upt Universitatea Politehnica Timișoara

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Research Report 2024

# Annual Research Report

Politehnica University Timisoara

2024

# Research Report 2024

Research Report, 2024



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Research Report 2024

# Annual Research Report

Politehnica University Timișoara

2024

Universitatea Politehnica Timișoara

# Structure of the report

Universitatea Politehnica Timișoara

# Introducing the Report

"It's not the walls that make a school, but the spirit living inside."
King Ferdinand I, 1923

The needs for a modern society, in the context of a competitive global market, require highly skilled human resource development. In this context, the role of universities in the innovation process has increased continuously over time because the development of new products or technologies depends more and more on the findings of scientific research.

Established in 1920, shortly after the union of Romanian territories, in a European context marked by the redefinition of states and by the aftermath of World War I, the Polytechnic School in Timișoara - as it was originally called - was the answer to one of the requirements of the Romanian society of the time, namely the formation of engineers.

The mission of the Politehnica University Timisoara (UPT) is to offer nationally competitive and internationally recognized opportunities for Learning, Research, and Innovation at the highest levels of excellence. As a resource of knowledge for the public, the university builds partnerships with other educational institutions, community organizations, government agencies, and the private sector to fulfil the requirements for competencies of the societal environment through superior professional training for students and graduates.

The present Research Report of Politehnica University Timisoara gathers the main results obtained through the research activities carried out within the university in 2024, Politehnica being renowned as a remarkable actor on the stage of scientific research, both at national and international level. Our research activity is facilitated by the existence of thirty-two research centers specialized in fields that are capital for the sustainable development of any modern society. Each of these research centers brings together various prestigious researchers, whom, by their effort and vision, provide UPT with the incentives needed to contribute to the progress of our society.

Most of the research activity carried out by our institution is financed through external sources, obtained either from national and international calls for projects, or through agreements with private companies. This represents a confirmation of the superior quality of the research, but also of the prestige and professional deontology of the researchers affiliated to our institution. Politehnica's reputation as an institution of advanced research is also emphasized by the patents obtained by its researchers, by the medals and prizes obtained in both national and international competitions, and by the collaborations with important research centers and institutes from Romania and from abroad.

Each year we select the most talented young researchers for our doctoral school, providing them with the opportunity to transform their knowledge and ideas into the innovations of tomorrow. Many of them take part in peer learning programs and consolidate in this way the relationship between our university and similar partner institutions. They strive for becoming doctors in science.

This report is divided into fifteen sections, each one presenting a specific component of the research activity performed within the institution.

The first section focuses on the research infrastructure, which comprises the thirty-two research centers hosted by the university. The order in which they are presented is given by the research fields. The research centers, respectively teams of researchers, on different themes, are highly important for our university since they manage to put into practice the scientific research strategy of the university successfully, within the framework of numerous grants and contracts won by competition. The research results are materialized in papers, patents and products, all bringing for the University prestige, as well as important funds.

The second section of the Research Report presents Renar accredited laboratories of the Politehnica University Timisoara.
The third section of the Research Report is dedicated to the Scientific Excellence Awards. These prestigious awards celebrate those colleagues who have made a significant contribution in their field of research and continue to inspire future generations to get involved in science.

The fourth, fifth and sixth sections include the research projects implemented by the university. The fourth and fifth sections includes the projects supported by public funds, both national and international, while the sixth one includes the projects supported by private funds awarded by companies. For the purposes of this report, we have chosen the most relevant projects for our the most representative projects for our research strategy.

The innovative capacity of the Politehnica University Timisoara is supported by teachers and scientific researchers through patents invented, presented in the seventh section.

Politehnica University Timisoara recognizes scientific excellence by conferring the honorary degrees of Doctor Honoris Causa and Honorary Professor to distinguished researchers for their contribution to the development of UPT of continuous support, as shown in section eight of this Report.

Sections nine and ten include habilitation theses and Ph.D. theses held in 2024 in our University.

Section eleven presents an overview of the most relevant scientific conferences that brought together scholars and professionals from Romania and from abroad. The conferences hosted by our university encouraged the dialogue, facilitated the exchange of ideas, and offered a great opportunity for new collaborations.

The twelve section gathers the scientific journals that have been published by our institution. This category includes journals specialized in various fields, such as computer science, chemistry and environmental engineering, electronics and communications, economics and social sciences, electrical engineering, mathematics and physics, hydrotechnics, physical education and sport, modern languages, etc.

The dissemination of the research results and findings is an integral part of the research process and the career in academia. Sections thirteen and fourteen present the most relevant scientific researches that have been published in 2024. It comprises the results obtained by our researchers, namely the papers that obtained recognition from some of the most prestigious journals, from both Romania and abroad.

And finally the fifteen section comprise a collection of books written by our researchers, most of them published under Politehnica Publishing House.

Through research, we generate ideas, through ideas we generate innovation and through innovation we contribute to the improvement of the quality of life; this is why research is our priority.

Universitatea Politehnica Timișoara

# RESEARCH CENTERS

# Center for Innovation and Technology Transfer Politehnica 2020 (CITT) of the Politehnica University Timisoara

In the 11th of November 2020, the **Center for Innovation and Technology Transfer (CITT) Politehnica 2020** received the provisional authorization from the Ministry of Research, Innovation and Digitalization, for a 12 month period, followed by a **permanent accreditation order** signed on the **19th of January 2022** in the fields of:

- √ *Eco-nano-technologies and advanced materials*
- √ *Information and communication technologies*
- √ *Energy, environment and climate change*

The **mission** of CITT is the general stimulation of the collaboration activity between the Research Centers within the Politehnica University Timisoara and the economic and industrial environment, by supporting and encouraging the technological transfer, in order to introduce in the economic circuit the research results transformed into products, processes and new or improved services. CITT mediates the additional steps that separate laboratory knowledge from industrial technology.

The **vision** of the CITT is in line with the strategic policy of the European Union for economic growth for the next ten years, with efforts to gradually align with recent guidelines of EU policy dictated by the need to increase capacity and competitiveness of education and research - development - innovation presented in the NDP National Development Plan 2007-2013 and their compatibility with similar systems in the European Union.

The general **objectives** of the CITT are:

**a)** Increasing the visibility of the research-innovation activity within the Politehnica University Timisoara regionally, nationally and internationally;

**b)** Consultation of the academic community, through the representatives of the research centers, for the implementation of the mission assumed by the Strategic Plan;

**c)** Training and development of human resources involved in the realization of projects;

**d)** Initiating, promoting and advising inter- and multidisciplinary collaboration for the realization of projects;

**e)** Supporting the achievement of the performance indicators of the Politehnica University Timisoara for the internal self-evaluation of the quality and the promotion of the quality in research;

**f)** Modernization and efficiency of the material base necessary for the development of scientific research in the university;

**g)** Orienting the research of the Politehnica University Timisoara towards the needs of the society on medium and long term and promoting the industrial doctorates;

**h)** Achieving an efficient management of the research - development - innovation activity;

**i)** Strengthening the dimension of national and international cooperation;

**j)** Creating a climate of trust and scientific cooperation between UPT teachers, based on decision-making transparency;

**k)** Periodic evaluation of the results of scientific research and research - development - innovation centers;

**l)** Efficient management of technology transfer results through continuous updating of data, operation of the database and conducting statistical studies on activities;

The **role** of CITT is materialized through:

**a)** Negotiating and drawing up research contracts, service contracts or partnership agreements with industrial partners;

**b)** Supporting inventors to prove the concept and pre-industrial validation. CITT will also manage the protection of intellectual property generated by the institution. This includes identifying sources of funding, both internal and external, for the registration of applications for intellectual property protection (such as patents, trademarks or copyrights);

**c)** Negotiation and preparation of license agreements and transfer of intellectual property to industry, with or without the support of specialized external legal advisers;

**d)** CITT will encourage and support the creation of new companies.

CITT has the following **attributions**:

**a)** Promotes the activity of innovation and technological transfer;

**b)** Contributes to the implementation of the results of scientific research and advanced technologies;

**c)** Ensures the access of SMEs to the technological services and RDI infrastructure of the Politehnica University Timișoara;

**d)** Provides assistance for technology acquisitions (domestic or import);

**e)** Ensures the realization and administration of product packages (CDI-production transfer documents);

**f)** Ensures the efficient transfer of the results of the RDI teams to the production departments of the companies;

**g)** Ensures the participation in competitions for RDI projects financed by the Romanian Government through the Ministry of National Education and in the projects financed by the EU;

**h)** Elaborates statistical or feasibility studies for the activities carried out.

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**CITT in 2024**

• More than 40 meetings and discussions with 13 companies focused on innovation, technological and know-how transfer. One frame contract signed with **Zoppas Industries Romania** focused on innovation support for product and production processes improvement.

• During 2024, CITT has successfully represented UPT in a series of International Invention Salons:

- International Exhibition of Inventics **BAP-INVENT**, Bačka Palanka, Serbia;
- International Exhibition **"INVENTCOR"** Deva;
- International Idea-Novelty Invention Exhibition and Fair **IDEA-EXPO 2024**, MAKO- Hungary
- International **Salon of Invention and Innovative Entrepreneurship**, Chișinău;
- European Exhibition of Creativity and Innovation **"EUROINVENT 2024"** Iasi;
- International Exhibition of Inventions and Innovations **"TRAIAN VUIA"** Timișoara;
- International Exhibition of Inventics **"INVENTICA 2024"** Iasi;
- International Exhibition of Innovation and Technological Transfer – **innoCENTA**, Timisoara;
- International Innovation and Invention Show **EURO POLITEHNICUS 2024**; obtaining 179 distinctions, as follows:

• 36 special prizes;
• 20 Diplomas for Excellence;
• 101 Gold Medals;
• 15 Silver Medals;
• 7 Bronze Medals;

• CITT has also supported **13 tech transfer projects** with multiple partners offering administrative and contracting support and consultancy.

In **July 2024**, CITT has successfully completed the **SR EN ISO 9001:2015** audit to maintain the **quality management system** for:

- Scientific and technological assistance and information
- Coordination of innovation, dissemination, transfer and capitalization of research results

**Research Institute for Renewable Energy**
Director: Prof. Dr. Eng. Viorel UNGUREANU
Contact: viorel.ungureanu@upt.ro, https://www.icer.ro, https://eertis.eu

**Research Center for Smart Energy Conversion and Storage**
Director: Prof. Dr. Eng. Nicolae MUNTEAN
Contact: nicolae.muntean@upt.ro, https://iee.upt.ro/web/ro/pdf/centru-de-cercetare-energy-conversion-and-storage-control-research-center, https://eertis.eu

**"Ștefan Nădășan" Research Laboratory for Strength, Integrity and Durability of Materials, Stuctures and Conductors**
Director: Prof. Dr. Eng. Liviu MARȘAVINA
Contact: liviu.marsavina@upt.ro, https://eertis.eu

**Research Center for Materials Mechanics and Structural Safety**
Director: Acad. Prof. Dr. Eng. Dan DUBINĂ
Contact: dan.dubina@upt.ro, https://www.ct.upt.ro/centre/cemsig/index.htm

**Research Center for the Processing and Characterization of Advanced Materials**
Director: Assoc. Prof. Dr. Eng. Bogdan RADU
Contact: bogdan.radu@upt.ro, https://sites.google.com/view/ccpcma/home, https://eertis.eu

**Research Center for Power Systems Analysis and Optimization**
Director: Assoc. Prof. Dr. Eng. Constantin BARBULESCU
Contact: constantin.barbulescu@upt.ro, https://iee.upt.ro/web/ro/departamente/electroenergetica/pdf/analiza-si-optimizarea-regimurilor-sistemelor-electroenergetice, https://eertis.eu

**Research Center for Computers and Information Technology**
Director: Prof. Dr. Eng. Mihai Victor MICEA
Contact: mihai.micea@cs.upt.ro, https://cs.upt.ro/ro/research, https://eertis.eu

**Research Center for Organic, Macromolecular and Natural Compounds Chemistry and Engineering**
Director: Prof. Dr. Eng. Daniel HĂDĂRUGĂ
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**Competence Center for Plastics Processing**
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Contact: aurel.tulcan@upt.ro

