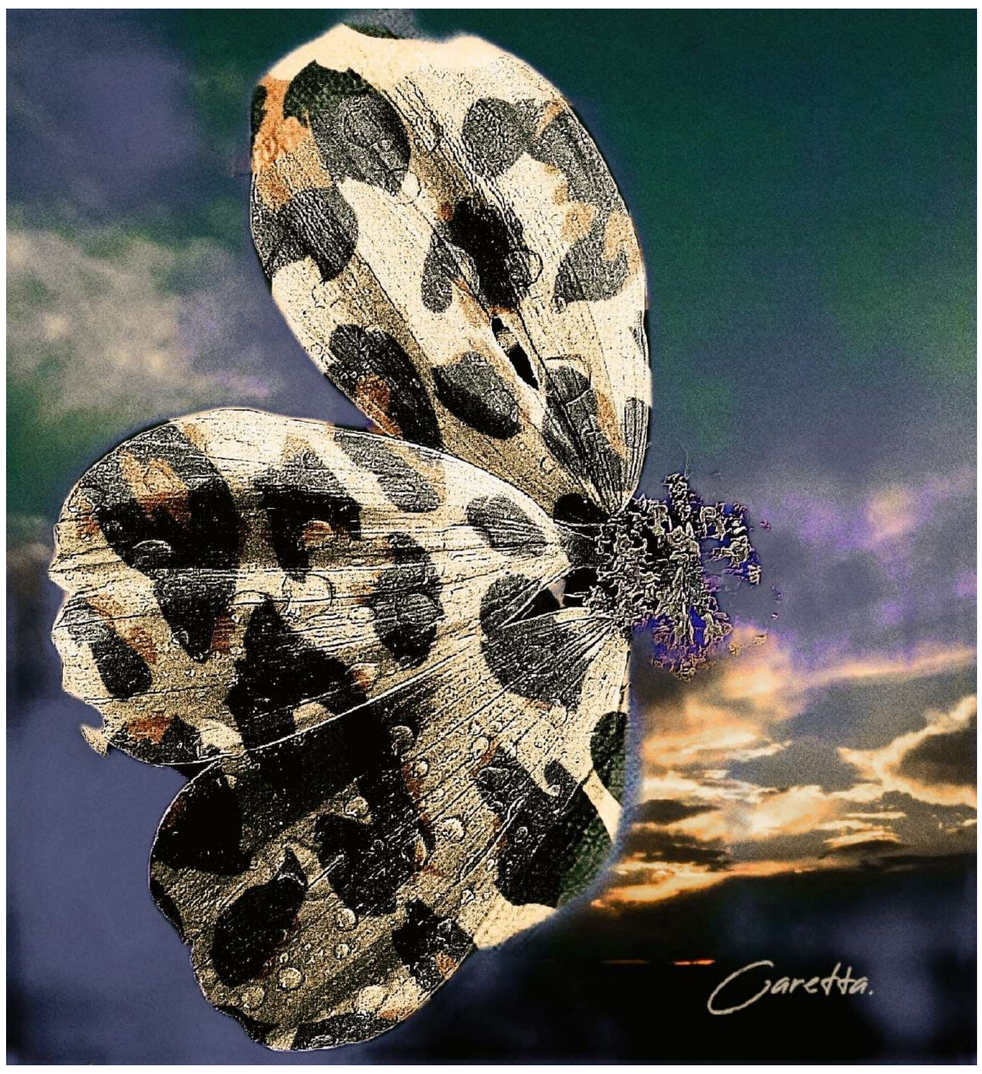
Innovative ART Project

Author: Maria Liliana ZAGREAN

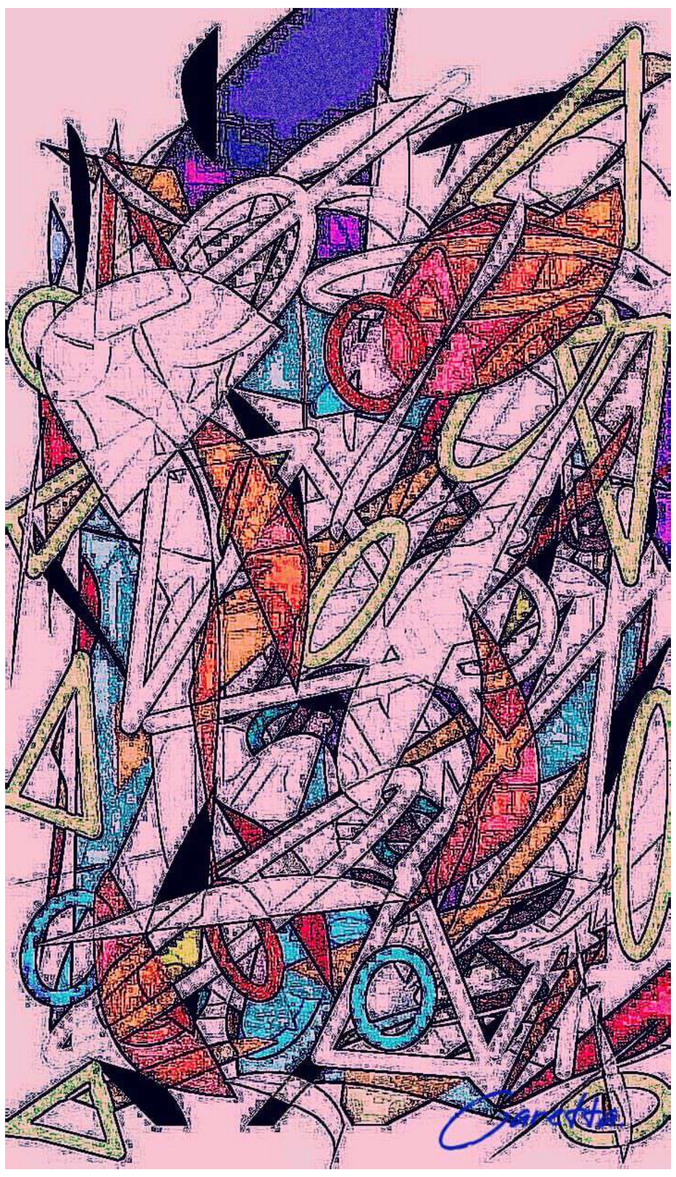
K

I don't create the abstract, nature create it for me, and this is reflected in my works of art. On an empty road with a shy point that easily tries to turn into lines that take on different shapes and color.

Since I was a child, I was fascinated about the wonder around us. The changing colors of the seasons, they make myself live a magic dream and as intensely live dreams become reality, 14 years ago, I had the opportunity to purchase a professional camera.

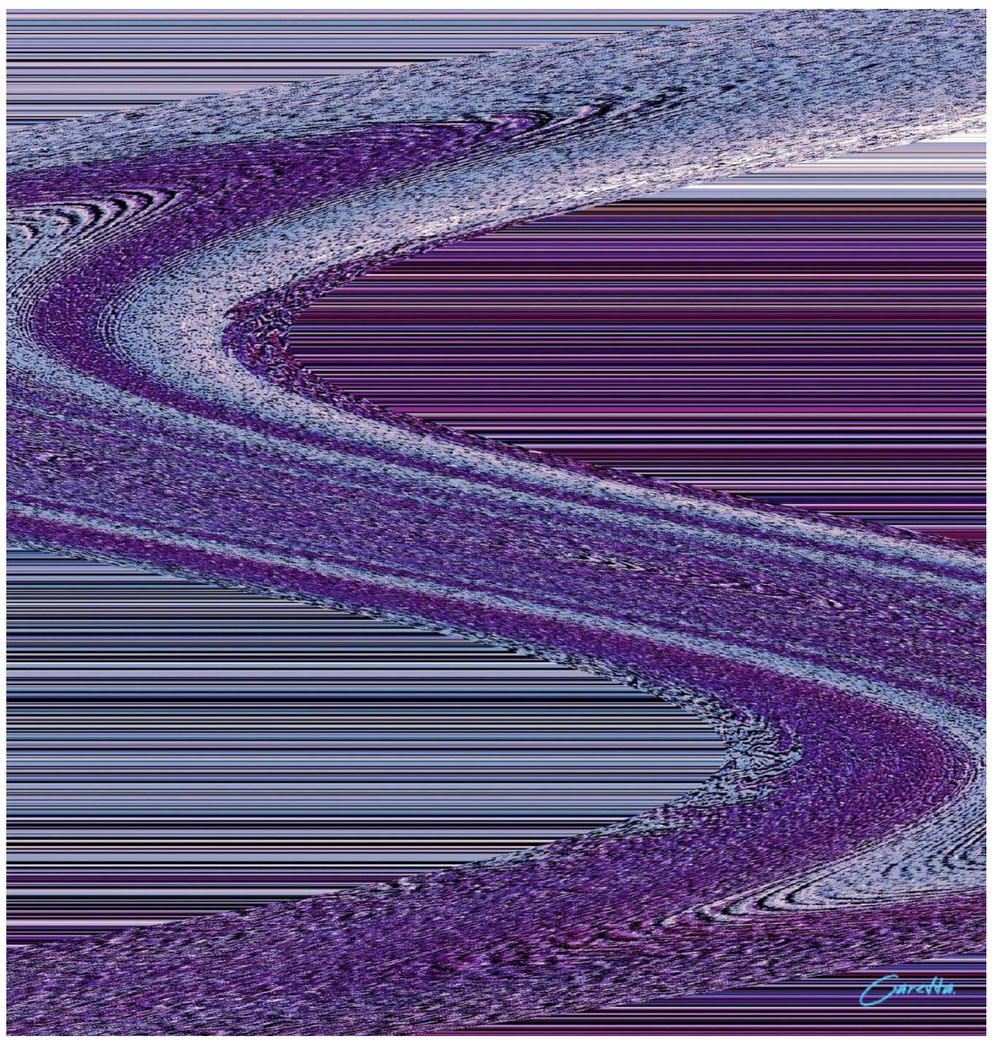


Fly to heaven



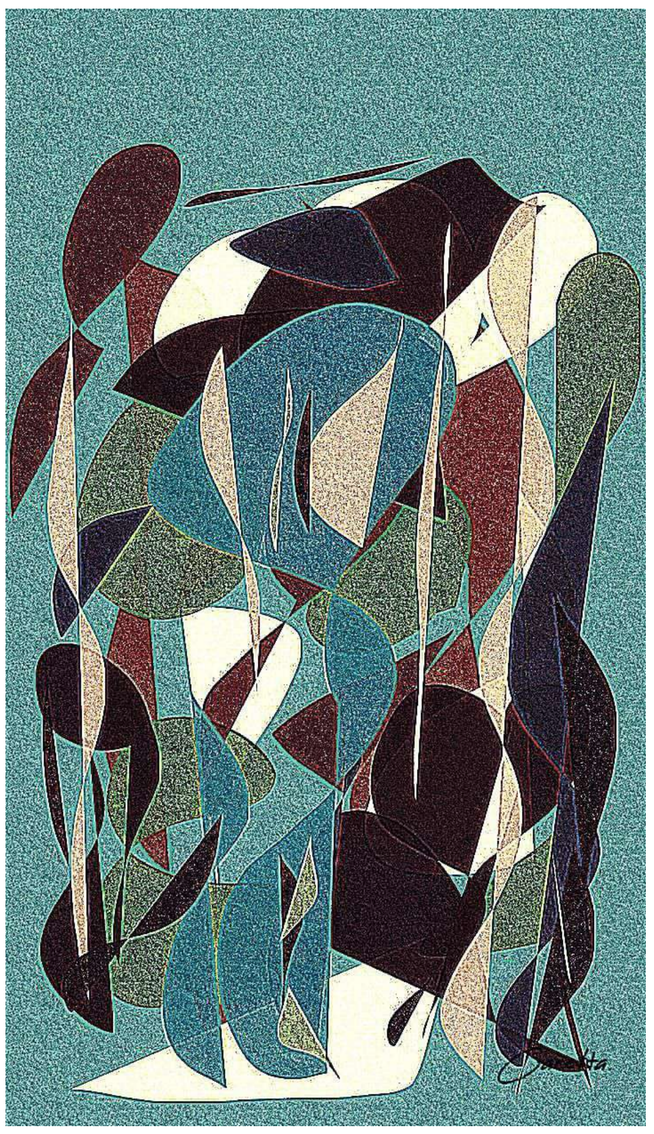
Inspired by Lissitzky
Running ahead of the bike