**Research Center for Hydrotechnics and Environmental Protection**
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**Research Center for Infrastructure for Civil Engineering and Transport**
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**Research Center for Automatic Systems Engineering**
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**Research Center for Complex Fluid Systems Engineering**
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**Research Center for Medical Engineering**
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**Research Center for Integrated Engineering**
Director: Prof. Dr. Eng. George DRĂGHICI
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**Research Center for Engineering and Management**
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**Research Center for Building Services**
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**Research Center for Thermal Machines and Equipment, Transportation and Environmental Pollution Control**
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**Research Center for Materials and Industrial Technologies**
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**Research Center for Mechatronics and Robotics**
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**Research Center for Advanced Study Methods for Physical Phenomena**
Director: Prof. Dr. Eng. Nicolina Rodica POP
Contact: nicolina.pop@upt.ro, https://iee.upt.ro/web/ro/pdf/centru-de-cercetare-metode-avansate-de-studiu-fenomenelor-fizice

**Research Center for Multimedia**
Director: Prof. Dr. Eng. Radu VASIU
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**Research Center for Urban Planning and Architecture**
Director: Assoc. Prof. Dr. Eng. Ileana KISILEWICZ
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**Research Center for Intelligent Signal Processing**
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**Research Center for the Rehabilitation of Buildings**
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**Research Center for Intelligent Electronic Systems**
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**Research Center for Environmental Science and Engineering**
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**Smart Materials and Structures Laboratory**
Director: Prof. Dr. Eng. Corneliu-Marius CRĂCIUNESCU
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**Center for Advanced Translation Studies**
Director: Prof. Dr. Eng. Daniel Codruț DEJICA-CARȚIȘ
Contact: daniel.dejica@upt.ro, https://sc.upt.ro/ro/cercetare/poli


**Center of Interdisciplinary Research in Communication and Sustainable Development**
Director: Prof. Dr. Eng. Vasile GHERHEȘ
Contact: vasile.gherhes@upt.ro, https://sc.upt.ro/ro/cercetare/policom

# RENAR ACCREDITED LABORATORIES

# RENAR accredited Laboratories of the Politehnica University Timisoara

## Laboratory for Fuel Analyses, Ecological Investigations and Pollutant Dispersion

**Head of laboratory**: Prof. Dr. Eng. Ioana IONEL
Contact: ioana.ionel@upt.ro,
https://mediu.ro/wp-content/uploads/2025/04/ANEXA_1_2021.pdf,
http://mettcp.mec.upt.ro/laboratoare.html

## Laboratory of Acoustics and Vibration

**Head of laboratory**: Prof. Dr. Eng. Nicolae HERIȘANU
Contact: nicolae.herisanu@upt.ro, n_herisanu@yahoo.co.uk
https://www.renar.ro/index.php/oec/get_oec_details/43467

Universitatea Politehnica Timișoara

# SCIENTIFIC EXCELLENCE AWARDS

# Politehnica University Timisoara, in the Research.com ranking of the best universities in 2023. Four professors, among the most important scientists in the world: Radu-Emil PRECUP, Ion BOLDEA, Ștefan PREITL and Liviu MARȘAVINA

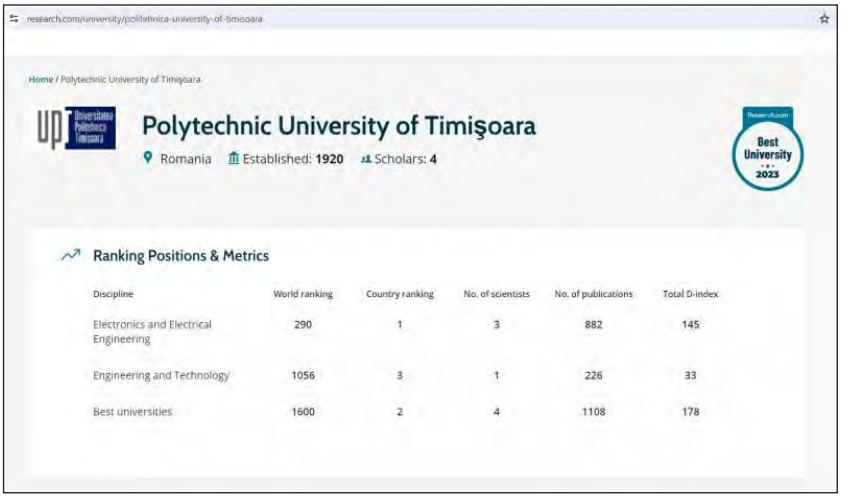
• Research.com, one of the most important portals dedicated to researchers/scientists from universities, has published the ranking of the best universities in 2023, which also includes higher education institutions in Romania, the main criterion being the sum of the values of the D index (the equivalent of the Hirsh index taking into account only the works in the field and citations) of all the top scientists affiliated to a certain university.

• According to Research.com, the Politehnica University Timisoara ranks 2nd in Romania and 1600th in the world, and the fields of Electronics and Electrical Engineering is ranked 1st in the country and 290th in the world.

• A top scientist is considered a researcher with a D-index (discipline H-index) higher than a predetermined threshold (usually 30 or 40) for their fields of study.

• The four top scientists who have raised the Politehnica University Timișoara in the international rankings are **Radu-Emil PRECUP** (D-index 58), **Ion BOLDEA** (D-index 50), **Ștefan PREITL** (D-index 38) and **Liviu MARȘAVINA** (D-index 33).

The ranking process involved a detailed examination of the profiles of 166,880 researchers from Google Scholar and Microsoft Academic Graph, from about 3,000 institutions.




## Romanian Academy Award 2022 – „ Nicolae Teclu" award for the published paper „Near-infrared reflective Ni, La-doped hibonite pigments for cool blue coatings", Authors: R.G. IANOȘ, C.I. RUS, R.I. LAZĂU and C.S. PĂCURARIU

• On 4th of December 2024, in Bucharest, the **Romanian Academy** awarded, during a solemn ceremony held in the presence of the members of the General Assembly, the prizes for the most valuable scientific and artistic creations achieved in 2022.
**The Chemical Sciences section, the "Nicolae Teclu" Prize was awarded to a team from the Faculty of Chemical Engineering, Biotechnologies and Environmental Protection: Robert-Gabriel Ianoș, Cristiana-Iulia Rus, Radu-Ioan Lazău and Cornelia-Silvia Păcurariu.**
• Their work entitled **"Near-infrared reflective Ni, La-doped hibonite pigments for cool blue coatings"**, obtained this prestigious distinction.

• The paper was published in 2022 in **Ceramics International**, Volume 48, Issue 23, Part A, 1 December 2022, Pages 34428-34436 of the prestigious Elsevier publishing house, one of the most respected publications in the field of advanced ceramic materials, enjoying 15 citations to date, according to the Scopus database. The journal has an impact factor (2023) of **5.1**, being in the top 3 publications in the field of MATERIALS SCIENCE, CERAMICS, in the **Q1 quartile**, according to Journal Citation Reports. • The paper focuses on a very actual topic, which has seen a rapid growth of interest in the past years among scientists and manufacturers in the context of global warming, namely reducing the temperature of surfaces exposed to solar radiation. One of the rational approaches with excellent measurable results is the use of so-called cool pigments, which reflect the radiation in the near infrared range responsible for heating surfaces, hence the name of **thermoreflexive** pigments.

• Although the applications spectrum of cool pigments is extremely wide, the first place in terms of use and importance is occupied by the field of construction materials and the automotive industry, where they play a significant role in reducing the energy consumption necessary to maintain a comfortable environment inside in the buildings and vehicles.
• In this regard, the blue pigments obtained by the authors within the awarded research were successfully tested in the coloring of acrylic paints used to coat metal sheets, with the result of a surface temperature 15 °C lower as compared to coatings prepared with similar commercial blue, regular pigments. The authors used an optimized combustion method, which is extremely fast, economically efficient and environmentally friendly.


# Romanian Academy of Technical Sciences, Timisoara Branch – new members who joined in 2024 (ASTR General Assembly, October 16, 2024, Bucharest)

• On October 16, 2024, the **General Assembly of the Romanian Academy of Technical Sciences (ASTR)** took place in Bucharest, having as its main objective to present the activity report for 2023 and the reception of new members.
• As for the Timisoara branch of ASTR, nine new members passed the voting test, as follows:

• Univ.Prof.Dr. Liviu MARȘAVINA
HONORARY MEMBER
Section of Technical Mechanics

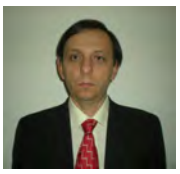
• Univ.Prof.Dr. Ion MITELEA
HONORARY MEMBER
Section of Materials Science and Engineering

• Univ.Prof.Dr. Nicolae VASZILCSIN
CORRESPONDING MEMBER
Section of Chemical Engineering

• Univ.Prof.Dr. Radu Adrian VASIU
CORRESPONDING MEMBER
Section of Electronics and Automatics

• Univ.Prof.Dr. Daniel-Viorel UNGUREANU
CORRESPONDING MEMBER
Section of Civil Engineering and Urban Planning

• Univ.Prof.Dr. Lucian TUTELEA
CORRESPONDING MEMBER
Section of Electrical and Power Engineering



• Assoc.Prof.Dr. Edward PETZEK
ASSOCIATE MEMBER
Section of Civil Engineering and Urban Planning

• Univ.Prof.Dr. Mihai MICEA
ASSOCIATE MEMBER
Section of Information and Communication Technology, Computers and Telecommunications

• Univ.Prof.Dr. Erwin-Christian LOVASZ
ASSOCIATE MEMBER
Section of Mechanical Engineering

# Academician Liviu MARȘAVINA, vice-rector of the Politehnica University Timisoara, Doctor Honoris Causa of the Technical University of Cluj-Napoca

• **Prof. Dr. Eng. Liviu MARȘAVINA**, corresponding member of the Romanian Academy and vice-rector of UPT responsible for scientific research, innovation and technology transfer, received the highest academic distinction, that of **Doctor Honoris Causa**, from the **Technical University of Cluj Napoca (UTCN)**.

• The title was awarded at the proposal of the Department of Mechanical Engineering, within the Faculty of Road Vehicles, Mechatronics and Mechanics within UTCN.

• **Academician Prof. Dr. Eng. Liviu MARȘAVINA** received this outstanding distinction as a result of his proven professional and academic excellence, his national and international professional notoriety, in his capacity as a corresponding member of the Romanian Academy, for his exceptional contributions and achievements in the field of Material Strength, Fracture Mechanics, Experimental Mechanics, for the didactic and scientific collaboration with the Technical University of Cluj-Napoca.

• **Professor Liviu MARȘAVINA** has long been a collaborator of the Technical University of Cluj-Napoca, by supporting the **Department of Mechanical Engineering** and the doctoral field of **Mechanical Engineering**, as well as by participating in numerous promotion and habilitation commissions.

• Also, the professor collaborates with the ECSML Laboratory team, has helped the involvement of its members in various research projects and has contributed to the creation of collaborative linking of the academic community of materials resistance in Cluj-Napoca, with the academic community in Timisoara, but also the other university cities, members of the Romanian University Alliance of Science and Technology (ARUST).

UNIVERSITATEA TEHNICĂ
DIN CLUJ-NAPOCA

Senatul Universității Tehnice din Cluj-Napoca
în ședința sa din 23 noiembrie 2023
a hotărât să acorde

Domnului Academician Prof. dr. ing.
Liviu Marșavina
Prorector la Universitatea Politehnica Timișoara

titlul de
Doctor Honoris Causa
al Universității Tehnice din Cluj-Napoca

În semn de înaltă prețuire și recunoaștere a excelenței academice și științifice, pentru notorietatea profesională națională și internațională, precum și pentru contribuția remarcabilă la dezvoltarea cooperării didactice și științifice cu Universitatea Tehnică din Cluj-Napoca

PREȘEDINTE SENAT
Prof. dr. ing. Nicolae BURNETE

RECTOR
Prof. dr. ing. Vasile TOPA

H.C.238

2024

# BANAT EXCELLENCE GALA 2024 – „Traian Vuia" Award for „Engineering Sciences" Acad.Prof.Dr.Eng. Liviu MARSAVINA

• **The "Banat Excellence Gala"** is an annual event organized in partnership with the Romanian Academy, having the role of recognizing, at regional and national level, those who perform in the most important fields of science, culture, and arts but also of social responsibility and of promoting Banat region.

• **The "Traian Vuia" award**, within this gala, has offered every year to some personalities of the Politehnica University Timisoara, and its 2024 winner was **Acad.Prof.Dr.Eng. Liviu MARSAVINA**, from the Department of Mechanics and Strength of Materials.

• **Acad.Prof.Dr.Eng. Liviu MARSAVINA** is a prestigious personality, recognized both nationally and internationally, in fields such as Strength of Materials, Mechanics of Materials Breaking, Integrity and Durability of Structures.

• His national and international recognition is highlighted as follows: he became Vice-President of the European Structural Integrity Society in 2018; he obtained the title of **Honorary member of the Italian Group of Fracture** since 2020; he has been a European Structural Integrity Society Fellow since 2020; he was awarded the **Paolo Lazzarin Medal** by the **Italian Group of Fracture** in 2021 and the title of **Doctor Honoris Causa of the Technical University of Cluj Napoca** in 2024.

• The results of his research have materialized in over 175 articles indexed by the Web of Science (of which over 100 articles in specialized journals) and several book chapters published by prestigious publishers (Springer, Trans Tech). These works have been cited over 1800 times in the literature.

# Acad. Ion Boldea, Profesor Emeritus ,UPT
# "The Romanian Academy Award at 2024 Gala of Banatian Excellence"

- **Acad. Ion Boldea, Profesor Emeritus ,UPT**
- **IEEE Life Fellow**
- **"THE Romanian Academy Award at 2024 Gala of Banatian Excellence": afterthoughts**

*Dear now Banatians,*

*First thank you for your appreciation; however, I will take it as a white Check since I have more work to do to imagine that I deserve this Award; After more than 56 years of being a "teacher/learner" at University Politehnica Timisoara Romania with numerous books and scientific papers mostly in America and in IEEE, and related directly to Industry (by co-founding an Electric Automation Company now 30 years old and having 90 engineers engaged in industrial automation, for saving energy and in water comprehensive treatment in Timisoara and outside it) and by Contracts, international tech. consulting, Patents, etc. I am taking the liberty to present you for criticism 10 tiny remarks:*

**1.** *The Metaphor in Poetry, Discovery in Science and Invention in engineering "spring" from a single mysterious place: our intuition, or creativity drop, or our inner Divinity, Daimon etc ; so we have to visit revisit all for a good-full life.*

**2.** *In one's profession, there is much need for "stunts", but only if they come at the end of a road.*

**3.** *It is good to honor and serve our family with humility, both the ones who come before us and those who come after us.*

**4.** *It is good to turn within us the "duty into privilege", although it was Nietszche who said it.*

**5.** *Let us say the Truth of an idea, without attacking anyone, or let us remain silent, or let us write it down for later.*

**6.** *A few educated friends of character and a few uneducated but also of character can make our life better.*

**7.** *It is good when we take from the community less than we give to it, by leading a civilized life without arrogance.*

**8.** When we focus on well-chosen priorities, we may afterwards discover that life may actually make sense (or, "I have not lived in vain").

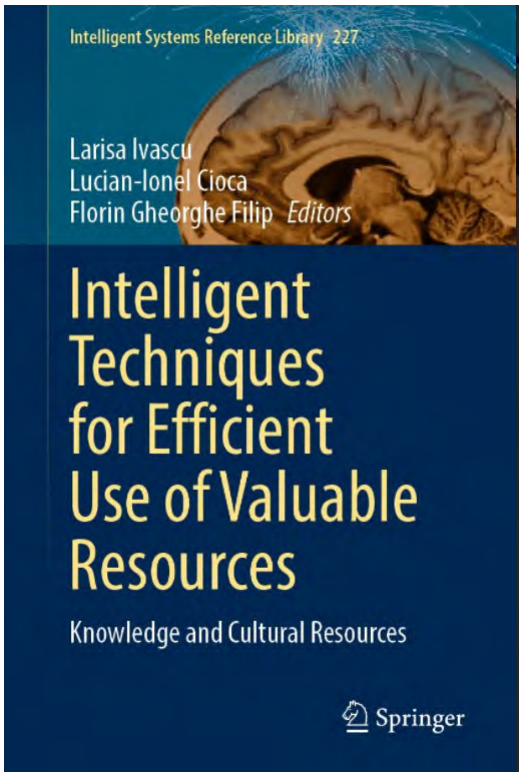
**9.** Do no harm by word or by act, and, if you did it, ask for forgiveness as soon as possible.

**10.** It is good to trust the young ones to take the Community into the future, without our guidance, towards "The Good, the Beautiful and the Truth", even if it is after short hesitations.

*Sincerely, Ion Boldea*


# The „Herman Oberth" Prize awarded in 2024 - Prof. habil. Dr. Eng. Larisa IVAȘCU (Romanian Academy of Scientists Awards for the year 2022)

• The prize was officially awarded during the special session **"Romanian Academy of Scientists Awards for the year 2022"** held in Aula of the "Carol I" Central University Library of Bucharest, on 21th June 2024.
• This prize was obtained for the book entitled **Intelligent Techniques for Efficient Use of Valuable Resources**, coordinated by: **Larisa Ivașcu**, Lucian-Ionel Cioca, Gheorghe Filip, Published by **Springer**.
Weblink: https://www.intechopen.com/books/10226


• The book aims at presenting a multidisciplinary view meant to illustrate several significant efforts and results about the contribution of information technologies to make available new resources and enable rationally usage the existing ones in the context of the ever-growing trends to use ever more resources.

• Authors from various countries have been invited to contribute so that a rather broad and balanced image about the current trends and recent results obtained could result. The proposed book addresses methodologies and information technology-based tools and systems designed for the efficient use of diverse resources such as manpower and human knowledge, natural resources including water, raw materials and end of life products, financial assets, datasets, and even cultural goods.

• The book is organized in ten chapters. It is intended to be insightful for researchers, instructors, and planers from various domains. It can also be used as an auxiliary material for postgraduate studies in applied informatics, business administration, industrial engineering, engineering and management, computer, and digital humanities.

## 2024 Excellence Awards Gala at Politehnica University Timisoara: Award „Excellence in research" - young researchers, Lecturer Dr. Eng. Sergiu GALATANU and Researcher Dr.Eng.Iosif HULKA
## Award „Excellence in research" - young doctoral students, Eng. Christian-Daniel CURIAC, doctoral student

• At the end of the year, Politehnica University Timisoara awarded the **"Excellence in Research"** prizes to young people who achieved remarkable results during the academic year 2023-2024.

• **Lecturer Dr. Eng. Sergiu-Valentin GALAȚANU** from the Faculty of Mechanical Engineering in Timisoara received the „Excellence in Research" award at the **young researchers section**.
• During the academic year 2023-2024, **Lecturer Dr. Eng. Sergiu-Valentin GALAȚANU** published 9 articles in journals and conference proceedings, indexed by Web of Science (4 articles Q1, 2 articles Q3, 2 articles in Q4, and one ISI Conference Proceedings article.) Of these, 3 are as first author, and another 3 as corresponding author.
• At the same time, in the last two years, he has published another 9 Scopus-indexed articles, in which he involved 7 master's and doctoral students. Three of the students he coordinated to complete their bachelor's and dissertation works are now PhD students in their first and second years, respectively.
• He has been involved in 7 projects, 2 international projects, 2 national projects and 3 other projects with industry. **Sergiu-Valentin GALAȚANU** is currently a Lecturer at the Mechanics and Strength of Materials Department, Faculty of Mechanics, from the Politehnica University Timisoara.


• The award of excellence in Research at the young doctoral students section was offered to **Eng.Christian-Daniel CURIAC**,**PhD Student** at the Faculty of Automation and Computers, for outstanding research results reflected in publications, grants participations or research internships.


• The Award „Excellence in research" - young researchers was also offered to **Researcher Dr. Eng. Iosif HULKA** from the Research Institute for Renewable Energy, Politehnica University Timisoara.

• During the academic year 2023-2024, **Researcher Dr. Eng. Iosif HULKA** published as author and co-author 24 papers in journals and conference proceedings, from which 17 are indexed in Web of Science (15 articles are published in journals with Q1 and Q2 quartile). Throughout his research, starting with his doctoral studies, he is the author and co-author of 100 papers (according to Google Scholar) from which more than 65 are indexed Web of Science. Several papers have been awarded by UEFISCDI for publication in journals classified in the Q1 quartile (red zone). Additionally, in 2020, 3 papers were honored with the Excellence Award by UEFISCDI for being published in journals ranked first in the corresponding subfield - Q1 top 1.
• His research focuses on Materials Science, Surface Engineering, Biomaterials, and Materials Characterization. His skills were acquired as on-site training and as a result of exchange research programs at foreign universities such as Fachhochschule Gelsenkirchen (Germany) – 6 months, Tampere University of Technology (Finland) – 1.5 years, The Institute of Plasma Physics of the Czech Academy of Sciences (Czechia) – 1 year, and The University of Las Palmas de Gran Canaria (Spain) – 1 year. In addition, he has gained expertise in materials characterization through specialized training programs at FEI Europe in Eindhoven (Netherlands), and the Bio-Nano Electronics Research Centre at Toyo University in Kawagoe (Japan). In 2023, he participated as project leader of the CSPTBC project at the PROMES-CNRS laboratory (France) under the SFERA project - Grant Agreement N° 823802. • His work focused on investigating the influence of concentrated solar power on plasma-sprayed thermal barrier coatings. The results of this research were published in the Journal of Thermal Spray Technology (Springer) in collaboration with researchers from the Institute of Plasma Physics of the Czech Academy of Sciences, Prague. • He provided materials characterization support for doctoral and master's students at Politehnica University Timisoara, served as a member of the supervision committee for several doctoral students at Politehnica University Timisoara and Transilvania University of Brașov, and established R&D and consulting framework agreements with private companies, including SC Hella SRL, Klass CNC, Contitech Romania SRL, DueVerde, and others.

# Prof. Dr. Daniel DEJICA elected as Vice President of the German Society for Translation and Interpreting Studies (DGUD)

• On July 18, 2024, during the annual meeting of the German Society for Translation and Interpreting Studies - Deutsche Gesellschaft für Übersetzungs und Dolmetschwissenschaft (DGUD), **Prof. Dr. Daniel DEJICA** was unanimously elected as **Vice President of the Society**.

• The election, chaired by Prof. Dr. Gyde Hansen, also saw the reelection of Dr. Bernd Benecke as President and Dr. Edmond Kembou as Managing Director. **Prof. Dr. Daniel DEJICA** accepted the position, underscoring his commitment to furthering the Society's mission of advancing translation and interpreting studies through interdisciplinary collaboration and innovative research.

• **The German Society for Translation and Interpreting Studies (DGUD)** is dedicated to advancing the field of translation and interpreting through research, education, and collaboration. The Society focuses on strengthening the academic profile of translation and interpreting studies while fostering the development of young scholars in the field.

• By promoting interdisciplinary dialogue and innovative methodologies, DGUD aims to address the evolving challenges of intercultural communication in a globalized world.

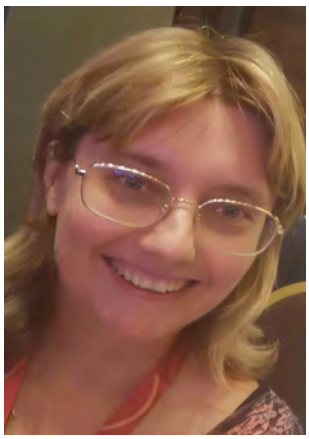
• DGUD emphasizes the importance of understanding translation and interpreting as intercultural communication, highlighting the role of culture in shaping discourse, text structures, and communication practices. The Society encourages research that explores the interplay between theory and practice, aiming to develop comprehensive frameworks that account for cultural, linguistic, and disciplinary diversity.

• Through its initiatives, DGUD supports the dissemination of knowledge, the publication of scholarly works, and the organization of conferences and workshops. The society serves as a platform for professionals, academics, and students to engage in meaningful discussions, share insights, and contribute to the advancement of translation and interpreting studies on both national and international levels.

• **Daniel DEJICA** is a Professor of Translation Studies at the Department of Communication and Foreign Languages, Politehnica University Timisoara, Romania. He also serves as a PhD Supervisor at the Doctoral School of Humanities, West University of Timișoara. He has held various leadership roles, including Dean of the Faculty of Communication Sciences, Chair of the Department of Communication and Foreign Languages, and Director of the Politehnica Center for Advanced Translation Studies. His research interests span translation theory, technical and scientific translation, and the use of digital tools in translation.

• **Professor DEJICA** has contributed extensively to the field through his publications, including books, articles, and edited volumes, and is actively involved in international collaborations and academic initiatives.