Opening the hard way



Waves of lavender

SCAN ME



The freedom of the sleepwalker

Contact: caretta.foita@ gmail.com

Romanian Folk Tales

AI Generated Art

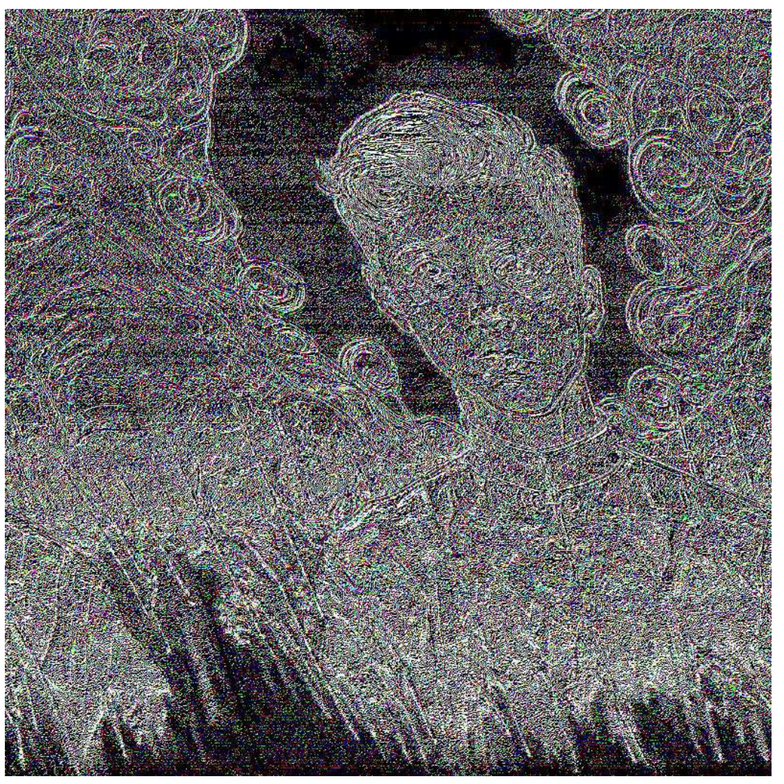
Author: Irina Fachin

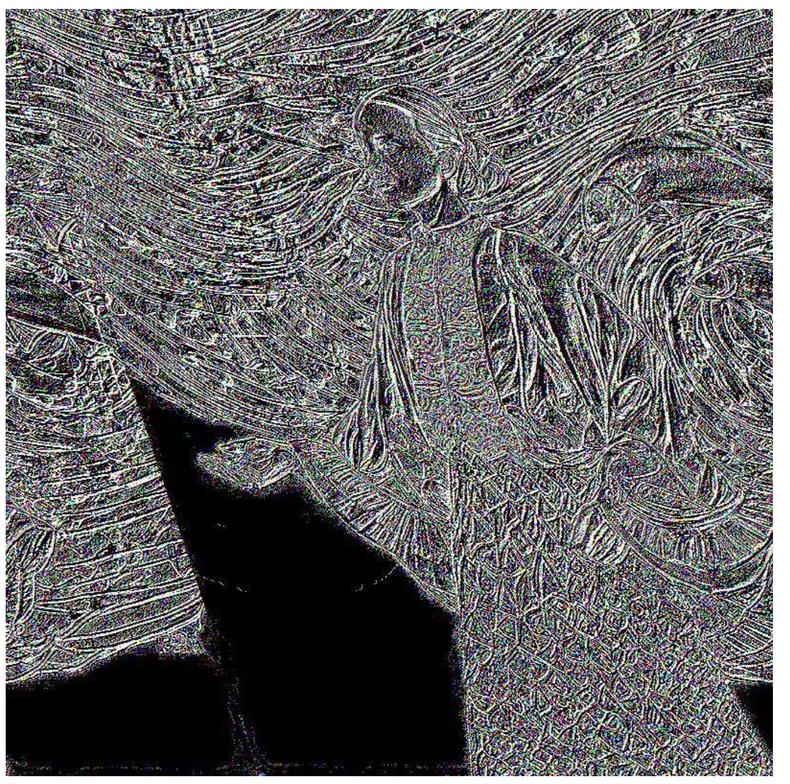
K

“Romanian Folk Tales” unveils a digital tapestry of Romania’s rich folklore through AI artistry. The exhibit features young Romanians adorned in traditional costumes, their garments rendered with striking detail against fantastical landscapes. Each artwork is a digital homage to the nation’s heritage, blending historical motifs with contemporary art techniques.

The gallery space becomes a bridge between eras, where AI interprets timeless stories in a visual format. The portraits are more than mere images; they are narratives that celebrate Romania’s cultural saga, re-envisioned with a touch of modernity. Visitors are invited to traverse this fusion of past and future, where each piece resonates with the echoes of folklore.

Expanding the narrative, the exhibition offers a unique perspective on tradition and technology. It’s a creative exploration that challenges the boundaries of art and storytelling. As viewers move from one piece to the next, they engage with a visual feast that redefines the essence of Romanian folk tales for a new generation.





Contact: +40.770.212.357
Instagram: https://www.instagram.com/virtualmedianet/
Facebook: https://www.facebook.com/virtualmedianet.eu/
X: https://twitter.com/v1rtualmed1anet

CONTEMPLATION IN SHADOWS

Photography project

Author: Stoica Adrian

K

A photograph veiled in darkness and laden with significance, "Contemplation in Shadows" brings together the essence of mystery and the delicacy of a profound gaze. Wrapped in a jute veil that shrouds her head and shoulders, she creates an aura of mystery, hinting at an untold story. In her hand, a flower becomes a symbol of fragility and the ephemeral passage of time. The soft light highlights the textures of the jute and her skin, creating a contrast that underscores beauty in a unique form.

Gazing directly at the viewer, the woman exudes a deep sadness, and the dancing shadows on her face accentuate the contemplative expression.

It's a scene where each element seems to contribute to the whole, suggesting a search for deeper meaning and reflection on the unseen mysteries of existence.

"Contemplation in Shadows" is a dialogue between light and darkness, an introspection into human emotions, and an invitation for the viewer to unravel the hidden secrets and subtleties within the shadows of this artistic composition.

SCAN ME

Contact:

adistoica21@gmail.com

www.adistoica.ro

SPRING SYMPHONY

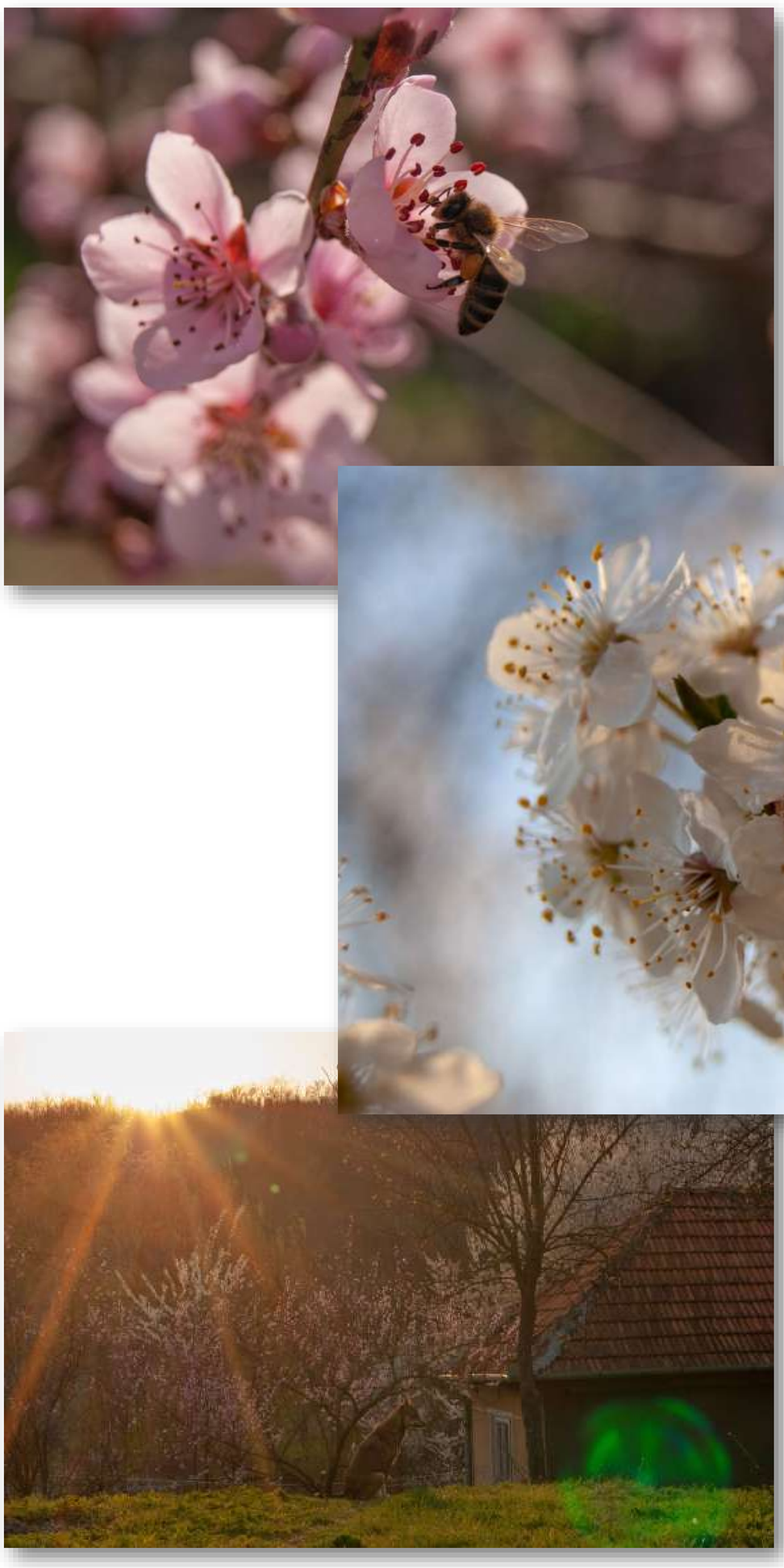
Photography project/Innovative art

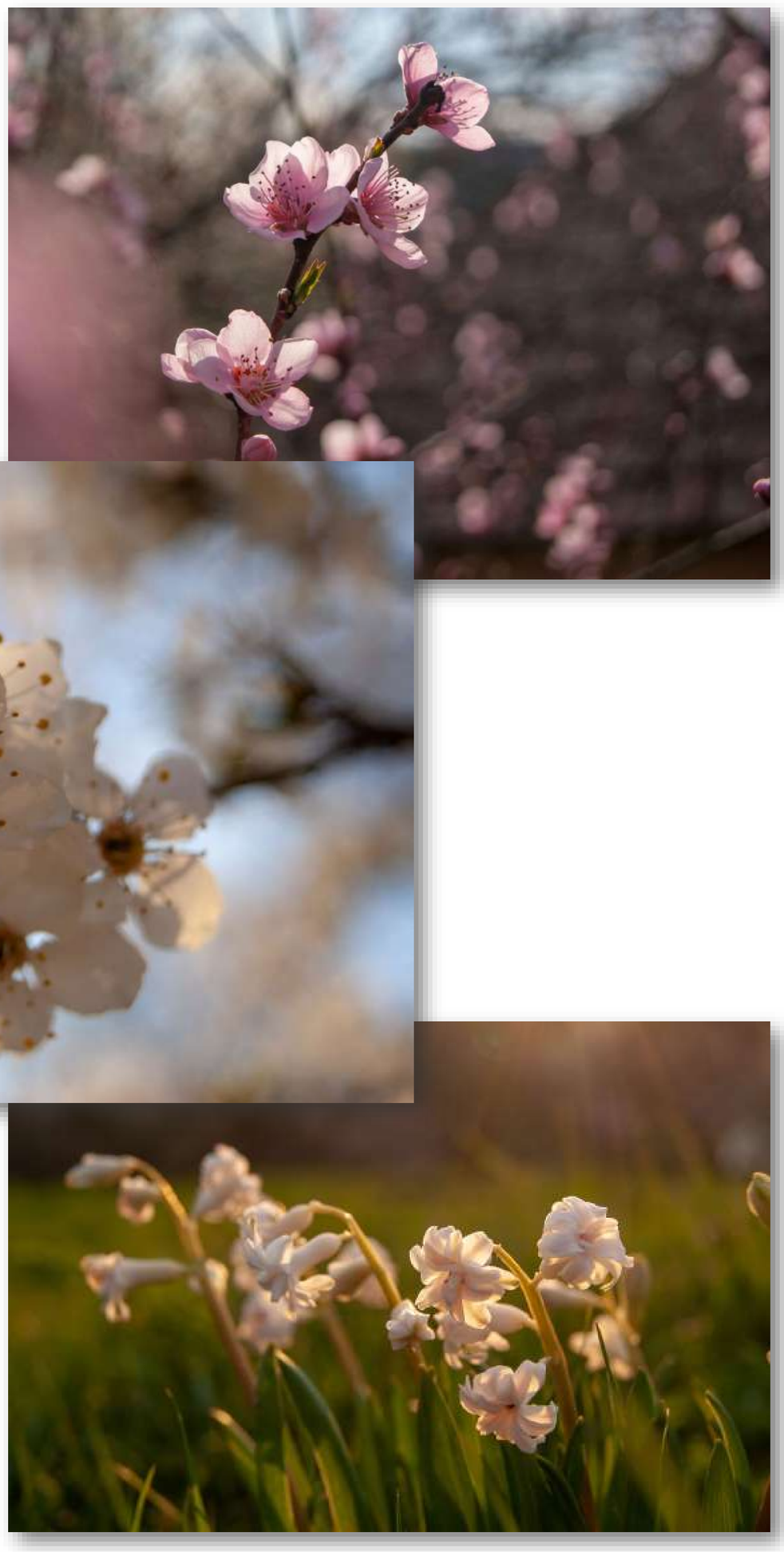
Author/s: Diana Miruna Armioni

K

"Spring Symphony" invites you to immerse yourself in the enchanting beauty of spring blossoms captured through the lens. Explore a kaleidoscope of colors, textures, and intricate details as nature orchestrates its annual symphony of renewal and vibrancy.

From delicate petals to lush landscapes, each photograph celebrates the ephemeral yet timeless grace of springtime blooms. Let these captivating images awaken your senses and inspire a deeper appreciation for the fleeting wonders of the season.





Contact: armionimiruna@yahoo.com

CORINA's Art

THE POETRY OF CREATION

Author: Corina Gianina Popa (Uieț)

K

The miracles of everyday life in the battle against the elements. Water, sun, sky, earth, sunset, grace, the wonders of the Creator.

Contact: popa.corina@hotmail.com

“Ordinary”

Student Project

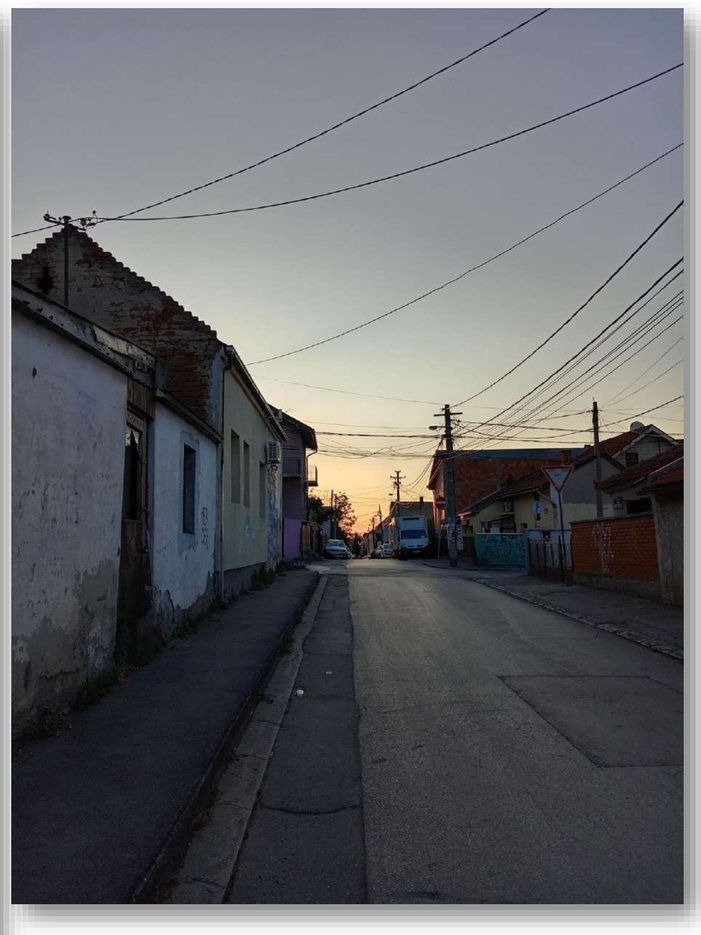
Author: Maksimović Milica

K

I tried taking pictures of the beautiful scenery of my hometown. What I ended up with were pictures that inspire a dream-like sense of adventure, like anything’s possible. Rather than representing my hometown, it’s more of a look into how I view my surroundings.

Without capturing any important landmarks, I simply took my camera with me on a walk, taking pictures at odd angles and getting inspiration from the “ordinary” world around us.

I made shots that were interesting to me, and I hope you can enjoy them too and find some inspiration from them.



Contact:

milicamaksimovic200@gmail.com

+3811622955510

THE CONCEPT OF SUSTAINABLE SYSTEMS MARKETING AND ARTIFICIAL INTELLIGENCE (AI) IN PHOTO AND VIDEO

Student project

Authors: Mădălina MIHOC, Mihai MIHOC

Mihoc Studio is a photo-video company that offers both digital and hard copy material.

The description of the problem is very simple, because recycled paper is a scarce resource on the market, the demand for recycling paper is higher than the supply.

The collection of paper for recycling is poor in Romania, so that only a little more than half of this waste ends up being recovered and transformed into new products.

Our solution is to create sustainable products, services and experiences. One of the simplest decorative objects made from paper is origami. It is only necessary to follow a few steps and we will obtain various shapes from paper that will delight our customers. Origami can be made from coloured paper or from white paper, written paper or wrapping paper.

Mihoc Studio found a solution to this problem, so we decided to recycle and reuse paper. Printing can also result in defective pictures. These defects can be generated by the printer, but also in some cases where the brightness is not the desired one. In addition to photo paper, we also have documents that are no longer useful. The equipment used is: shredder, shredder/blender, frames, mesh, paper, water pot. All these papers of different thicknesses, sizes and layouts become waste.

With a shredder we shred the paper, and with a kitchen shredder we have ground the previous product, where we also added water to make the pulp.

The paper used is not plasticized. Plasticised and contaminated paper it is harder to recycle. With the help of a screen and a sponge I attached the ground paper, and after this process, I put everything to dry.

This way we created: pages for the album, letters, cards, decorations that we can cut and paint as we want, bookmarks.

In conclusion, the development of a strategy is influenced by the status of the business: where it is in the current market, what resource potential it has.

Contact: madalina@mihocstudio.eu +40767333661
vaduvaiulianateodora@gmail.com +40724980731

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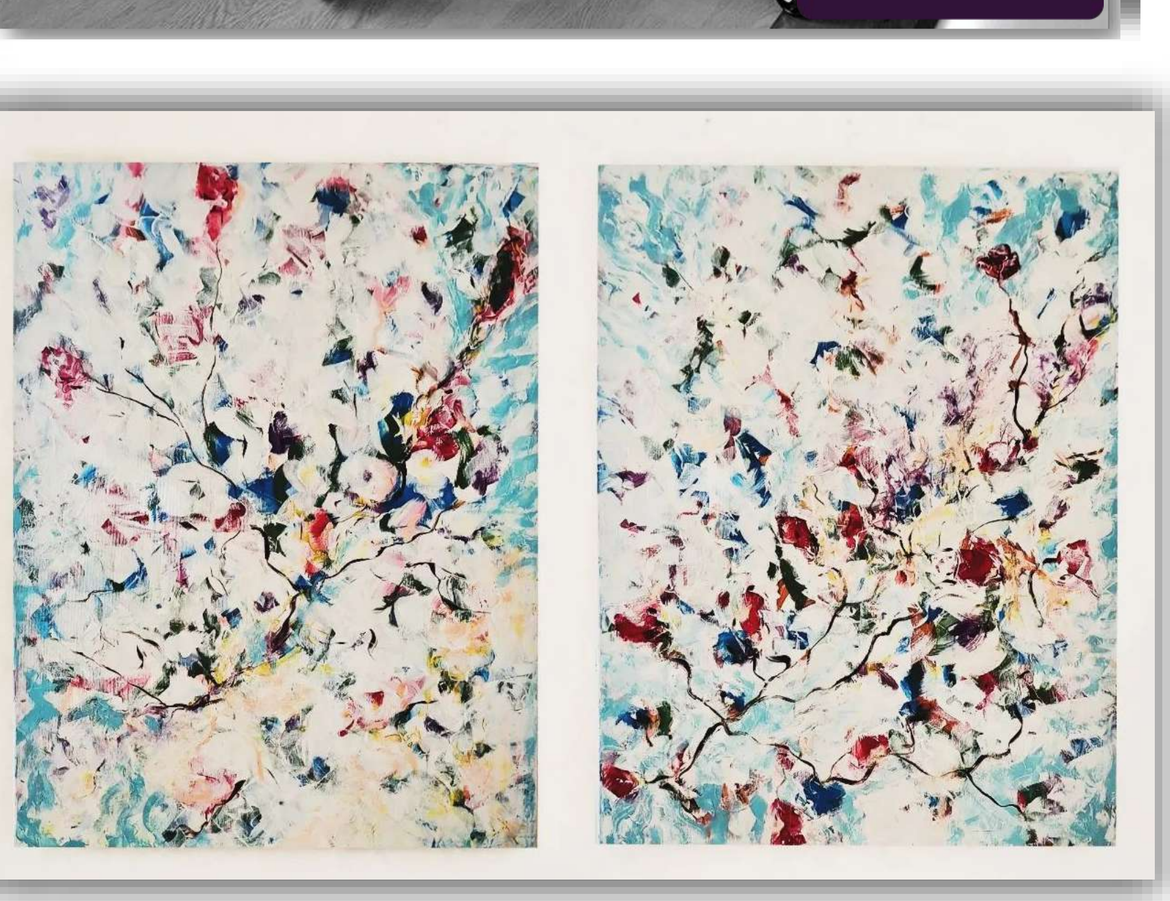
Violeta Art

THE MIRACLE OF INTUITIVE PAINTING

Author: Violeta COPROS

K

I discovered intuitive painting recently, I wasn't necessarily looking for it, it came to me somehow naturally, being fascinated by how creative this practice can be. For me it was a new thing, and as C.G Yung said, "Creating something new is not done with the help of reason, but through the play of instinct, which acts from an inner necessity" I gave free rein to my imagination with the help of colors on the canvas.