## Prof. Dr. Eng. Corina NAFORNITA – Chair of the Artificial Intelligence and Machine Learning for Synthetic Apertures (MLSA) Project Authorization Request (PAR) Study Group (SG) & Chair of the P3520 Recommended Practice for Leveraging Machine Learning in Synthetic Aperture Imaging and Sensing Working Group – IEEE Signal Processing Society Synthetic Aperture Standards Committee



• The Institute of Electrical and Electronics Engineers (IEEE) is the world's largest technical professional organization designed to serve professionals involved in all aspects of the electrical, electronic, and computing fields and related areas of science and technology.

• In 2022, the Synthetic Aperture Standards Committee (SPS SASC) was formed in the framework of the IEEE Signal Processing Society, to develop standards and recommended best practices for applying aperture synthesis to a broad range of disciplines, such as radar, sonar, channel sounding, optics, MRI, quantum apertures, and radiometry. In the framework of this Committee, the Artificial Intelligence and Machine Learning for Synthetic Apertures (MLSA) Project Authorization Request (PAR) Study Group was formed in 2023.

The Study Group was tasked with identifying and recommending to the SASC Committee the machine learning technical standards, best practices, or guides that may benefit the object detection/classification or image formation functions in synthetic aperture systems.

• In January 2024, **Prof. Corina Nafornita** was selected as **Chair of the Study Group**. In July 2024, the MLSA-SG with Prof. Corina Nafornita as Chair, presented a proposed PAR related to machine learning to the SASC voting members. The PAR was approved and it was forwarded to New Standards Committee (NesCom). NesCom approved the PAR and a working group was created based on the former study group, having the kickoff meeting in November 14, 2024.

• The Chair of this working group is Prof. **Corina Nafornita**. The purpose of the group is to develop a recommended practice document that leverages Machine Learning (ML) in synthetic aperture applications, including radar, sonar, radiometry, magnetic resonance imaging, automotive radar, remote sensing, ultrasound, and other imaging modes.

• It will address the choice of ML architectures for different imaging scenarios and the appropriate training regime, it will provide techniques for object classification/segmentation in synthetic aperture images and explore the best data format for ML algorithms in different applications. ML architectures examples will include traditional approaches and new generative approaches.

• The Chair of both Study Group and Working Group is **Corina Nafornita** (Politehnica University Timisoara, Romania). The Chair of the SASC Committee is Peter Vouras (Department of Defense, USA).

• The webpages of the **SASC Committee** and of the ML Working Group are:

- https://sagroups.ieee.org/sps-sasc/ and
- https://sagroups.ieee.org/sasc-machinelearning-SG/.

# Dr. Diana Andone, Director of the Department of ID/IFR and Digital Education of the Politehnica University Timisoara, Vice-President of the IEEE Education Society

• **Dr . Diana Andone** has been elected as **Vice President of the IEEE Education Society**.

• Elected during 2021-2023 as a member of the IEEE Education Society Board of Directors, **Dr. Diana Andone** was re-elected in August 2023 to this position and, at the same time, through a global online election, **Vice President of conferences, workshops and events** (2024-2025), the first member from Romania in such a position.

• At the end of 2023, IEEE has also designated **Dr. Andone** as **Distinguished Lecturer for 2024-2025**, through which the most active and well-known professionals are annually recognized.

• IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

• IEEE and its members inspire a global community to innovate for a better tomorrow through its more than 400,000 members in more than 160 countries, and its highly cited publications, conferences, technology standards, and professional and educational activities.

• IEEE is the trusted "voice" for engineering, computing, and technology information around the globe.

## The cultural project Spotlight Heritage Timisoara, coordinated by Politehnica University Timișoara, through the Digital and Distance Education Department and Multimedia Centre won the European Cultural Tourism Network Award, in Dublin, at the International Conference for Cultural Tourism in Europe "European Collaboration for Smart and Sustainable Cultural Tourism Destinations"

• **The cultural project Spotlight Heritage Timisoara**, coordinated by Politehnica University Timisoara, through the Digital and Distance Education Department and Multimedia Centre won the European Cultural Tourism Network Award, **1st prize** in **Progress of digitization and digital transition in smart and sustainable cultural tourism**. The international jury particularly appreciated how the project embraced and promoted the latest innovations in digital technologies.

• The award was presented to **UPT's project coordinator, Dr. Diana Andone**, in Dublin, at the **International Conference for Cultural Tourism in Europe "European Collaboration for Smart and Sustainable Cultural Tourism Destinations"**.

• Among the elements that impressed the ECTN jury were the international impact of the project, which reached more than 2.5 million people over the 6 years, of which more than 50 thousands people visited the exhibitions and participated in the guided tours, more than 57 thousands took part in the cultural events organized by UPT (conferences, workshops, webinars, performances and public events) and more than 400 thousands people attended the national and international events of the project.

• Through digital technologies, **Spotlight Heritage Timisoara** had an impact of almost 2 million users, both on the website, mobile apps and through **Augmented reality AR** and **Virtual reality VR equipment**, digital experiences that were used by Timisoara's inhabitants, tourists, virtual tourists, on the streets, in museums and at international festivals in 10 countries.

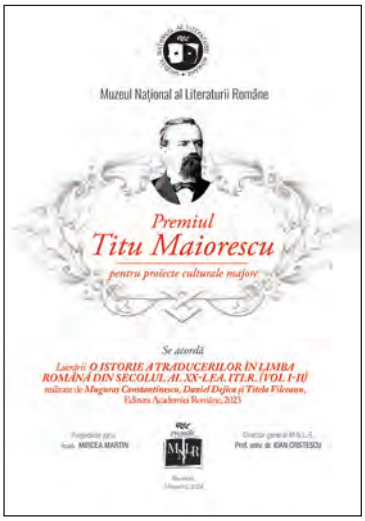
### Spotlight Heritage Timișoara in 2024

• During 2024, the Digital and Distance Education Department of the Politehnica University Timișoara continued its engagement with the **Spotlight Heritage Timișoara project**, by organizing events and guided tours through the year, in particular at the UPT Technical Museum.

• In 2024 the project expanded its network of partnerships and broadening the project's impact through the collaborative Creative Schools - Timișoara's Stories initiative, undertaken in partnership with the "Grigore Moisil" Theoretical High School Timișoara and "Avram Iancu" which produced more then 50 drawings by children, 1 VR demo and several guided tours.

# National Museum of Romanian Literature, Gala of Literary Excellence projects, 2024 - The Titu Maiorescu Prize for Major Cultural Projects: A History of Translations into the Romanian Language (Volumes I–II). Coordinators: Muguraș Constantinescu, Daniel Dejica, and Titela Vîlceanu

• On November 27, 2024, the National Museum of Romanian Literature awarded the prestigious **Titu Maiorescu Prize** during a ceremony as part of the **Gala of Literary Excellence projects**. Organized in collaboration with APLER (The Association of Literary Publications and Publishers of Romania) and funded by the Ministry of Culture, the event marked its 16th edition. This distinction celebrates the most significant works in philology published in 2023 in Romania. The prize was granted to the work **A History of Translations into the Romanian Language** (Volumes I–II), coordinated by **Muguraș Constantinescu, Daniel Dejica**, and **Titela Vîlceanu**, published by the Romanian Academy Publishing House. This recognition underscores the Museum's commitment to promoting critical editions, innovative literary research, and groundbreaking contributions to Romanian philological and cultural studies, both nationally and internationally.




• **"A History of Translations into the Romanian Language – 16th to 20th Centuries (ITLR)"**
The project, titled **"A History of Translations into the Romanian Language – 16th to 20th Centuries (ITLR)**," is supported by the Special Situations Fund (FSS) under the provisions of O.M.E.N. no. 3694/2019 and O.M.E.N. no. 3132/2020.

• Inspired by similar endeavors in countries such as France, Germany, Spain, the United Kingdom, and Brazil, which have produced or are in the process of producing histories of translations in their respective languages, the initiative aims to highlight Romania's contribution to the global cultural and intellectual heritage. Addressing a critical gap in Romanian research, this project underscores the integral role of translation in shaping a nation's cultural identity.

• The ITLR project is dedicated to studying translations as an integral part of the Romanian cultural and intellectual patrimony, exploring their intercultural and dialogical dimension as a means of connection to universal heritage. The plural form of "translations" emphasizes the uniqueness of each translation, reflecting the specific circumstances and constraints, as well as the creativity and efforts of individual translators.

• The research spans translations into the Romanian language across all historical regions—Moldova, Muntenia, Transylvania, Bassarabia, Bukovina—and other Romanian-speaking cultural spaces. This is a complex, large-scale academic effort requiring 9–10 years of work to produce 4–5 comprehensive volumes, with contributions from approximately 200 researchers across multiple universities.

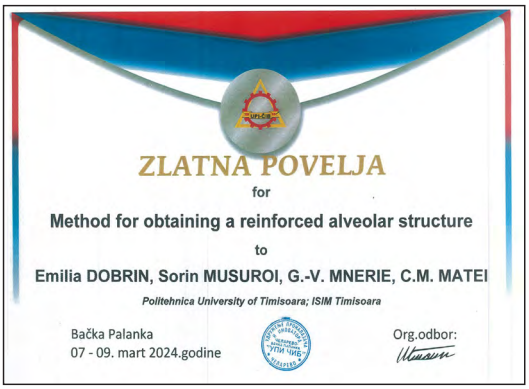
• This ambitious editorial venture not only enriches the study of Romanian culture but also establishes a framework for understanding translation as a powerful tool for intellectual and cultural dialogue.


# International Exhibition of Inventics BAP-INVENT, Backa Palanka, Serbia, March 7-9, 2024
# Multiple medals and awards for the Politehnica University Timisoara

• Between March 7-9, 2024, the invention team of the Politehnica University Timisoara coordinated by **Lecturer Dr. Eng. Corneliu BIRTOK-BĂNEASĂ**, participated with 12 inventions/projects in **Bačka Palanka**, Serbia, at the **BAP-Invent International Exhibition**, organized by the Association of Inventors and Innovators of Serbia UPI-ČIB.

• Since the first edition, a seminar on innovation topics has been held at the **BAP INVENT exhibition**. Exhibitors participate with models, zero series or functional prototypes of their innovative solutions.

• Numerous medals and prizes were obtained: **12 gold medals**, **6 special prizes** and **5 diplomas of excellence**.


ZLATNA POVELJA
for
Method for obtaining a reinforced alveolar structure
to
Emilia DOBRIN, Sorin MUSUROI, G.-V. MNERIE, C.M. MATEI
Politehnica University of Timisoara; ISIM Timisoara
Bačka Palanka
07 - 09. mart 2024.godine
Org.odbor:


ZLATNA POVELJA
for
System for functionalized membranes testing for water treatment
to
Lavinia LUPA, Petru NEGREA, Laura COCHECI, Anca FILIMON
University Politehnica Timisoara, Faculty of Industrial Chemistry and Environmental Engineering, Timisoara, Romania; "Petru Poni" Institute of Macromolecular Chemistry, Iasi, Romania
Bačka Palanka
07 - 09. mart 2024.godine
Org.odbor:


ZLATNA POVELJA
for
INSTALLATION USED FOR THE COLLECTION AND STORAGE OF THE MICROPARTICLES RESULTED FROM THE WEAR OF THE CAR BRAKES
to
Pavel Ştefan, Ungureanu Daniel-Viorel, Pascu Ioan-Bogdan
Politehnica University of Timisoara
Bačka Palanka
07 - 09. mart 2024.godine
Org.odbor:


ZLATNA POVELJA
for
EQUIPMENT FOR REDUCING OF HYDRAULIC INSTABILITIES GENERATED BY THE SWIRLING FLOW FROM THE CONICAL DIFFUSER OF HYDRAULIC TURBINES
to
Susan-Resiga Romeo Florin, Bosioc Ilie Alin, Tanasa Constantin, Stuparu Adrian Ciprian, Szakal Raul Alexandru
Politehnica University Timisoara, Faculty of Mechanical Engineering, Hydaulic Machinery Laboratory
Bačka Palanka
07 - 09. mart 2024.godine
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# The fifth edition of the International Exhibition "INVENTCOR" Deva, 4-6 April 2024 Multiple medals and awards for the Politehnica University Timisoara

• CORNELIUGROUP research-innovation Association, in collaboration with the Faculty of Engineering Hunedoara – The Politehnica University Timisoara, organizes, in a hybrid format, **the International Exhibition INVENTCOR**, the 5th edition, 4-6 April 2024, at „Drăgan Muntean" Cultural Center in Deva city, Romania.

• Inventions, research projects, products, educational programs and experimental teaching stands from universities, research institutes, companies and private inventors were presented at the show.