Contact: foltutvioleta71@gmail.com

Liceul de Arte "Sigismund Toduță" Deva

MARIA'S MYSTERIES

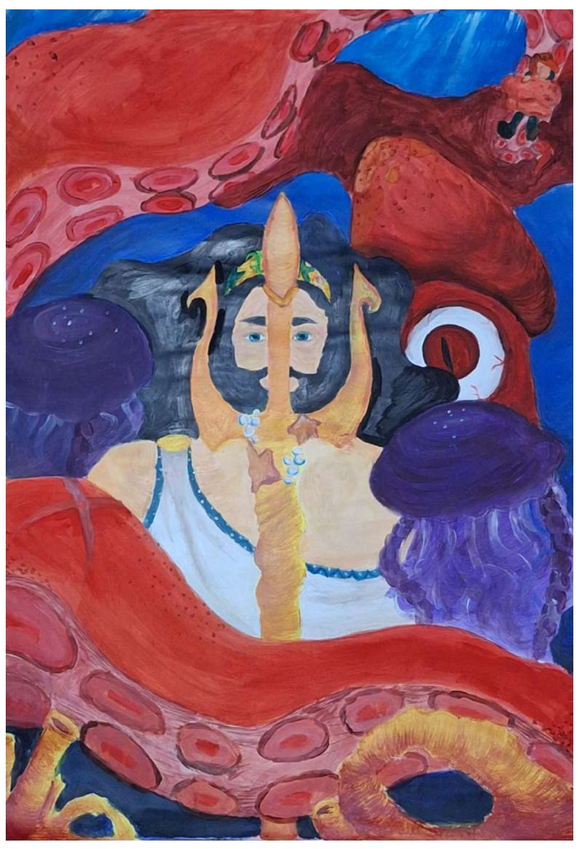
ART Project

Author: Maria Gabriela HOLOBUȚ

K

I'm a student in the 9th grade of the "Sigismund Toduță" Art High School in Deva. I was born in Portugal, on September 22, 2009, and from an early age I manifested a special sensitivity towards art. I felt drawn to color, finding it useful to express my feelings on any material that could take on color and life. In addition to color and fine art, I like music, the guitar being an instrument in which I trained my curiosity to discover secrets, self-taught.

Ever since elementary school, painting has been a way to express my colorful universe.



Contact: holobutmariagabriela@gmail.com

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Universitatea Politehnica Timișoara

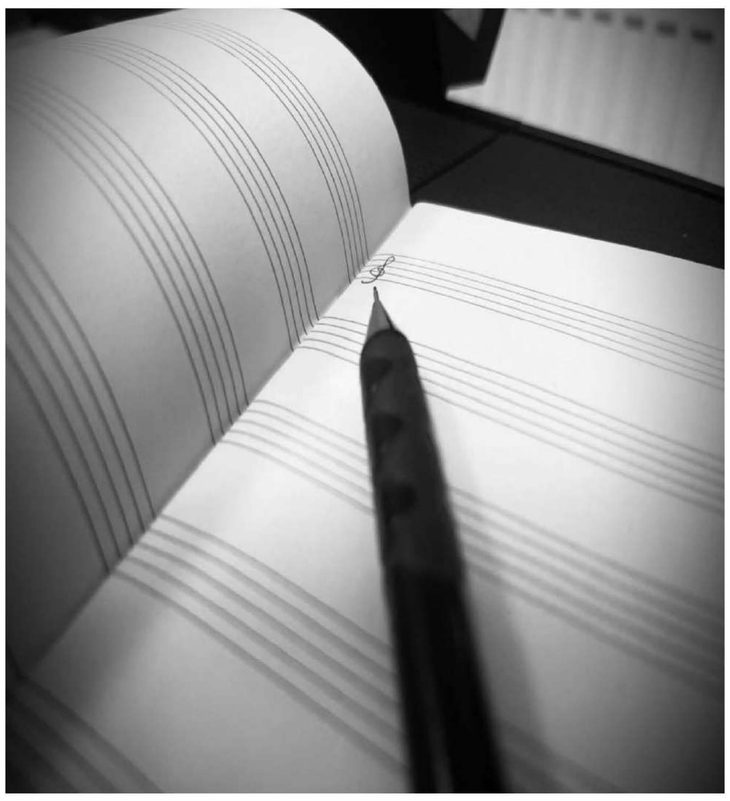
Peaceful Song

Piano concert

Adrian-Emanuel IUGA

K

Peaceful song is a piano concert performed in the F major chromatic scale, the F major chromatic scale includes all the musical notes starting from F to the next F (12 musical notes are used, compared to the standard F major scale consisting of 7 notes).

It is a concert that can be performed both on piano and in an orchestra composed of piano, violin and harp. For the best experience, the concert will be performed in the musical standard A432Hz, which means that the instrument will be tuned so that the A note in the 4th octave has a frequency of 432Hz.

YouTube

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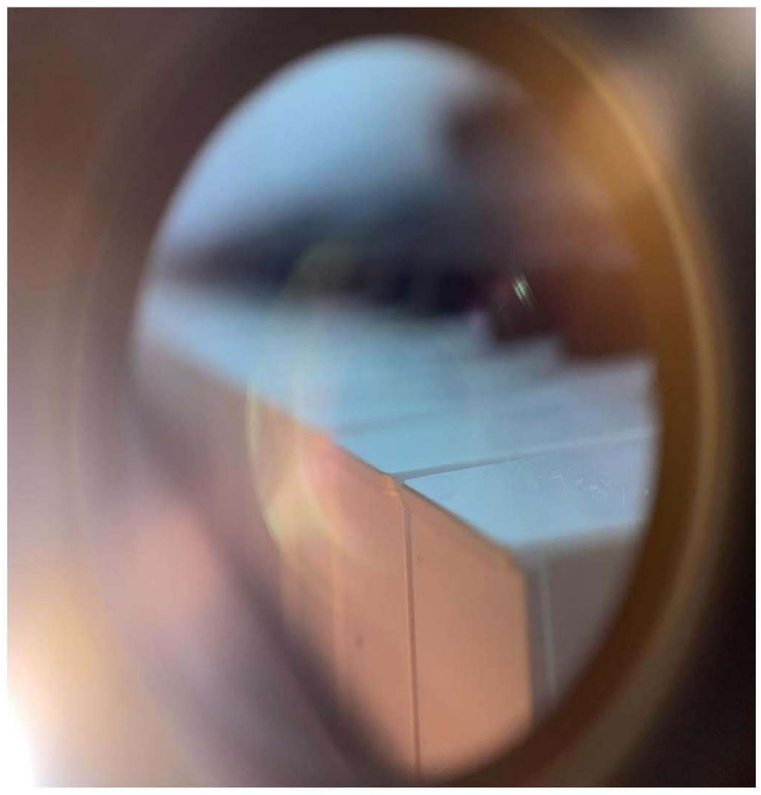

The purpose of the concert is to give peace, healing, well-being, to refresh the soul!

Contact: adrian.iuga2@student.upt.ro

Before the Petals Scatter in the Wind

AI Generated Anime

Author: Irina Fachin / Virtual Media Net

This 3:30 minute animated short film was entirely created with AI generation tools (script, images, videos, music, voice) in the style of Japanese anime.

Inspired by the Japanese concepts of "mono no aware" (the awareness of the impermanence of things) and "ichi-go ichi-e" (treasuring the unrepeatable nature of a moment), this animated film follows a young Japanese girl as she contemplates deep philosophical questions about the passage of time and the beauty of life's small joys, inviting us to pause and reflect on how we can truly cherish the moments that matter most.

WATCH

VIRTUAL MEDIA NET specializes in immersive media (360 photos and videos, virtual tours) and AI generated content (images, videos, music)

WATCH

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Facebook: https://www.facebook.com/virtualmedianet.eu/
X : https://twitter.com/airina_xyz

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MOLDOVA STATE UNIVERSITY
Institute of Genetics, Physiology and Plant Protection
Laboratory of Genetics and Plant Resistance
60, Alexei Mateevici str., MD 2009, Chisinau, Republic of Moldova
Tel.: (+373) 79630734; E-mail: vasile.botnari@sti.usm.md

AGRO BIOLOGICAL AND TECHNOLOGICAL PECULIARITIES OF ONION AND GARLIC CROPS

Book: ISBN 978-9975-165-35-8

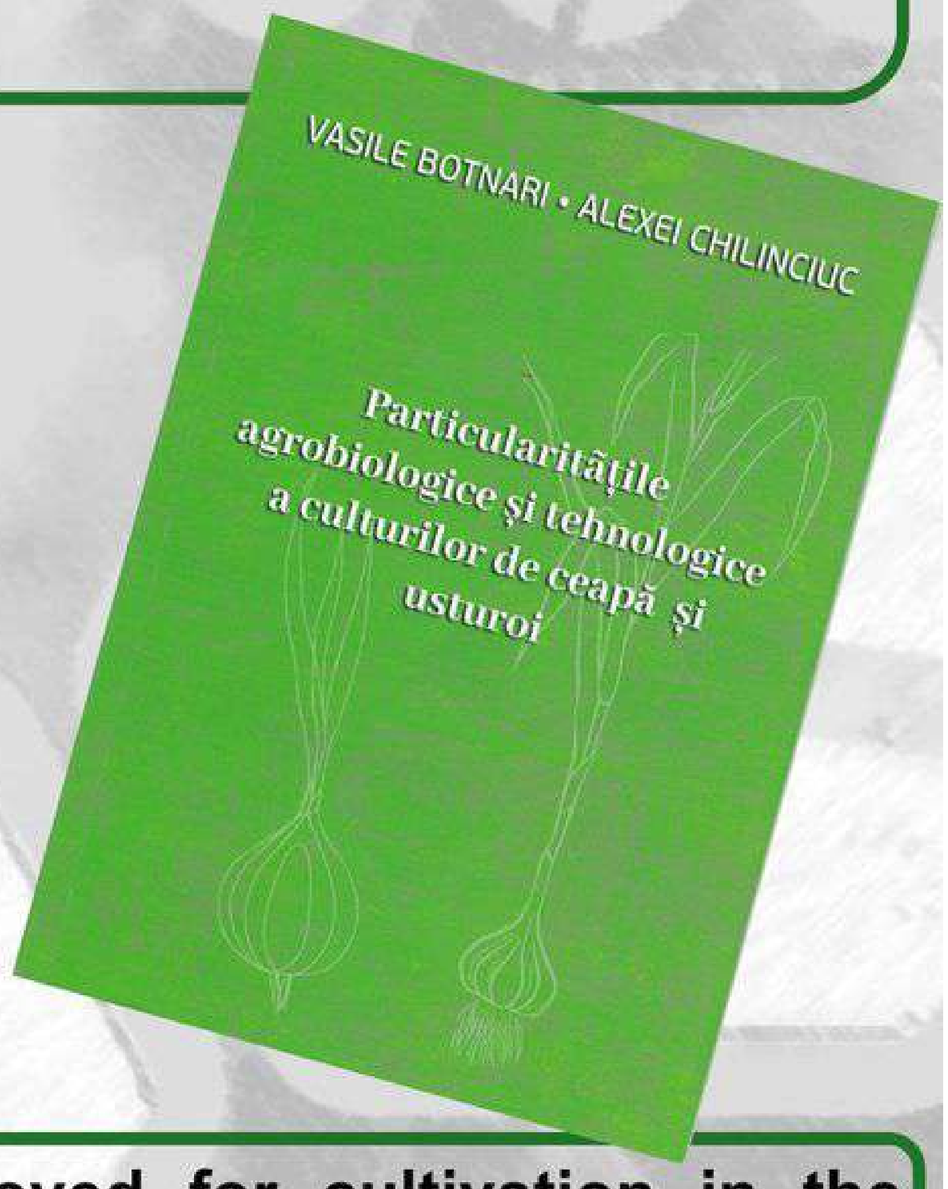
AUTHORS: Vasile BOTNARI, Alexei CHILINCIUC

APPLICATION FIELDS: Agronomy.

AIM: Dissemination of results and scientific implementation in the real sector of the economy.

SOLUTION: The work is intended for agricultural specialists, students, master's students, farmers and other categories of producers, as well as for all those interested in growing vegetables.

ADVANTAGES: The guide presents good practice information, accompanied by color illustrated images that facilitate the acquisition of knowledge regarding the agrobiological and technological peculiarities of onion and garlic crops.



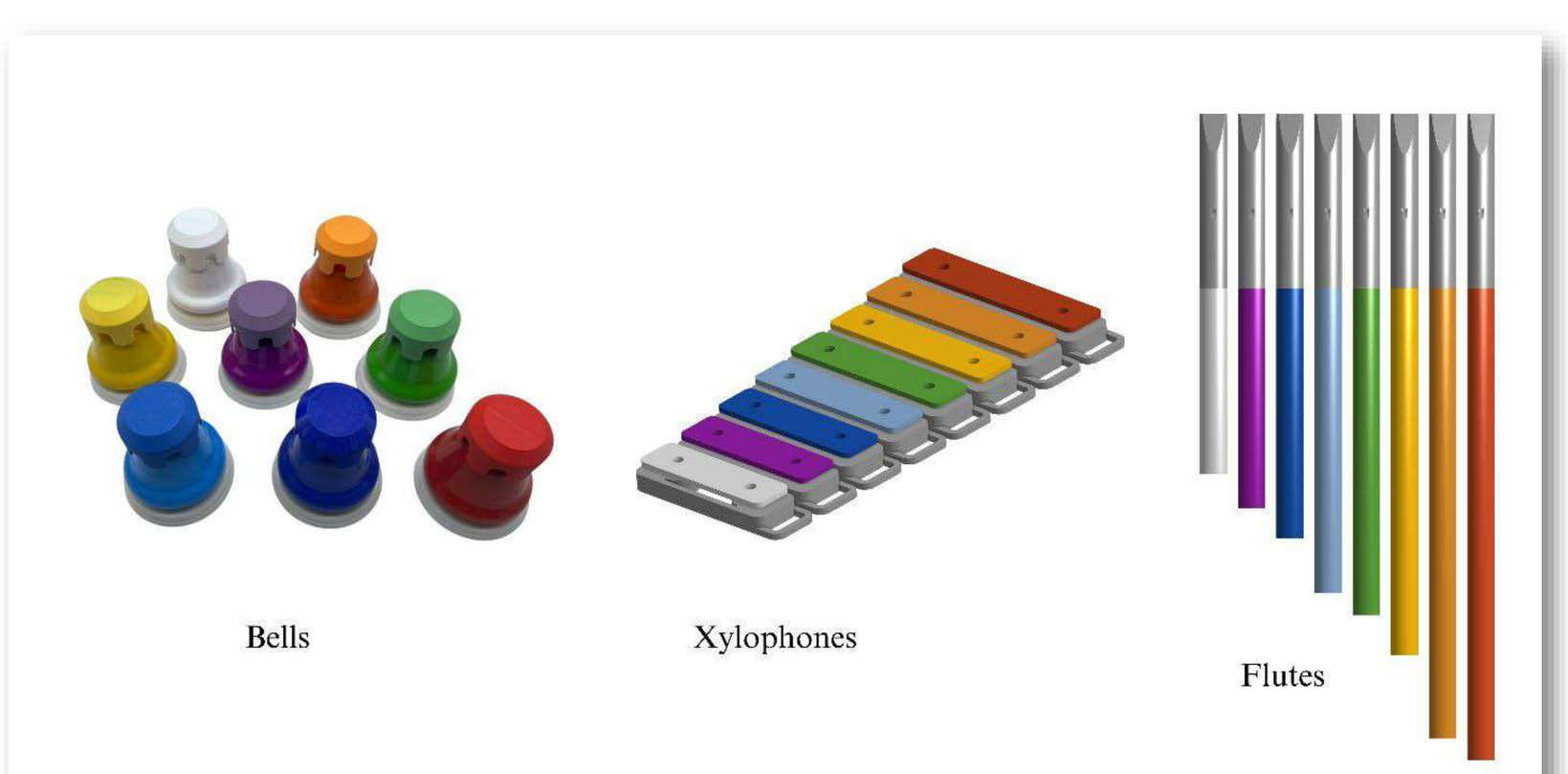
IMPLEMENTATION STAGE: Variety approved for cultivation in the Republic of Moldova.

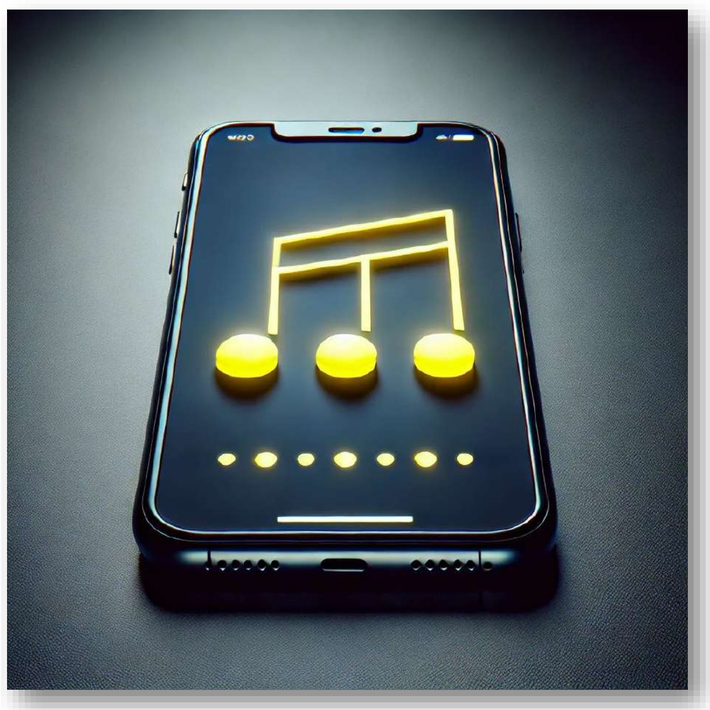
ACKNOWLEDGMENTS: This research was supported by the Research Subprogram 011102. Increasing and conservation genetic diversity, agricultural crop breeding in the context of climate change, financed by the Ministry of Education and Research.

Music Without Barriers

Phongphol Damrongrat, Kornsiripatchara Damrongrat
Advisors: Kaewkan Yambangyang, Parinton Jangtawee,
Jeerasak Jitrotjanarak

Music Without Barriers is a social innovation that makes music accessible to everyone, including individuals with disabilities and mental health challenges. The project redesigns basic musical instruments—such as bells, xylophones, flutes, and guitars—into simplified one-note versions, making them easy to play. A color-coded system replaces traditional notation, enabling intuitive learning. The initiative includes an interactive digital platform, workshops, and community outreach programs. By combining music, technology, and inclusivity, the project fosters joy, creativity, and emotional well-being for all.





Contact: j_jerasak@hotmail.com

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Cristian Fodor

O viață prin cântec

La vârsta de 13 ani, pe care o avea Cristian Fodor pe când câștiga premiul I la Festivalul "Să fim copii" din Orăștie, cariera sa de interpret de cântec popular se anunţa ca o promisiune.

Astăzi performanţele sale vocale îl situează cu certitudine pe drumul ascendent către galeria de frunte a cântăreţilor ardeleni.

Cristian Fodor s-a născut la 7 iunie 1981, la Cugir, judeţul Alba, beneficiind încă din primii ani de viaţă, în familie, de o ambianţă propice apropierii de cântecul popular românesc. Primul mare premiu câștigat în 1994, a fost urmat, pe parcursul unui întreg deceniu, de numeroase alte distincţii și titluri de laureat, cu precădere în concursurile din zona Transilvaniei, dar și la Concursul "Moștenitorii", al Televiziunii Române – premiul I în anul 2000, la prestigiosul festival "Toamna Buzoiană" al cărui trofeu îl cucerește în anul 2001, la "Festivalul Naţional studenţesc de Folclor – Premiul I – Iași 2002, și la Concursul Naţional "Floarea din Grădină", al cărui trofeu i se atribuie în anul 2003.

Trei albume personale și două albume colective, dintre care unul de colinde, completează un palmares artistic al lui Cristian Fodor, de acum consacrat unei cariere profesionale de cântăreţ popular, chiar dacă specializarea în marketing și studiile academice economice, pe care le-a urmat îi deschid și alte perspective.

Dragostea și dăruirea sa pentru cântecul strămoșesc, precum și nevoia cântăreţului de a se identifica cât mai mult cu stilul tradiţional al zonei, l-au îndreptat către o susţinută activitate de culegere a folclorului în satele din jurul Orăștiei : Căstău, Orăștioara de Jos, Orăștioara de Sus, Costești, Bucium, Beriu, Grădiște (Valea Costeștiului) și Geoagiu, Homorod, Renghet, Văleni, Bozeș (Valea Geoagiului) precum si în satele din vecinătatea zonei Apusenilor.

Este un interpret cu personalitate care îmbină remarcabile calităţi vocale, cultivate cu grijă, graţie unei tehnici dobândite și prin experienţa cântului și prin studii de canto popular.

Vocea sa plăcută de tenor, are o culoare personală, cu inflexiuni calde, valorificate cu generozitate în frazele de amplă respiraţie ale doinelor sud-ardelenești, pe care le recreează uneori, reașezând variaţiuni ale unor motive melodice tradiţionale în noi întruchipări strofice. Ambitusul de o întindere remarcabilă – îi permite să abordeze cu succes și melodiile instrumentale de joc, adaptate interpretării vocale.

Tehnica de care dispune se remarcă în numeroasele pasaje de virtuozitate pe care le atacă fără nici-o greutate, în pofida frecventelor salturi vocale dificile, a pasajelor și seriilor ritmice de agilitate și de factură instrumentală, reușind să pună în valoare, cu virtuozitate, – melodii crenelate de învârtite, ţarine, jiene, haţegane...

O respiraţie amplă și o susţinere vocală impecabilă a tonurilor prelungi ale doinelor sud - ardelenești, un vibrato îngrijit și cald, excelând în nobleţea unor finaluri cu nuanţe diminuate, completează acest profil vocal.

Contact: evenimente@cristianfodor.ro https://cristianfodor.ro/
Presentation link: https://cristianfodor.ro/video/

SCAN ME

LIVE STREAMING PRODUCTION

Authors: Multimedia Class LTE "Dragomir Hurmuzescu" Deva
mentor Marius DRAGOMIR

K

Our Multimedia class is passionate about technology, creativity, and innovation. We specialize in digital media, video production, and live broadcasting, gaining hands-on experience in modern communication technologies.

At **InventCor 2025**, we are proud to support innovation by providing **live streaming** of the event on the social media channels of **Corneliu Group Association**, the official organizer. Our goal is to bring the event closer to the public, ensuring that every moment of creativity and technological advancement reaches a wider audience.

Join us online and witness the future of innovation in real time!

Contact: Marius Dragomir +40744636456 marius.dragomir@big-fm.ro

https://www.youtube.com/@energeticdeva5587/videos

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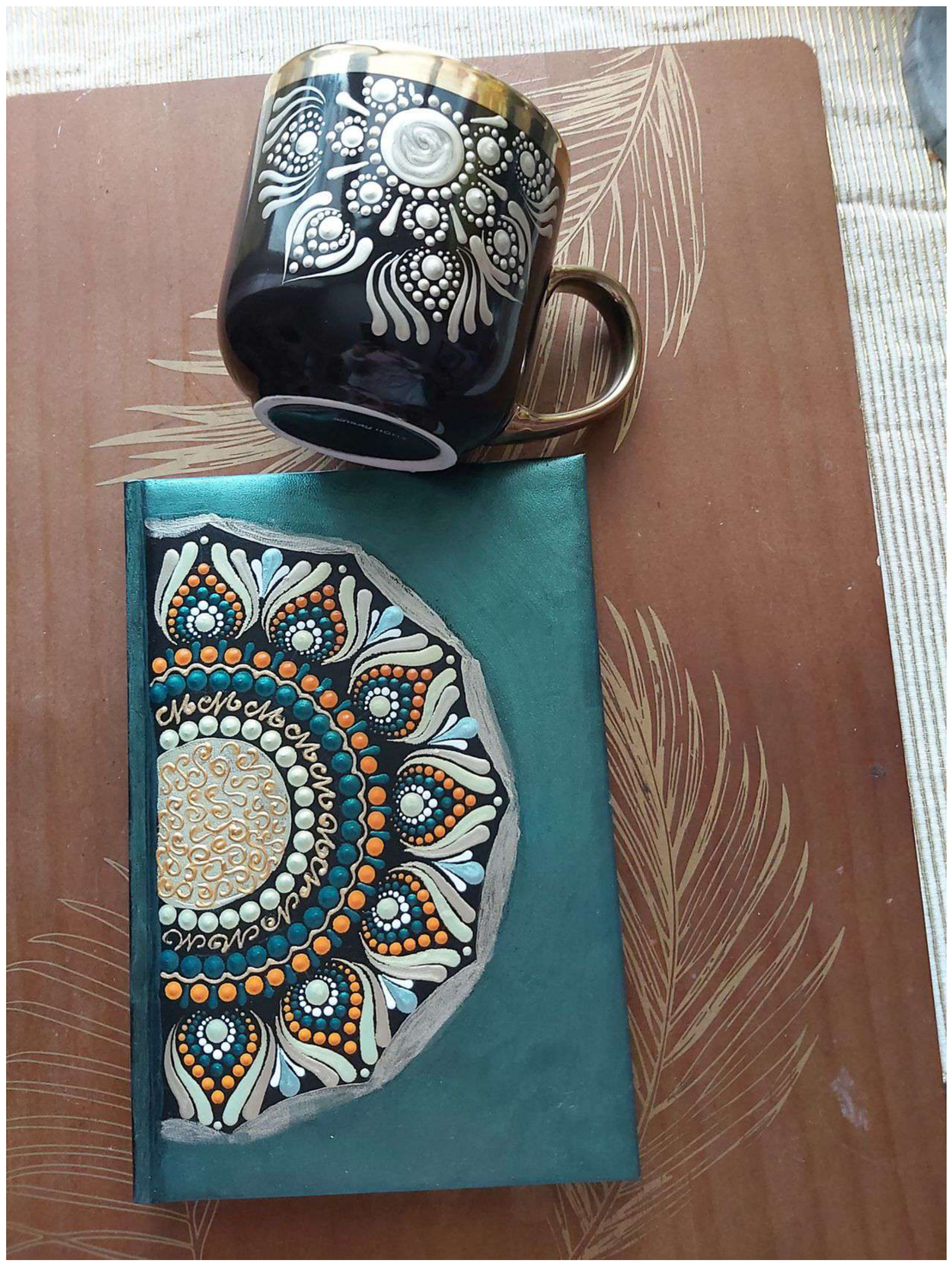
MANDALE