• **The INVENTCOR 2024 international exhibition** covers the following areas: environmental protection, materials, bio&nanotechnology, food industry, architecture, IT, electronics, automotive, aeronautics, management, publications, history, medicine, agriculture, textiles, and also includes KidsCorner and InnovativeART.

• The main objective of **INVENTCOR 2024** was the importance of developing the innovative creative spirit, through the Power of Example with the involvement of young people and the promotion of Hunedoara County & Romania.

• The invention team of the Politehnica University Timisoara coordinated by **Lecturer Dr. Eng. Corneliu Birtok BĂNEASĂ** participated with **39 inventions/projects**. Results obtained by the CITT UPT team: **35 gold medals, 4 silver medals, 6 special prizes and 5 diplomas of excellence**.

• Virtual catalogue: • https://www.corneliugroup.ro/CATALOGUE_INVENTCOR_2024.pdf

• www.inventcor.ro



# International Idea-Novelty Invention Exhibition and Fair IDEA-EXPO 2024, MAKO-Hungary, 25-27 April 2024
# Multiple medals for the Politehnica University Timisoara

• The UPT invention team participated in the IDEA international exhibition organized between April 25-27, 2024 in **Mako, Hungary**, organized by the **IDEA 13 Association**, bringing together researchers from all over the world, with **10 inventions/projects**.

• The participation was carried out under the aegis of **CITT Politehnica 2020**.

**The IDEA 13 Association** was founded in 1996 as a non-profit organization. Since 1999, it has regularly organized the IDEA Exhibition, which brings together inventors and researchers from all over the world.

• Following the international judging, the UPT team obtained **10 gold medals**.

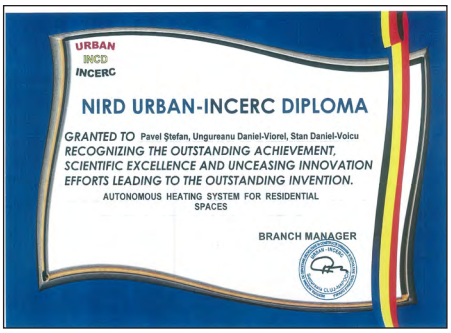
# 16th edition of European Exhibition of Creativity and Innovation "EUROINVENT 2024" Iasi, 6-8 June 2024
# Multiple medals and awards for Politehnica University Timisoara

• The Politehnica University Timisoara participated between June 6-8, 2024 at the **Euroinvent International Exhibition** in Iasi, the 16th edition, with **10 inventions/projects**.
At this edition, over 700 inventions and projects were presented, thus being the largest in Eastern Europe.

• The event promotes creativity and innovation in an international context.
• The Politehnica University Timisoara was represented by the team coordinator, **Lecturer Dr. Eng. Corneliu Birtok-Baneasa**.

• The invention team of the Politehnica University Timisoara achieved the following performances:
**- 9 Gold Medals, 1 Silver Medal, 6 Special Prizes**
•Virtual catalogue:
https://www.euroinvent.org/Report_Euroinvent_2024.pdf



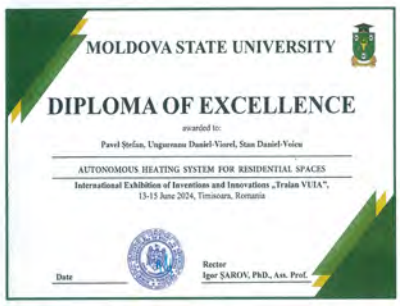
## 2nd edition of the International Salon of Invention and Innovative Entrepreneurship, Chișinău, 16-17 May 2024
## Multiple medals for the Politehnica University Timisoara

• The **International Exhibition of Invention and Innovative Entrepreneurship** took place on May 16-17, 2024 and was organized by the **Institute for Research, Innovation and Technology Transfer of the State Pedagogical University "Ion Creangă"** in **Chisinau**.
• The salon promotes inventions, published scientific literature (books) of authors (individuals or legal entities), from the country and abroad, willing to make them known to the general public.
• Areas of the **International Exhibition of Invention and Innovative Entrepreneurship**:
- Inventions,
- Implementation of Research Results in Practice,
- Book Fair,
- Innovative Entrepreneurship.
• The Politehnica University Timisoara was represented by the team coordinator, **Lecturer Dr. Eng. Corneliu BIRTOK-BĂNEASĂ**.
• The invention team of the Politehnica University Timisoara participated with **13 inventions/projects**.
• The following performances were obtained: **12 gold medals and 1 silver medal**.
• Virtual catalogue: http://dir.upsc.md:8080/xmlui/123456789/6928

# 10th edition of the International Exhibition of Inventions and Innovations "Traian Vuia" Timișoara, 13 - 15 June 2024
# Multiple medals and awards for the Politehnica University Timisoara

• The team of the Center for Innovation and Technology Transfer of the Politehnica University Timisoara, represented by **Lecturer Dr. Eng. Corneliu BIRTOK-BĂNEASĂ** participated in **the "Traian Vuia" International Exhibition of Inventions and Innovations** in Timișoara, the tenth edition, organized by the **"King Mihai I" University of Life Sciences** in Timișoara at the Administrative Palace of the Timis County Council, with **10 inventions/ projects**.

Numerous medals and prizes were obtained: **10 gold medals, 6 special prizes and 3 diplomas of excellence.**


MOLDOVA STATE UNIVERSITY

DIPLOMA OF EXCELLENCE

awarded to:

Pavel Ștefan, Ungureanu Daniel-Viorel, Stan Daniel-Voicu

AUTONOMOUS HEATING SYSTEM FOR RESIDENTIAL SPACES

International Exhibition of Inventions and Innovations „Traian VUIA",
13-15 June 2024, Timisoara, Romania

Date

Rector
Igor ȘAROV, PhD., Ass. Prof.


SALONUL INTERNAȚIONAL DE INVENTII INOVATII „TRAIAN VUIA" TIMIȘOARA

Diploma

IS AWARDED GOLD MEDAL

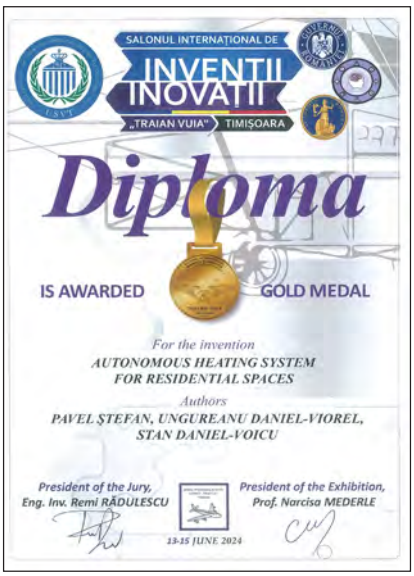
For the invention
AUTONOMOUS HEATING SYSTEM FOR RESIDENTIAL SPACES

Authors
PAVEL ȘTEFAN, UNGUREANU DANIEL-VIOREL, STAN DANIEL-VOICU

President of the Jury, Eng. Inv. Remi RĂDULESCU

President of the Exhibition, Prof. Narcisa MEDERLE

13-15 JUNE 2024


SALONUL INTERNAȚIONAL DE INVENTII INOVATII „TRAIAN VUIA" TIMIȘOARA

Diploma

IS AWARDED GOLD MEDAL

For the invention
AUTONOMOUS HEATING SYSTEM FOR RESIDENTIAL SPACES

Authors
PAVEL ȘTEFAN, UNGUREANU DANIEL-VIOREL, STAN DANIEL-VOICU

President of the Jury, Eng. Inv. Remi RĂDULESCU

President of the Exhibition, Prof. Narcisa MEDERLE

13-15 JUNE 2024

# 28th edition of the International Exhibition of Inventics "Inventica 2024" Iasi, 3-5 July 2024
# Multiple medals and awards for the Politehnica University Timisoara

• The invention team of the Politehnica University Timisoara participated in the **International Exhibition of Inventions – INVENTICA 2024 Iasi**, the 28th edition, held between 3-5.07.2024, organized by the **"Gheorghe Asachi" Technical University of Iași** and the National Institute of Inventions Iași, with **10 inventions/projects**.

• The **INVENTICA 2024 Salon** aims to bring together universities, research institutes, companies, associations, inventors and people interested in the field of Invention and represents an opportunity to communicate and disseminate the results of the work in this field with potential users and the general public.

• Results obtained by the CITT UPT team coordinated by **Lecturer Dr. Eng. Corneliu BIRTOK-BĂNEASĂ**:
**4 gold medals, 5 silver medals, 1 bronze medal, 3 special prizes and 4 diplomas of excellence**.



# 1st edition of the International Exhibition of Innovation and Technological Transfer innoCENTA, Timisoara, Romania, 7-8 November 2024
# Multiple medals and awards for the Politehnica University Timisoara

• The Politehnica University Timisoara participated between 7 and 8 November 2024 at the **International Exhibition of Innovation and Technology Transfer – innoCENTA** in Timișoara, with **11 inventions/projects**.
• The Politehnica University Timisoara was represented by the team coordinator, **Lecturer Dr. Eng. Corneliu BIRTOK-BĂNEASĂ**.

• **The International Exhibition of Innovation and Technology Transfer innoCENTA** is organized by the National Institute for Research and Development for Welding and Testing of Materials - ISIM Timisoara.

• This event represents a significant moment in the innovation and technology transfer landscape in Romania, meant to promote collaboration between academia, industry and community.

• The invention team of the Politehnica University Timisoara achieved the following performances:
- **4 gold medals,**
- **1 silver medal,**
- **6 bronze medals** and
- **1 special prize**.


# 1st edition of the International Innovation and Invention Show EURO POLITEHNICUS 2024, Bucharest, Romania, 22-24 November 2024
# Multiple medals and awards for the Politehnica University Timisoara

• The invention team of the Politehnica University Timisoara participated in the first edition of the **EUROPOLITEHNICUS Invention Salon**, 1st edition, organized by the Polytechnic University of Bucharest, with **8 inventions/projects**.
• The purpose of **EURO POLITEHNICUS** is to present, disseminate and promote the results of scientific research and technological development, to aknowledge the achievements and stage of development in almost all areas of daily life, to increase the visibility of the contribution of inventors to the international scientific heritage.

• The Politehnica University Timisoara was represented by the team coordinator, **Lecturer Dr. Eng. Corneliu BIRTOK-BĂNEASĂ**.
• Following the international judging, the invention team achieved the following performances:
- 5 gold medals
- 3 silver medals
- 3 diplomas of excellence
- 8 special awards

Universitatea Politehnica Timișoara

# NATIONAL RESEARCH PROJECTS

# ARTIFICIAL INTELLIGENCE BASED CONTROL SYSTEM FOR LEGGED ROBOTS USED IN AUTONOMOUS NAVIGATION, MAPPING AND SURVEILLANCE OF UNSTRUCTURED ENVIRONMENTS

## Goal of the project

• The scope of the **AI-LegRob (Artificial Intelligence based Control System for Legged Robots used in Autonomous Navigation, Mapping and Surveillance of Unstructured Environments) project** was to build an Artificial Intelligence sense-and-control system based on multitasking Deep Neural Networks (DNN) for controlling 4-legged robots used in autonomous navigation on unstructured terrain.

• The objectives of this project are:

**O1:** AI-based Environment Perception and Terrain Estimation;
**O2:** 4-legged robot motion control;
**O3:** Connectivity, mapping, and data collection;
**O4:** Case Studies.

## Short description of the project

The objective of **AI-LegRob** is to build an Artificial Intelligence based system for controlling a legged robot which continuously monitors, maps, and centralizes the state of its environment.

## Project implemented by

**Coordinator:** Transilvania University Brașov (UTBv)
**Partner:** Politehnica University Timișoara (UPT)

## Implementation period

30.06.2022 – 20.06.2024

## Main activities

**The AI-LegRob project** is planned to be implemented through four technical Work Packages (WP), over 2 years of activity, with an additional fifth management, exploitation, and dissemination work package:

**WP1:** Multitasking DNN for scene and terrain perception
Task 1.1. Synthetic training data generation
Task 1.2. Multitasking perception DNN
**WP 2:** AI-based motion control for legged robots
Task 2.1. Classical baseline predictive control for 4-legged robots
Task 2.2. AI-based data driven control for legged robots
**WP 3:** Data connectivity and legged robotics database
Task 3.1. 4-legged robotics connectivity
Task 3.2. Real-world training data
Task 3.3. Dynamic map
**WP 4:** Evaluation and Case Studies
Task 4.1. Rovis.Dojo simulation and RovisLab AMTU tests
Task 4.2. Indoor evaluation
Task 4.3. Evaluation on forest roads
**WP 5:** Management, Exploitation and Dissemination
Task 5.1 Management
Task 5.2 Exploitation plan
Task 5.3 Dissemination

## Results

• The development of the motion planning method relative to a reference trajectory was realized using a simplified model of the 4-leeged robot. In parallel, the direct and inverse kinematic model was created, as well as the dynamic model of the robotic system, including all 12 actuator motors of the system. These models were used to transform the reference point, which indicates the direction of movement and is defined in Cartesian space, into control signals that are sent directly to the robot's motors.