Gabriela BERGHIAN

K

A mandala is a complex abstract design that is usually circular in form. In fact, "mandala" is a Sanskrit word that means "circle". Mandalas generally have one identifiable center point, from which emanates an array of symbols, shapes and forms. Mandalas can contain both geometric and organic forms. They can also contain recognizable images that carry meaning for the person who is creating it. In essence, mandalas represent the connection between our inner worlds and outer reality. Designing your own mandalas can be both inspirational and therapeutic.

Mandalas, painted in the dot technique with acrylic paints. Handmade paintings on wood, glass, ceramics



Contact: gabrielaberghian@yahoo.com

Presentation link: https://www.facebook.com/angelika.dakini/

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APPLICATIONS OF THE FIBONACCI NUMERICAL SERIES IN THE FIELD OF MUSIC PRODUCTION

Student Project

Author: Robert-Daniel SĂCUIU,
Mentor: Conf. Dr. Diana Alina BISTRIAN

This project investigates the application of the Fibonacci number series in the field of music production, for the construction of scores using the FL Studio application. The use of the Fibonacci series in music production, especially in FL Studio, can create pleasant rhythms, melodies and harmonies in a natural way, as this mathematical sequence frequently appears in nature and art. In this project, rhythmic patterns and several melodic compositions were created using the golden ratio to structure phrasing, placing key notes or chords at the points of the golden ratio.

By integrating the Fibonacci series-based structure into FL Studio, several compositions were created that are mathematically structured, but are musically organic.

Piano sounds using Fibonacci Sequance [more details in description]

SCAN ME

Contact: robisacuiu@gmail.com

3D EXPAND PAINT PRINTING and MORE

Author: Cătălin Părăoan & Eurografics Team

With every print and customization, Eurografics fulfills its mission to turn ideas into reality and bring a smile to our customers' faces. Screen printing is a printing process on smooth surfaces that consists of applying a layer of ink to the material being printed on through a stencil with cutouts covered with a fine mesh. Turn your ideas into reality!

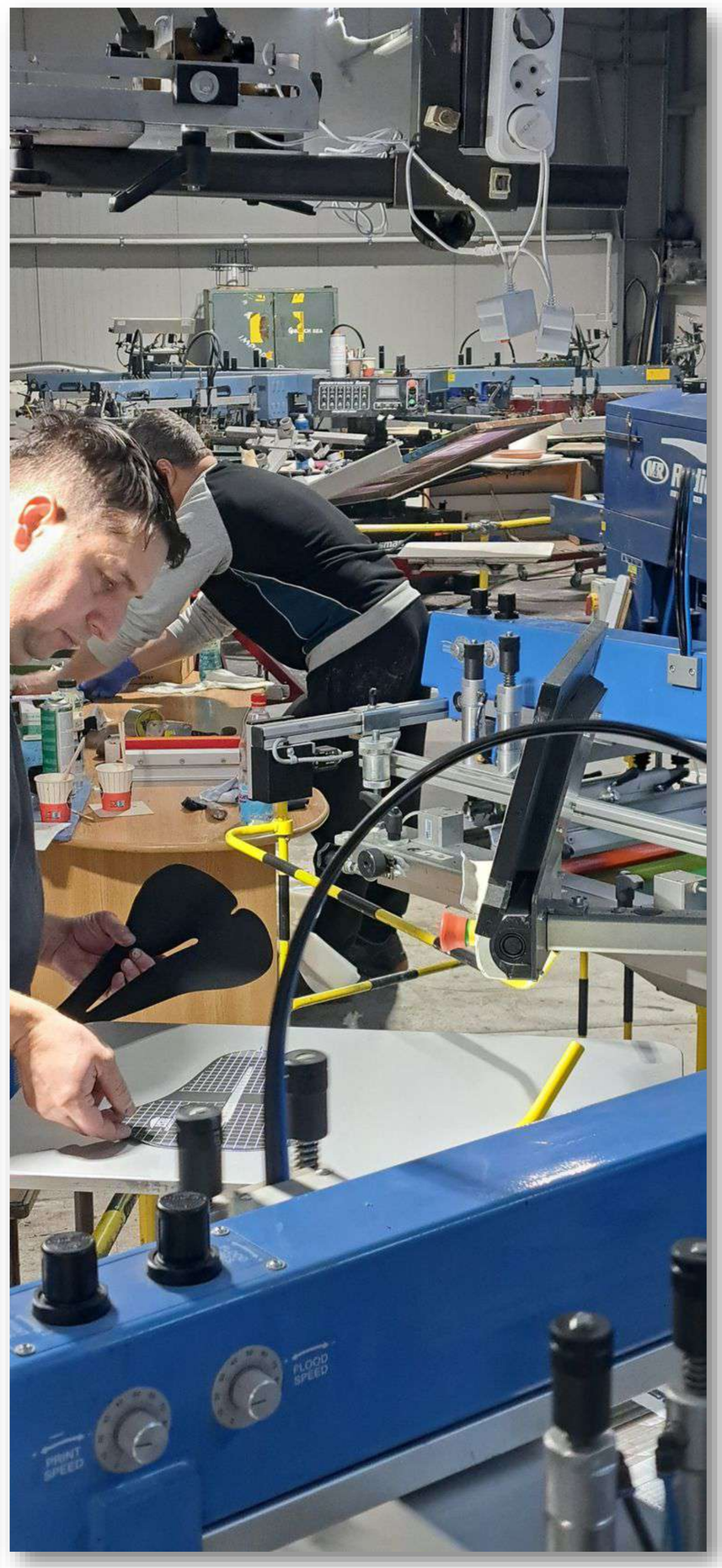
Have you ever wanted promotional materials that stand out and tell the story of your brand?

With us, you can bring any idea to life:

✓ Pens, lighters, stickers, umbrellas, mugs, personalized t-shirts and much more!

✓ Unique design tailored to your needs.

✓ Superior quality and fast delivery!



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Bolbi's Comedy

JOKES AND CHEERS
GLUME ȘI VOIE BUNĂ

Stand up comedy

Adrian Alin BOLDI

K

I have always had a sense of humor and I am passionate about jokes, so I started making these pamphlets during the pandemic.

Because many people were scared by those unpleasant moments and I thought it would be good to laugh a little more and forget about the less unpleasant things. In my view, humor should not be neglected at all.

It is the thing that keeps us alive, unites us and strengthens our relationships!

Las să vină iarna. ...
671 de vizionări

Să audă vecinii. #boldialinmaka
13 K de vizionări

Ca la început.... #boldialinmaka
4,7 K de vizionări

Doar o glumă. #boldialinmaka
588 de vizionări

Asa scapai de nunti. ...
22 K de vizionări

Follow me on Inatagram

https://www.instagram.com/boldialin?igsh=MTIybWs3OGs3eXJubg

@BOLDIALIN

Boldi's Reels

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Contact: alin.boldi@yahoo.com https://www.facebook.com/boldi.alin/about

EM Art Gallery-Deva

Gallery

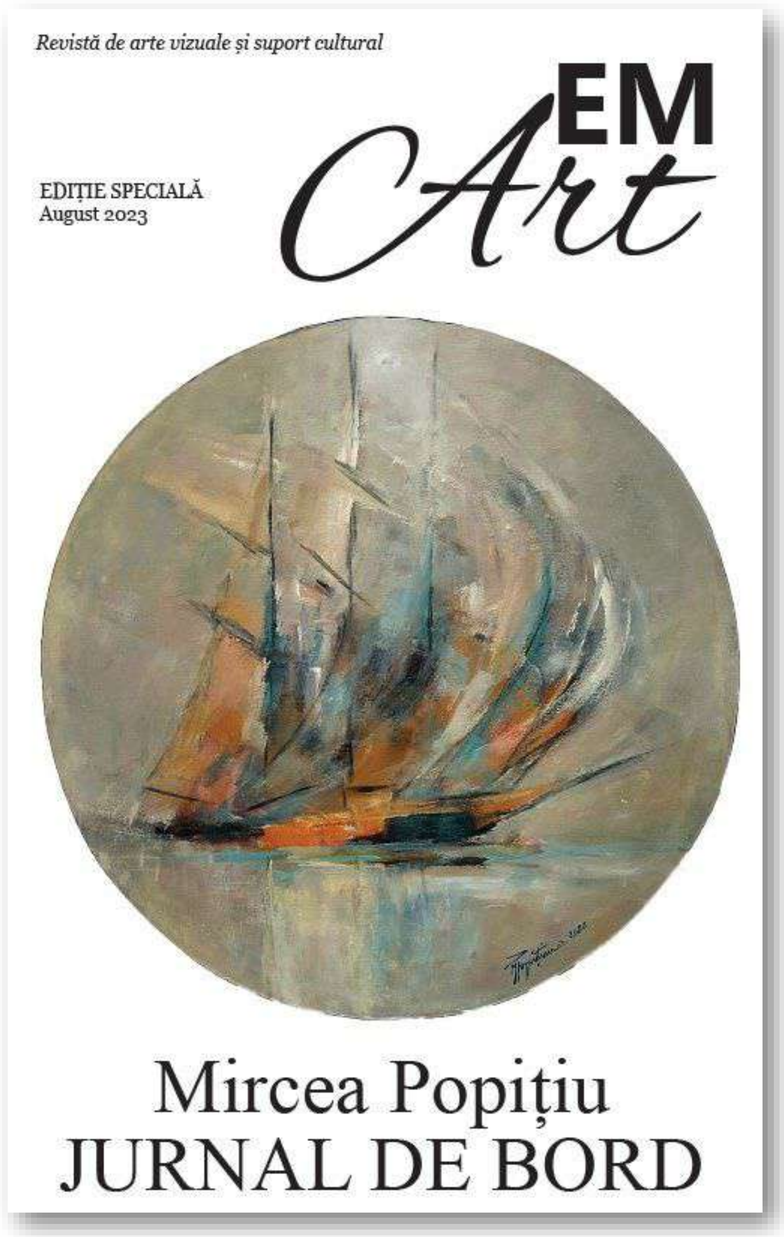
Author: Mircea POPITIU

K

EM Art Gallery-Deva was born from the desire to promote contemporary visual artists, on December 5, 2018. From the beginning to the present, more than 50 contemporary professional artists have been exhibited, the gallery registering as the first private gallery in Hunedoara County!

Artists from the main cities in Romania and artists from France, the USA and the Republic of Moldova exhibited on the EM Art Gallery!

Out of the desire to do more, we have created a magazine of visual arts and cultural support entitled EM Art.