• The AI-based perception system was developed around the ObserveNet Control algorithm, originally developed by RovisLab for autonomous vehicle control. In the case of AI-LegRob, the training data is represented by RGBD images acquired by the robot's Intel RealSense RGBD sensor.

• The development of communication between the robot and other robots, or monitoring servers, was done using the Rovis.DataChannel protocol, a protocol through which the dynamic map built around the robot was also transferred.

• The experiments were carried out in the Drumul Vechi area of the city of Brașov. There were mapped forest road areas with relatively difficult sections for quadrupedal robots to cross, due to the surfaces and obstacles present.

The results of this project have been disseminated in:
- 1 PhD thesis;
- 2 papers published in Clarivate Analytics Web of Science (formerly ISI Web of Knowledge) journals with impact factor;
- 12 papers published in conference proceedings indexed in international databases (ISI, IEEE Xplore, Springer Link).

## Applicability and transferability of the results

• From a technological perspective, AI-LegRob aimed to enhance the autonomy of legged robotic systems designed to navigate unstructured terrain.
AI-LegRob delivered a distributed robotic system demonstrator for navigating forest roads, starting from available technologies, previously developed by the consortium partners in the area of AI-based computer vision, mobile robotics, autonomous driving and control systems.
• To the best of our knowledge, there is no other AI-based data-driven automated controlled technology for 4-legged robots used to navigate and monitor unstructured environments such as forest roads.

**Fig.1.** The Unitree A1 4-legged robot on a forest road near Brașov

## Financed through/by

UEFISCDI (PN-III-P2-2.1-PED-2021-4587)

## Research Center

- RovisLab (Robotics, Vision and Control Laboratory), Transilvania University Brașov,
https://rovislab.com/
- CCISA (Research Center for Automatic Systems Engineering), Politehnica University Timișoara,
https://www.aut.upt.ro/centru-cercetare/index.EN.php

## Research Team

**Project leader (UTBv)**: Prof. Dr. Eng. Sorin GRIGORESU
**Partner leader (UPT)**: Assoc. Prof. Dr. Eng. Adriana ALBU

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- Prof. Dr. Eng. Claudiu POZNA
- Ph.D. Student Eng. Mihai-Valentin ZAHA
- Assoc. Prof. Dr. Eng. Lucian-Mirea SASU
- Eng. Bogdan MUNTEAN
- Alexandra ENACHE
- Ph.D. Student Cosmin GINERICA

**Researchers (UPT):**
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- Ph.D. Student Eng. Monica-Lavinia NEDELCEA
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# DYNAMICS OF HYPERCOMPLEX-VALUED NEURAL NETWORKS

## Goal of the project

- The main goal of the project is to study stability and synchronization properties of quaternion, octonion, Clifford, and matrix-valued recurrent neural networks. More precisely, sufficient conditions given in terms of linear matrix inequalities for the stability and synchronization, using different control schemes, of quaternion-valued Hopfield and fractional-order neural networks with neutral-type, leakage, time-varying, and/or distributed delays on time scales will be derived using techniques and methods extended from the real- and complex-valued domains.
- Further extending these ideas to the octonion domain, sufficient conditions for the stability and synchronization of octonion-valued Hopfield and fractional-order neural networks with the same types of delays on time scales will also be obtained. The stability and synchronization analysis of Clifford-valued Hopfield and fractional-order neural networks with delays on time scales will follow.
- Finally, all the previously obtained results will be generalized in order to study the stability and synchronization of matrix-valued Hopfield and BAM neural networks with delays on time scales. The derived linear matrix inequalities can be easily solved by standard mathematics software. Numerical simulations of various examples will illustrate the effectiveness of the obtained theoretical results and their easiness of use for practical applications.

## Short description of the project

- Recurrent neural networks (RNNs) have many applications in classification, optimization, signal and image processing, pattern recognition, system identification, cryptography, and so on. These applications are highly dependent on the dynamical properties of the networks, making the analysis of the dynamical behavior an important part in the design of RNNs. Also, neural networks (NNs) were extended to hypercomplex domains, yielding hypercomplex-valued NNs, which have caught the attention of researchers in the past years, due to their increasing number of applications.
- Thus, the project aims at studying the stability and synchronization of quaternion, octonion, Clifford, and matrix-valued RNNs. Sufficient conditions given in terms of linear matrix inequalities for the stability and synchronization, using different control schemes, of quaternion-valued Hopfield and fractional-order (FO) NNs, of octonion-valued Hopfield and FO NNs, and of Clifford-valued Hopfield and FO NNs with neutral-type, leakage, time-varying, and distributed delays on time scales (TS) will be derived using techniques and methods extended from the real- and complex-valued domains.
- Finally, all the previously obtained results will be generalized to study the stability and synchronization of matrix-valued Hopfield and BAM NNs with delays on TS. Numerical simulations of various examples will illustrate the effectiveness of the obtained theoretical results and their easiness of use for practical applications.

## Project implemented by

Politehnica University Timisoara

## Implementation period

01.04.2022 – 31.03.2024

## Main activities

The main objectives of the research project are:

**01**. Stability and synchronization analysis of quaternion-valued Hopfield and fractional-order neural networks.

**02**. Stability and synchronization analysis of octonion-valued Hopfield and fractional-order neural networks.

**03**. Stability and synchronization analysis of Clifford-valued Hopfield and fractional-order neural networks.

**04**. Stability and synchronization analysis of matrix-valued Hopfield and BAM neural networks.

**05.** Dissemination of results and support of research activities.

## Results

The main theoretical impact will be the profound understanding of several qualitative properties of hypercomplex - valued recurrent neural networks with delays. The main practical impact of the anticipated contributions lies in the fact that they allow and facilitate the design of highly efficient neural networks that can be employed in many areas such as associative memories, pattern and image recognition, secure communication, cryptography, and so on. The implementation and analysis of state of the art neural network models may lead to major technological advances which have potential for great impact in the fields of communication and control engineering. The expected publications obtained in the framework of this project will give visibility to the research in this scientific area accomplished in Romania, and will increase the potential for external funding and international collaborations.

- Each of the activities in the project will be summarized in at least one journal or conference paper, representing the deliverables of that activity. Thus, the deliverables of the project will be a minimum of 5 journal papers and a minimum of 3 journal papers or conference papers.

## Applicability and transferability of the results

- The main theoretical impact will be the profound understanding of several qualitative properties of hypercomplex-valued recurrent neural networks with delays;
- The main practical impact of the contributions lies in the fact that they allow and facilitate the design of highly efficient neural networks that can be employed in many areas such as associative memories, pattern and image recognition, secure communication, cryptography, and so on;
- The implementation and analysis of state of the art neural network models may lead to major technological advances which have potential for great impact in the fields of communication and control engineering;
- The expected publications obtained in the framework of the project will give visibility to the research in this scientific area accomplished in Romania, and will increase the potential for external funding and international collaborations.

## Financed through/by

- Ministry of Research, Innovation and Digitalization,
CNCS - UEFISCDI,
Project number PN-III-P1-1.1-PD-2021-0345, within PNCDI III

## Research Center

Research Center for Computers and Information Technology

## Research Team

**Project leader:** Prof. Dr. Eng. Habil. Călin-Adrian POPA
**Mentor:** Prof. Dr. Eng. Radu-Emil PRECUP

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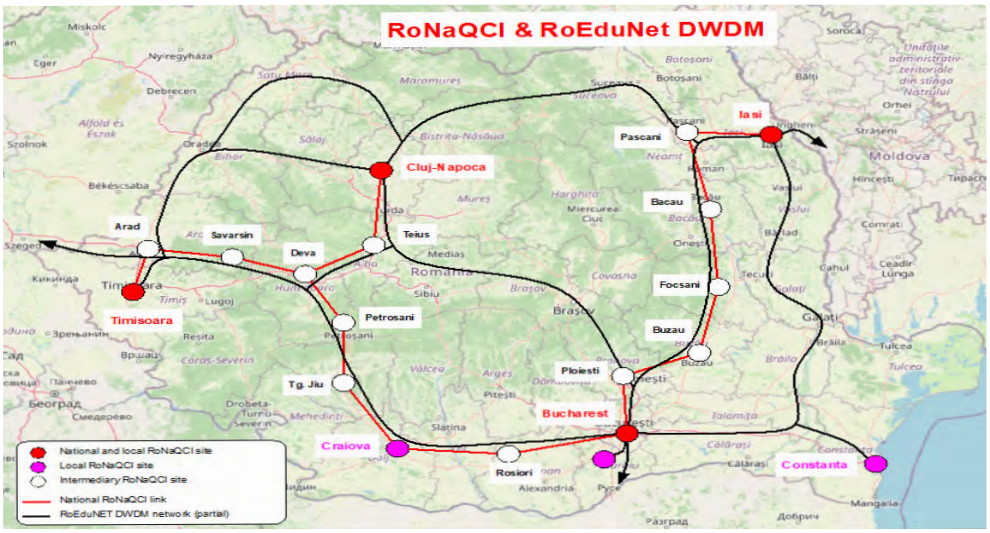
# ROMANIAN NATIONAL QUANTUM COMMUNICATION INFRASTRUCTURE

## Goal of the project

• RoNaQCI aims to deploy a 1,500km+ quantum communication infrastructure (QCI) network across Romania, including six metropolitan networks in key cities (Bucharest, Iași, Cluj-Napoca, Timișoara, Craiova and Constanța). It connects 10 universities, 5 research institutes, 5 public bodies, 3 data centers, and a medical clinic with 36 QKD links. It also focuses on quantum technology education, security software development, and industry collaboration while preparing for future quantum internet expansion.




## Short description of the project

• RoNaQCI deploys a 1,500km+ quantum communication network across Romania, linking key cities and institutions.

## Implementation period

January 1, 2023 – June 30, 2025

## Project implemented by

- **Coordinator**: Politehnica University of Bucharest
- **Partners**: Gheorghe Asachi Technical University of Iași (TUIasi), Alexandru Ioan Cuza University of Iași (UAIC), Politehnica University Timișoara (UPT), West University of Timișoara (UVT), Babeș-Bolyai University (UBB), Technical University of Cluj-Napoca (UTC-N), University of Bucharest (UB), University of Craiova (UCv), Dunărea de Jos University of Galați (UGAL), Lucian Blaga University of Sibiu (ULBS), Maritime University of Constanța (CMU), National Institute for Research and Development in Physics and Nuclear Engineering – Horia Hulubei (IFIN-HH), National Institute for Research and Development in Laser, Plasma, and Radiation Physics (INFLPR), National Institute for Research and Development in Isotopic and Molecular Technologies (INCDTIM), National Institute for Research and Development in Materials Physics (INCDFM) ), Institute for Advanced Technologies (ITA), Institute of Space Science (ISS), Romanian Space Agency (ROSA), Ministry of National Defense (METRA), National Agency for Information Network Management for Education and Research (RoEduNet), Trencadis Corp SRL (TRC), Intergraph Computer Services SRL (ICS), Trans Sped SA (TSP).

## Main activities

- Besides the 1,500km quantum network with 36 QKD links, RoNaQCI developed quantum security protocols, open-source QCI monitoring software, and secure VPNs.
- The project will test 15 metropolitan and 2 national use cases in medical, financial, public, and defense sectors. A national QCT certification was created, alongside training programs for academia, industry, and government.
- Collaboration with ISPs, security institutions, and stakeholders ensures compliance with EU standards and drive quantum Internet expansion.

## Results

- UPT coordinates **WP7 – Advanced Use Cases**, which focuses on developing and deploying quantum-secure applications within RoNaQCI. To this end, UPT integrated QRNG chips into X.509 certificate generation.
- The UPT team also contributed to the implementation of the open-source QCI monitoring software, QKD-based VPN, and QKD-based SSH. The UPT team also founded the UPT Quantum Educational Hub and held Basic Quantum Knowledge trainings for students.