Contact: ***+40723355939*** ***popitiuart@yahoo.com***

SCAN ME

Title: HANDMADE JEWELLERY BY AC BIJOUX

Author/s: Alexandra CSAPAI

Institution/Country: AC BIJOUX, Romania

Description: *AC Bijoux is a studio dedicated to creating handcrafted jewellery that fuses the art of modelling with a commitment to sustainability. Our distinctive element is the use of thermally cured polymer clay, which is meticulously shaped and coloured, resulting in vibrant and unique central pieces. We differentiate ourselves through our dedication to sustainability and creative reuse. Our collections incorporate fragments from pre-owned and pre-loved jewellery pieces, which we carefully disassemble and repurpose. Through this process, we grant a second life to forgotten materials, transforming older items into modern accessories with their own unique history. Every piece is a wearable work of art that celebrates individuality and environmental responsibility. The result is a statement piece that not only adorns but also narrates a journey of transformation.*

Contact: *alexandra.csapai@gmail.com*

Presentation link: *https://www.instagram.com/ac_bijoux_jewelry?igsh=M2g5aHQwNTJxM2sy*

AC_BIJOUX_JEWELRY

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Liceul de Arte „Sigismund Toduță” Deva

Title: WHERE FUNCTION MEETS DREAM

Author/s: 10th grade Students, coordinating teacher Ana Iancu

Institution/Country: "Sigismund Toduță"Art Hight School, Deva, Romania

Description: *The students created ceramic plates, following the essential stage of the craft-from casting plaster molds and shaping with clay slip, to bisque firing and glazing. The chromatic theme explored the texture of colors and their fusion, wirh overlays and transparecies.Through decorative rhytms, each plate became more than a utilitarian object: a personal artistic statement. The final works reveal a harmony between function and beauty, inviting viewers to discover the poetry of everyday forms.*

Contact: +40354 805 697, office@artedeva.ro

Presentation link: *https://catedradearte.ro/*

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Liceul de Arte „Sigismund Toduță”
Deva

Title: SEQUENCES OF THE IMAGINARY

Author/s: 4th grade, 5th grade, 9th grade and 10th grade Students, coordinating teachers Alina Nealcoș, Cristina Poenar-Alexa

Institution/Country: "Sigismund Toduță "Art Hight School, Deva / Romania

Description: *The series of graphic works illustrates sequences from the world of fairy tales and stories, as well as from the affective-imaginative field, represented using the means of expression offered by drawing and which brings to attention the imagination and creativity present among young people today, symbolically - visually suggesting different fantastic creatures, metaphorical places in which they live, as well as their own projections of their inner self.*

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Title: VISUAL NARRATIVES

Author/s: 12th grade Students, coordinating teacher Ioana Moldovan
Institution/Country: "Sigismund Toduță "Art Hight School, Deva / Romania

Description: *This means of visual-graphic dialogue, often accompanied by words, that the comic strip has, brings to the fore the ability to represent and illustrate narratively thoughts, feelings, reactions, moments, experiences. From the desire to visually communicate what already exists textually, the images joined in this series of digitally created comics, signify once again what concerns us from a creative point of view, as well as what develops us as visual individualities in the midst of technological ascension.*

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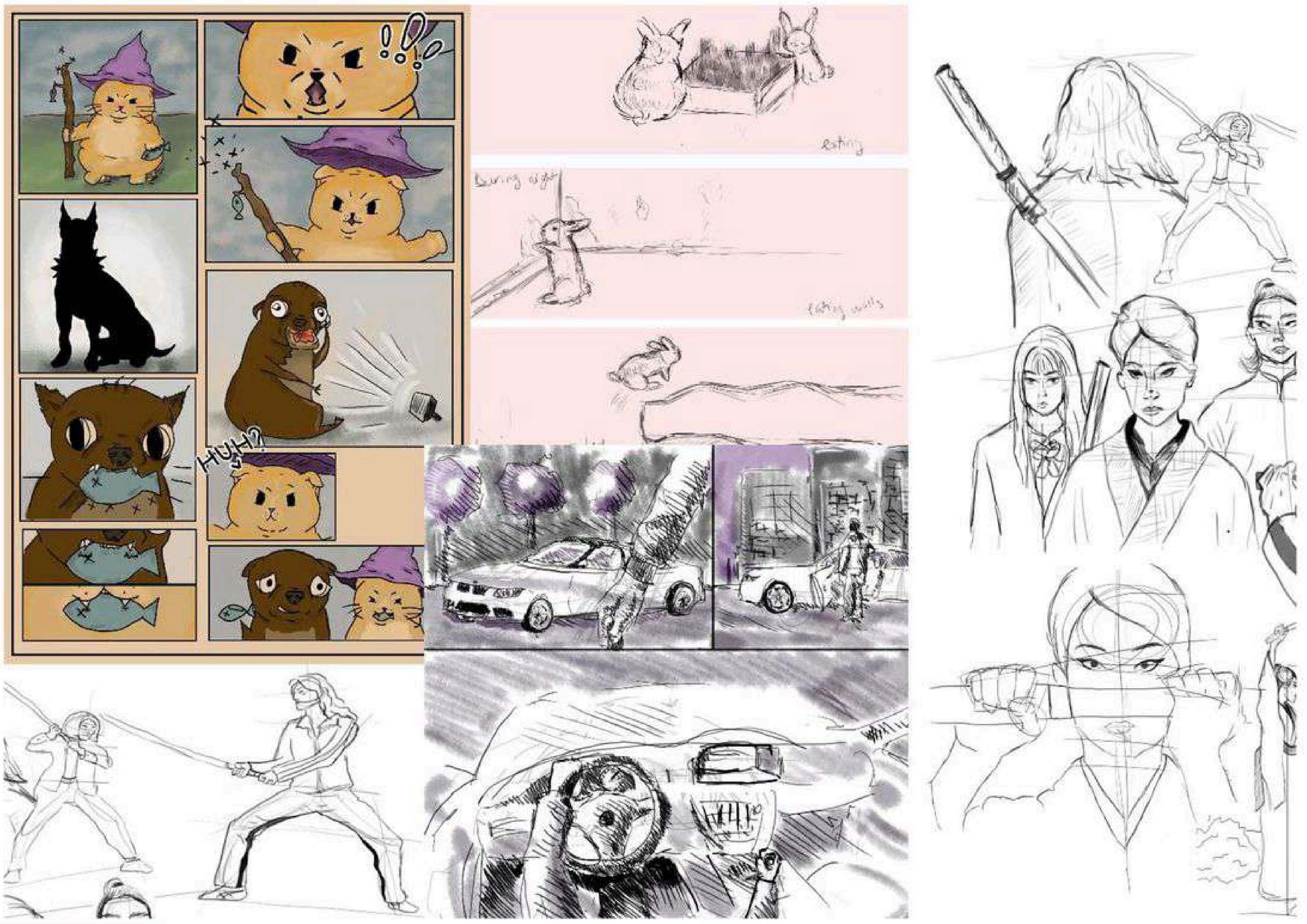

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Title: AUDITORY VISIONS

Author/s: 12th grade Students, coordinating teachers Mădălina Stan, Daniel Bocșe, Adrian Lascău-Bîlc
Institution/Country: "Sigismund Toduță "Art Hight School, Deva / Romania

Description: *The series of studies after the violin, composed in the form of an art installation, is intended to be a joint project in which a parallel is drawn to the influences transmitted by sound on the image, as well as a reference to the connection that is formed between the two artistic areas, inspiration and virtuosity being landmarks for both. Also, the absence of the three-dimensional object - the violin - in the proposed installation, leaves room for the assertion of its visual presence, bringing to the attention of the public its perfect sound, imprinted on the surface of the papers.*

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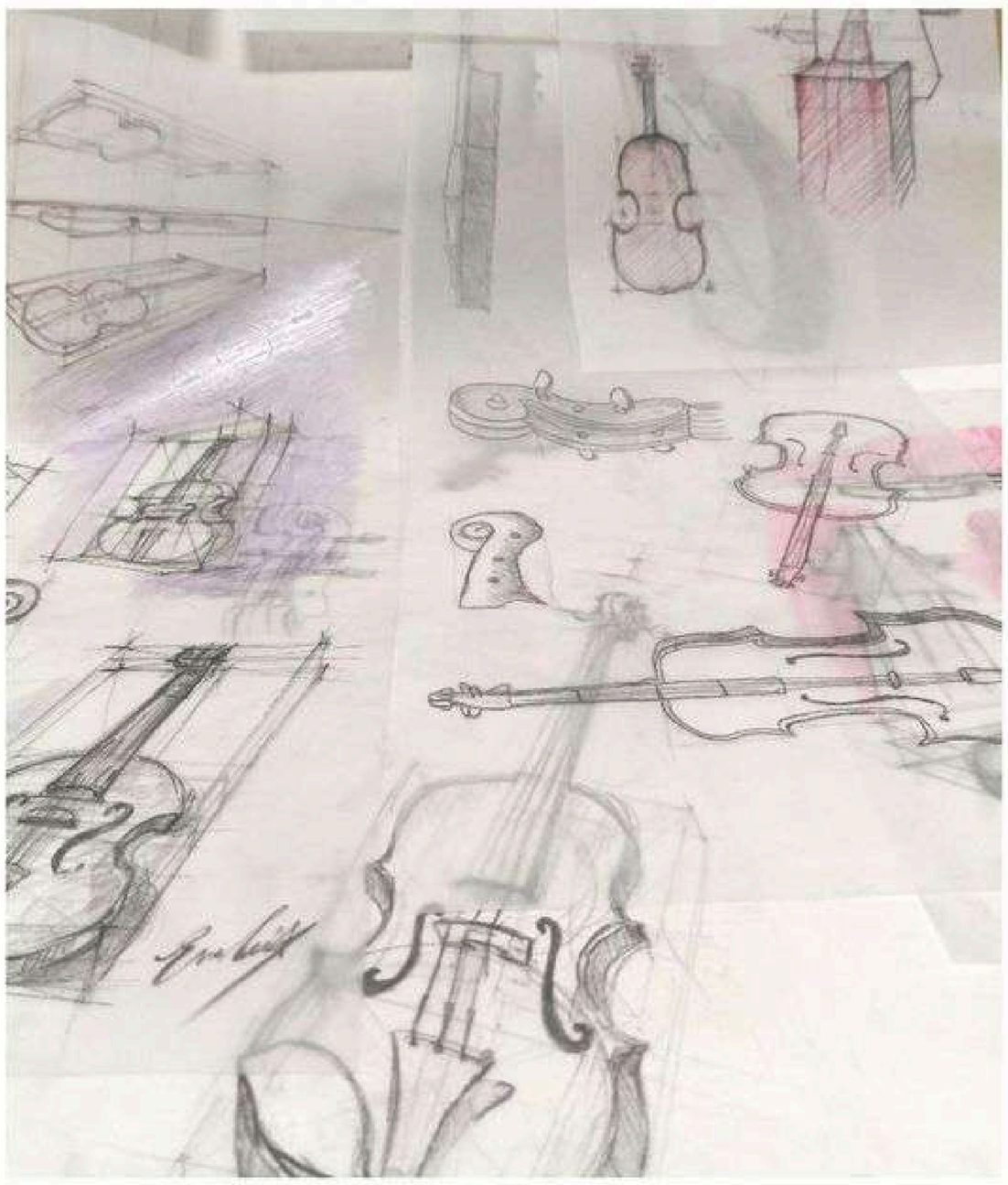