## Applicability and transferability of the results

- RoNaQCI enhances cybersecurity, healthcare, finance, public services, and cloud computing through quantum-secured communication. It strengthens data protection for governments, banks, ISPs, and research institutions while enabling secure medical and financial transactions.
- The project is scalable across Europe, supports cross-border quantum networks, and fosters industrial adoption. Its training programs and certification models can be replicated in other countries, ensuring long-term impact in quantum technology education and workforce development.

## Financed through/by

- European Commission, UEFISCDI

## Research Center

- Research Center for Computers and Information Technology

## Research Team

- **Project leader**: Prof. Dr. Eng. Mihai Udrescu

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# IMPROVED TECHNOLOGIES FOR THE DEVELOPMENT OF ELECTROSPUN POLYSULFONE MEMBRANES INTEGRATED IN AN EXTRACORPOREAL DEVICE APPLICABLE IN RENAL FAILURE

## Goal of the project

• The goal of the project is to catalyze the fundamental redesign of dialysis, supported by a series of innovations in biomaterials field used for hemodialysis and to develop a novel technology able to overcome the disadvantages of conventional dialysis technologies and to offer numerous advantages. The project aims to design and develop new bioactive functionalized hollow membranes - fibrous functionalized bioactive membranes based on quaternized polysulfones - with improved characteristics (modeled and controlled morphology, biocompatibility, hydrophilic/hydrophobic balance), which will be used as medium separations in an extracorporeal innovative device.

## Short description of the project

We aim to develop new bioactive functionalized hollow membranes (FHMs) which will be used as medium separations, considering the competitive or selective adsorption of the biological materials, in an extracorporeal innovative device (EID), which will be tested and validated by establishing their efficiency in advanced hemodialysis (HD) treatment.

## Project implemented by

•"Petru Poni" Institute of Macromolecular Chemistry Iasi (ICMPP) – project **coordinator**

• Politehnica University Timisoara, Faculty of Industrial Chemistry and Environmental Engineering (UPT) – project partner

## Implementation period

28.06.2022-30.06.2024

## Main activities

- Formulation and design of functionalized hollow biocompatible membranes based on quaternized polysulfones (FHMs)
- Optimization of surface properties in order to obtain FHMs applicable in the dialysis process.
- Design and development of an extracorporeal innovative device (EID) by integrating the optimized experimental demonstrator (FHMs) into a final product.
- Evaluation of FHMs membranes functionality for medical applications.
- Validation of the laboratory technology through specific tests.
- Dissemination of the results.

## Results

- Various hollow biocompatible membranes based on quaternized polysulfones functionalized with antioxidants/anticoagulants (FHMs) with desired properties for applications in biomedicine, were obtained.
- Was designed and developed an extracorporeal innovative device (EID), which together with the tested membranes (FHMs) will fulfill the following requirements: present a small and compact design, allow high blood flow rates, prevent clotting, permits the easy replace of the membrane and an easy cleaning and sterilization processes.
- The use of PSFQ in combination with CAP and PVDF, as well as the incorporation antioxidants has led to a new generation of dialysis membranes that are more efficient and less invasive for patients.

## Applicability and transferability of the results

- A solid transfer of knowledge occurs during the collaboration between the partners involved in the research.
- Application of the developed membranes in an extracorporeal innovative device (EID), increasing competitiveness in research-development-innovation and technology transfer by introduction to new innovative materials integrated in a circuit with application in HD therapy.

## Financed through/by

This work was supported by a grant of the Romanian Ministry of Education and Research, CCCDI - UEFISCDI, project number PN-III-P2-2.1-PED-2021-2700, within PNCDI III

## Research Center

- Research Center for Environmental Science and Engineering
- Research Institute for Renewable Energy

## Research Team

- (ICMPP) – **project coordinator**:
- Dr. Anca FILIMON – **project director**
- Dr. Adina Maria DOBOS
- Dr. Irina ROSCA
- Dr. Dragos PEPTANARIU
- Dr. Alexandra BARGAN
- Dr. Mihaela Dorina ONOFREI
- Ph.D. Student Oana DUMBRAVA

- (UPT) – **project partner**:
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# SUSTAINABLE ROUTES FOR CARBOHYDRATE-BASED BIOSURFACTANTS IN GREEN REACTION MEDIA (GREENBIOSURF)

## Goal of the project

The key objective of the project is to develop an innovative and sustainable process and solvent system for the synthesis of new sugar ester biosurfactants.
Specific objectives are:
(i) design and optimization of the biocatalytic synthesis of sugar ester in green solvent systems (NADES), to determine the optimal solvent composition, reaction conditions, enzyme recovery possibilities and downstream processing parameters and
(ii) synthesis and characterization of at least three different novel carbohydrate biosurfactants.

## Short description of the project

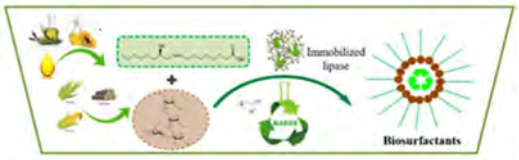
The project develops an innovative and sustainable biocatalytic process to produce sugar fatty acid esters (SFAEs), an important class of green biosurfactants.

SFAEs have excellent emulsifying properties and foaming ability, and can be used in food ingredients, in cosmetics, detergents, pharmaceuticals and in agrochemicals.

The aim of this project is to develop and optimise efficient biocatalysts and solvent systems for the synthesis of SFAEs (Scheme 1). For this reason, the biocatalytic synthesis of novel SFAEs will be carried out in natural deep electric solvents (NADES) and the optimal solvent composition, reaction conditions, enzyme recovery possibilities and downstream processing will be determined. Selectivity and operational stability of different lipases in NADES will be evaluated.

*The stabilization of the selected enzymes will be improved by immobilization, including covalent binding on synthetic resins and sol-gel entrapment.* The reaction engineering will target the effect of NADES composition and process parameters.

SFAEs will be prepared at preparative scale, at optimal process conditions. The biobased carbohydrate-based surfactants will be characterized in detail by appropriate analytical techniques for structure confirmation, assessment of the physico-chemical and surfactant properties, in view of possible applications in food and other sectors.




*Scheme 1. Enzymatic biotransformations of fatty acids and sugars into biosurfactants*

## Project implemented by

Politehnica University Timisoara

## Implementation period

15.02.2021 – 14.02.2024

## Main activities

### Phase 3/2024:

***Characterization of the synthesized biosurfactants and evaluation of the surface-active properties.***
***Round up project.***

Work focused on testing the foaming and emulsifying properties of carbohydrate esters and on the dissemination of results through publication in high impact journals.

## Results

*Main scientific achievements of Phase 3, 2024:*

- The structure and physical chemical properties of all new compounds obtained were determined with advanced methods.
- Fatty acid esters of polyols and carbohydrates are surface agents for stabilizing water/oil and oil/water emulsions, respectively. Fatty acid esters of carbohydrates are good foaming agents.

*Dissemination: Selected publications and conference presentations:*

**1.** A.R. Buzatu, M.A. Soler, S. Fortuna, O. Ozkinlic, D.M. Dreava, I. Bîtcan, V. Badea, P. Giannozzi, F. Fogolari, L. Gardossi, F. Peter, A. Todea, **C.G. Boeriu**. Reactive natural deep eutectic solvents as essential reaction media for lipase catalyzed esterification of carbohydrate polyols. Catalysis Today, 2024, 426, 114373.

**2.** A.R. Buzatu, A. Todea, F. Peter, **C.G. Boeriu**. *The role of reactive natural deep eutectic solvents in sustainable biocatalysis.* ChemCatChem, 2024, e202301597.

**3.** A.R. Buzatu, M.A. Soler, S. Fortuna, O. Ozkinlic, D.M. Dreava, I. Bîtcan, V. Badea, P. Giannozzi, F. Fogolari, L. Gardossi, F. Peter, A. Todea, **C.G. Boeriu**. *Lipase-catalysed esterification in a reactive natural deep eutectic solvent leads to lauroylcholine chloride rather than glucose ester.* React. Chem. Eng., 2024, 9, 2623-2634

**4.** A.R. Buzatu, A. Todea, R. Pop, D.M. Dreavă, C. Paul, I. Bîtcan, M. Motoc, F. Peter, **C.G. Boeriu**. *Designed Deep Eutectic Solvents for Lipase-Catalyzed Esterification.* Molecules. 2025, 30, 778.

**5.** A.R. Buzatu, A. Todea, R.O. Pop, D.M. Dreavă, C. Paul, I. Bîtcan, M. Motoc, F. Peter, **C.G. Boeriu,.** *Rational design of reactive natural deep eutectic solvents to enhance esterification activity and thermal stability of lipases.* Oral presentation, 33nd Symposium on Thermal Analysis and Calorimetry "Eugen Segal" of the Commission for Thermal Analysis and Calorimetry of the Romanian Academy, CATCAR33, 17-18 October, 2024, Timisoara, Romania.

## Financed through/by

Romanian Ministry of Education and Research, CCCDI - UEFISCDI, Project code: PN-III-P4-ID-PCE-2020-2177, within PNCDI III

## Research Center

Research Center for Organic, Macromolecular and Natural Compounds' Chemistry and Engineering

## Research Team

**Project leader**

- Prof. Dr. Eng. Carmen Gabriela BOERIU

**Researchers**

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- Lecturer Dr. Eng. Alina Ramona BUZATU
- Lecturer Dr. Eng. Cristina PAUL
- Lecturer Dr. Eng. Iulia Maria PĂUȘESCU
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- Ph.D. Student Eng. Ioan BÎTCAN

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Project Website:
https://chim.upt.ro/ro/cercetare/proiecte-de-cercetare/314-pn-iii-p4-id-pce-2020-2177

# INDUSTRIAL PROTOTYPE FOR STRUCTURAL SYSTEMS MADE OF COLD-FORMED STEEL BEAMS WITH CORRUGATED WEBS ASSEMBLED WITH WELDING TECHNOLOGIES OF HIGH PRODUCTIVITY (WELLFORMED-FRAME)

## Goal of the project

The purpose of the project is the testing, evaluation and validation of a structural system for single-storey industrial buildings made of cold-formed steel beams with corrugated webs. The technical solution will be raised to the technological level TRL 6, which will be introduced on the commercial market.

*Single-storey industrial buildings made of cold-formed steel beams with corrugated webs*

## Short description of the project

The project includes an experimental campaign, extended by numerical simulations, with the purpose of characterization and optimization of connection joints and a real-scale prototype under real operational conditions.

## Project implemented by

- ANOTECH STEELWORKS S.R.L., Romania
- Politehnica University Timisoara, Romania

## Implementation period

30.06.2022-30.06.2024

## Main activities

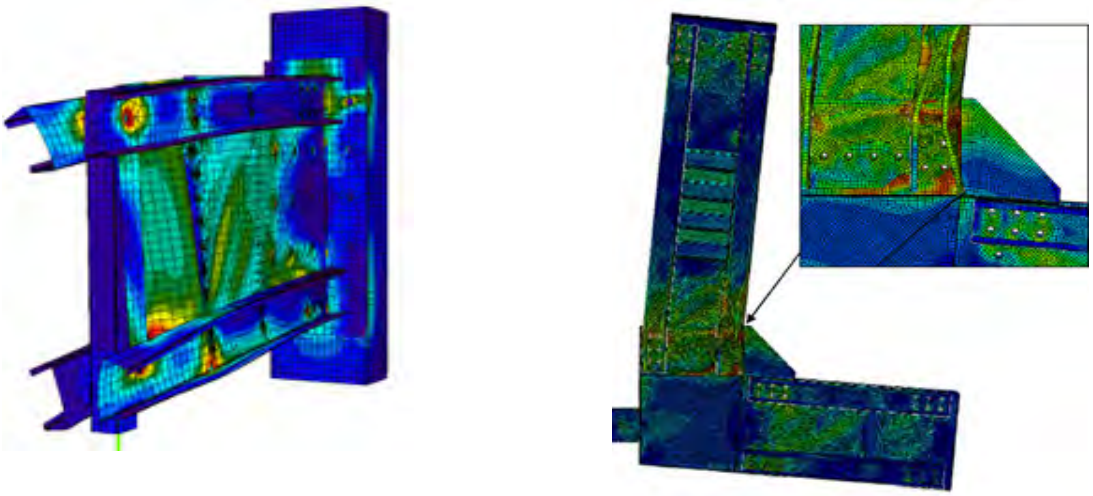
- Design of the experimental program;
- Experimental tests on materials and joints;
- Numerical investigations of joints;
- Experimental tests on full-scale industrial frames;
- Numerical studies on structural systems made of cold-formed steel beams with corrugated web;
- Guidelines for manufacture and design;
- Dissemination of results.