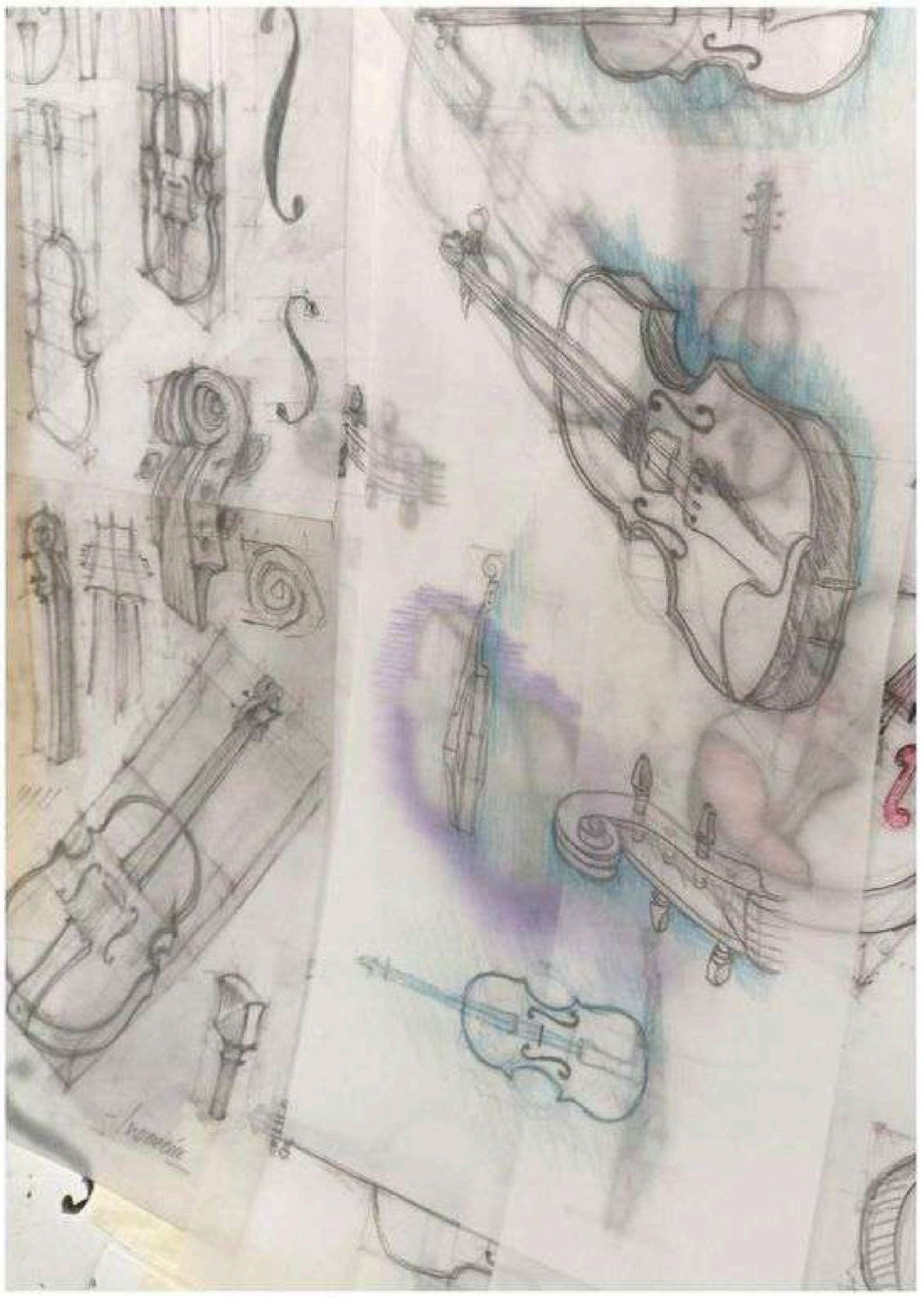

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Liceul de Arte „Sigismund Toduță” Deva

Title: INTERFACES

Author/s: 12th grade Students, coordinating teacher Mădălina Stan

Institution/Country: *"Sigismund Toduță "Art Hight School, Deva / Romania*

Description: The series of portraits composed in the form of a puzzle-type art installation brings into discussion the idea that the interface of the portrait with its expressions, gestures, and gazes are nothing more than a series of fragments of the whole, where the portrait taken in detail reveals pieces of each person's particularities and story.

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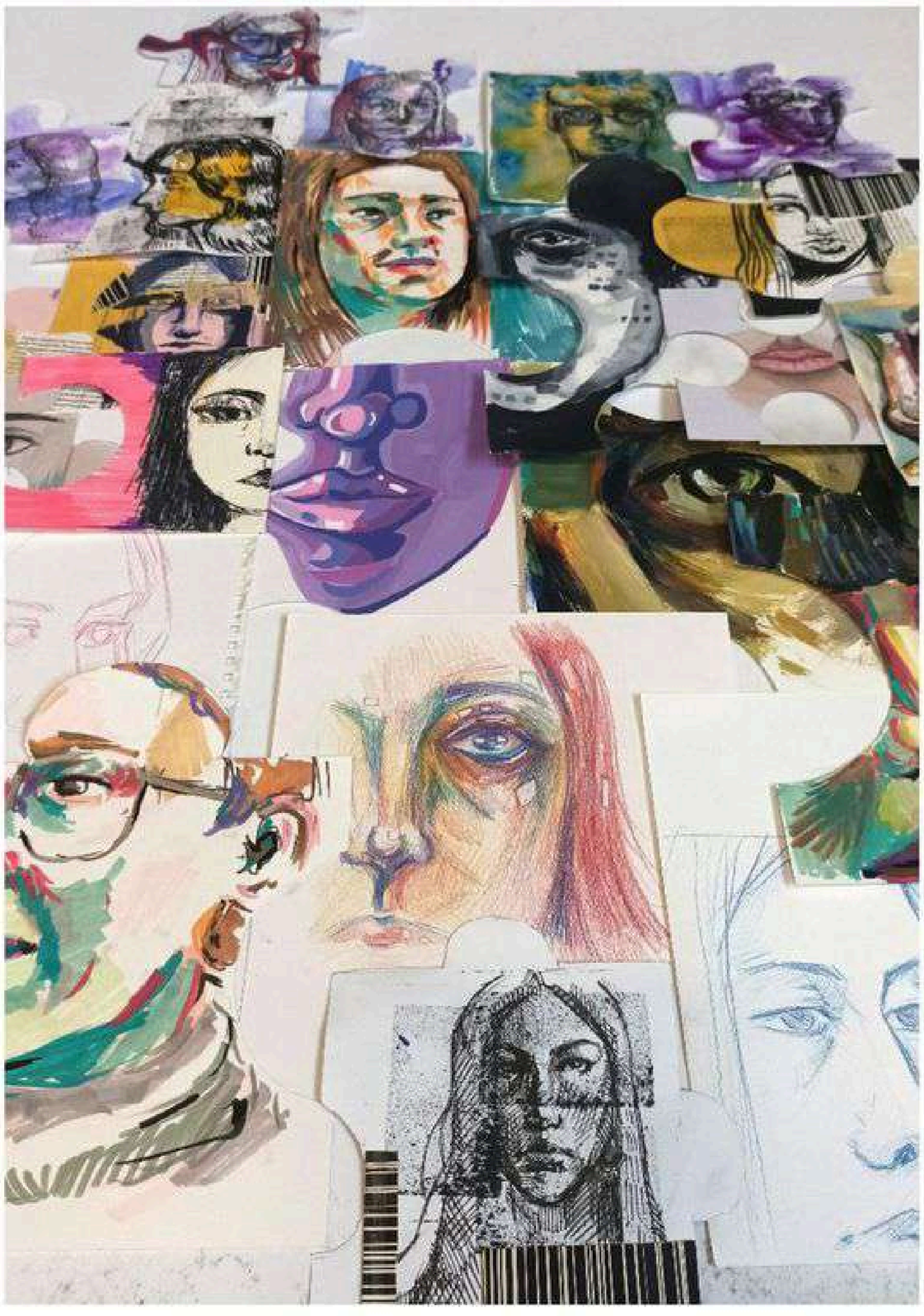

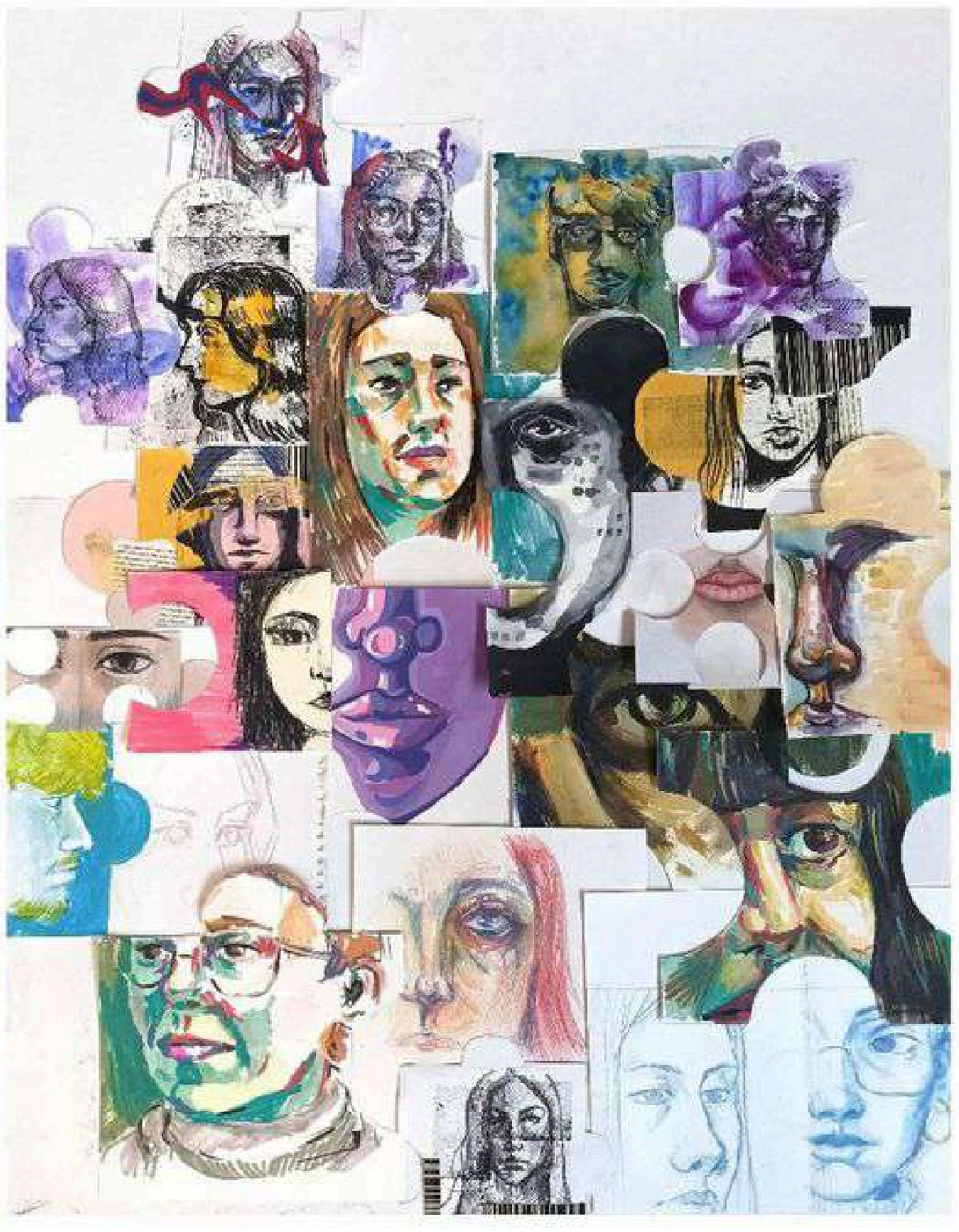

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Liceul de Arte „Sigismund Toduță” Deva

Title: IMMORTALITY

Author/s: Ivoniciu Evelina - 12th grade, coordinating teacher Mădălina Stan

Institution/Country: "Sigismund Toduță "Art Hight School, Deva / Romania

Description: *The series of works traces a journey towards the permanent connection that man has had with nature, giving rise to a series of images, full of symbols, regarding what was and what remains after the passage of time. Also, color carves a path between past and present, between ephemeral and freshness, between the presence or absence of life, touching on aspects of botany and anatomy, with strong influences from the artistic genre "vanitas".*

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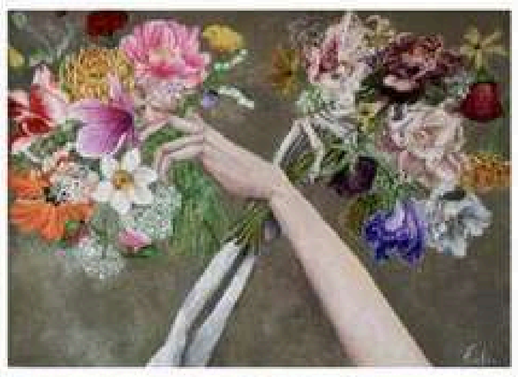

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