## Results

**1.** Guidelines for the design of structural systems made of cold-formed steel beams with corrugated web;
**2.** Tables for bearing capacities of joints and standardized frames composed of cold-formed steel beams with corrugated web;
**3.** Guidelines for the fabrication of structural systems made of cold-formed steel beams with corrugated web;
**4.** A prototype of structural system with cold-formed steel beams, with corrugated web and assembled using high productivity welding technologies, upgraded to TRL6, compared to the current TRL4 model.

## Applicability and transferability of the results

• Based on the results of the experimental campaign, a technical report will be produced with recommendations on the manufacture of structural systems made of cold-formed steel beams with corrugated webs.
• A guide with recommendations on the design and modelling of structural systems made of cold-formed steel beams with corrugated webs, together with capacity tables for different spans and loads, will be available.



*Numerical investigations of joints*


## Financed through/by

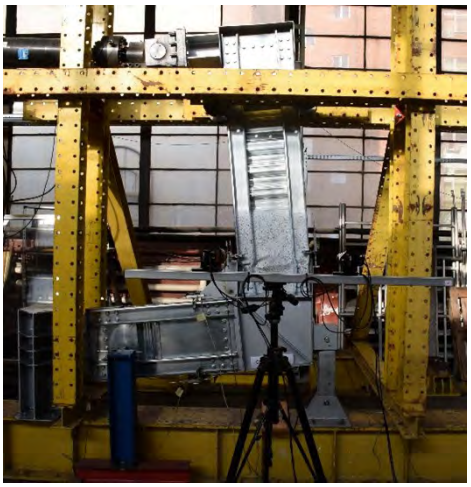
This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CCCDI - UEFISCDI, project number PN-III-P2-2.1-PTE-2021-0237, within PNCDI III".


## Research Center

- Research Center for Mechanics of Materials and Structural Safety (CEMSIG), Politehnica University Timisoara

## Research Team

- Prof. Dr. Eng. Viorel UNGUREANU
- Prof. Dr. Eng. Florea DINU
- Lecturer Dr. Eng. Ioan BOTH
- Lecturer Dr. Eng. Mircea BURCĂ
- Ph.D. Student Eng. Andrei GÎRBACEA
- PhD Student Eng. Florin BODEA

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# OPTIMISATION AND VALIDATION OF A SPECIALISED SOFTWARE USED FOR CALCULATING THE THERMAL PERFORMANCE OF THE BUILDING ENVELOPE COMPONENTS, DEVELOPED BASED ON AERIAL AND TERRESTRIAL THERMOGRAPHY METHOD

## Goal of the project

• The primary goal of the project is to develop and provide a calculation methodology and software for use in both the technical expertise and thermal rehabilitation of existing buildings, encompassing structural and energy expertise.
• Additionally, the project aims to facilitate the evaluation of the energy performance of newly constructed buildings prior to the reception phase.
• Furthermore, the project acknowledges the imperative to provide training for the workforce, equipping them with the requisite skills to serve as specialists capable of contributing to the creation of buildings with nearly zero energy consumption and emissions.

## Short description of the project

- This project presents a methodology and software that utilizes aerial and terrestrial thermography to evaluate the thermal performance of building envelopes under real operating conditions. This approach provides more accurate assessments and significantly reduces the time required for energy audits. The study includes multiple case buildings, with five located in Timisoara.

## Project implemented by

Coordinator: Technical University of Cluj-Napoca
Partners:
Politehnica University Timisoara
Technical University of Civil Engineering of Bucharest
Technical University Gheorghe Asachi of Iasi

## Implementation period

July 2022 – June 2024

## Main activities

The project activities are structured in three main phases. Stage 3 (2024) includes the following main activities:
- Completion of the thermal performance evaluation methodology of building envelope components.
- Completion of the calculation algorithm based on the methodology.
- Completion of THERMOG software based on the proposed methodology and developed algorithms.
- Development of the manual on how to use the software and the calculation methodology.

## Results

- In Stage 3 of the project, activities were focused on completing the research and continuing the dissemination. The methodology for evaluating the thermal performance of the building envelope components has been refined, addressing both the problems encountered in the pre-processing phase of the thermograms (i.e., the graphic modules) and in the post-processing phase, respectively the calculation algorithm.

- The THERMOG software was adjusted and completed, integrating new algorithms developed in this stage of the project, while keeping the line of the thermal performance evaluation methodology defined in the previous stages. In parallel, the first version of the user manual of both the graphics and calculation modules was developed.

## Applicability and transferability of the results

- The methodology developed in this project can play an important role in substantially reducing the time required for conducting building audits. Moreover, it enables the possibility to obtain results based on the actual behavior of buildings. This streamlined approach ensures a more accurate and practical assessment of the building's performance, enhancing the overall effectiveness of the energy audit process.
- Research results have been and will be disseminated by participating in scientific events and publishing articles in international journals.

## Financed through/by

This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CCCDI - UEFISCDI, project number PN-III-P2-2.1-PED-2021-4137, within PNCDI III - CT 714PED / 2022.

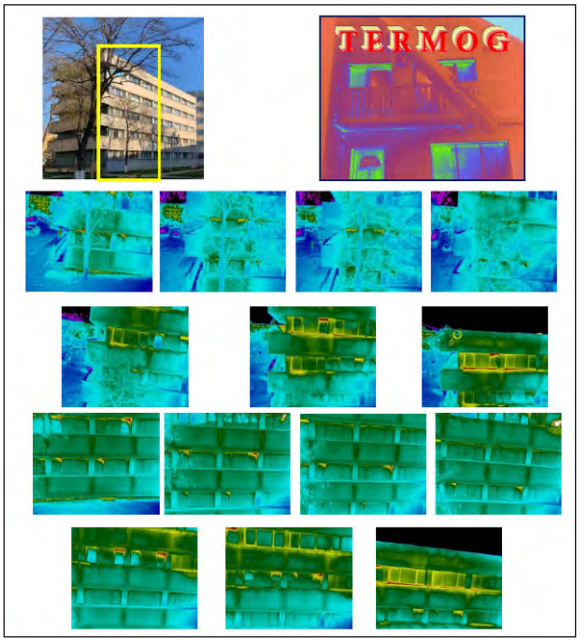
## Research Team

**Project leader**:
- Prof. Dr. Eng. Daniel DAN

**Researcher**:
- Lecturer Dr. Eng. Cristina MARINCU

## Research Center

Research Center for the Rehabilitation of Buildings

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# SMART DEVICE FOR AVOIDING PARALLEL RESONANCES TO THE SWITCHING OF CAPACITIVE COMPENSATORS IN UNBALANCED AND HARMONIC POLLUTED THREE-PHASE NETWORKS

## Goal of the project

• Capacitor banks switching to the network leads to the resonance phenomena, which, along with harmonic current flow having frequencies near the resonance frequency, causes high values of the voltage across the capacitors and respectively high values of the currents flowing through the capacitor banks. The overvoltages lead to insulation overstressing and the high values of currents produce a capacitor heating. **The goal of the project is**: *developing and testing a smart device for avoiding the resonances to the switching of capacitive compensators in unbalanced and harmonic polluted three-phase networks.*

## Short description of the project

Within the project is developed and tested an experimental model for avoiding the resonances to the switching of capacitive compensators in unbalanced and harmonic polluted three-phase networks.

## Project implemented by

• Coordinator: Politehnica University Timișoara
• Partners:
- P1: Technical University of Cluj-Napoca;
- P2: ICPE S.A.

## Implementation period

27.06.2022 – 27.06.2024

## Main activities

• The activities carried out for the effective realization of the project are industrial research and experimental development, which include all the stages to be completed, from the mathematical model and the study by modeling-simulation, to the design, execution, and release of the experimental model.
• The first stage of the project includes activities related to modeling and simulation of experimental model operation regimes, design of primary and control-command circuits for the experimental model, design of monitoring circuits and process analysis, respectively design of the mechanical structure of the experimental model.
• The second stage refers to software development activities (creation of virtual instruments) and implementation on the intelligent device, respectively the physical realization of the experimental model.
• The third stage contains testing and optimization activities.

## Results

• Within the III stage of the project implementation, the control algorithm corresponding to the experimental model for the intelligent device for avoiding parallel resonances between the load balancing compensator and the network was tested.
• Several variable regimes were designed to test the experimental model, following the three functions it encompasses: increasing the power factor, balancing the load, and avoiding resonances in order to protect the capacitor banks against the amplification of the deforming regime.
• The virtual command-control instrument which implements the algorithm is designed in the form of a state machine. The capacities necessary to be connected on each side of the compensator in Delta connection, respectively on each branch a of the compensator in Y connection are determined.
• Accordingly, the values of the quantities of interest are displayed on the Front Panel of the virtual instrument: voltages, currents, active and reactive powers, power factor.
• For a visual verification of the correctness of the order, an LED display was designed on the Front Panel that indicates the connected stages within the capacitor bank.

## Applicability and transferability of the results

• Labratory tests will be done to validate the proposed technology. The test results will be included in the reports as part of the deliverables of this project, presenting the operating conditions and the accuracy of the obtained results in comparison to the estimated ones. The solution proposed by the project will be subject of a patent application.
• The P2 partner, ICPE S.A., is interested in the further development of this experimental model and the creation of a prototype to implement the solution proposed within the project.

## Financed through/by

• UEFISCDI, Contract number: 703PED/21.06.2022,
• Project code: PN-III-P2-2.1-PED-2021-4309

## Research Center

• Research Center for Power Systems Analysis and Optimization

## Research Team

**Project leader**:

- Assoc. Prof. Dr. Eng. Alexandru BĂLOI

**Researchers**:

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- Assoc. Prof. Dr. Eng. Florin MOLNAR-MATEI
- Lecturer Dr. Eng. Ilona BUCATARIU
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https://sites.google.com/view/smart-q-switching

# IMPLEMENTATION OF CMOS MULTIPLEXERS IN A WATER QUALITY CONTROL STATION FOR COST REDUCTION IN RECIRCULATING AQUACULTURE (RASCONTROL)

## Goal of the project

- Implementation of CMOS multiplexers in measurement, control and correction automatic systems of water quality in aquaculture, aiming to reduce equipment costs to make it accessible to smaller RAS farms.

## Short description of the project

- The RASCONTROL project advances a new eco-technology for monitoring the aqueous environment, from the laboratory level to the industrial level, which will also include corrective intervention of water chemistry.
- This equipment will be able to be used in intensive aquaculture and by reducing costs and simplifying the setting, it will also allow small and medium-sized RAS farms to sustainably automate their water quality management.

## Project implemented by

**Coordinator:** DFR Systems SRL
**Partners:**
- P1: University of Craiova, Romania;
- P2: University Politehnica Timisoara. Romania.

## Implementation period

23.06.2022 - 22.06.2024

## Main activities

- Experimental model design;
- Realization of experimental model;
- Testing the experimental model in laboratory conditions;
- Designing a pilot system to work in a RAS monitoring system;
- Realization of pilot plant - integrated system;
- Pilot testing in situ conditions (mounting in a RAS system);
- Elaboration of manual for presentation and use of the system;
- Dissemination of results.

## Results

**A.** Expanding the capabilities of the SPEAR instrument for more electrode types and for driving water composition and circulation correction equipment;

**B.** Upgrading the SPEAR-64-8-8 switch/multiplexer into a masterboard switch/multiplexer, capable of managing up to 8 multielectrode probes (i.e. central observation nodes with measuring cells);

**C.** Development of the station's central monitoring and control unit (with computer and microcontrollers);

**D.** Upgrading the software used by SPEAR to the new architecture and new features;

**E.** Interfacing monitoring equipment with standard water property correction equipment (pumps, valves, activation of chemical filters, adjustment of nitrification activity and pH control);

**F.** Production of a user manual and training materials.

**G. In 2024**:
**i.** The RAS pilot station built in 2023 at Politehnica University Timisoara was tested.
**ii.** Published article: International Conference on Innovative Research 2024, 06-07.06.2024, Iași, România
**Vasile Daniel GHERMAN**, Vily Marius CIMPOIASU, Ioana Corina MOGA, Radu POPA, A Green Biotechnology to Prevent Harmful Algae, Blooms in Freshwater Lakes, Book of abstracts – page 67: https://www.euroinvent.org/conference/

**iii.** • The workshop "Educația-componentă esențială a politicii de mediu, Radu POPA, Vily M. CIMPOIASU, Ioana Corina MOGA, **Vasile Daniel GHERMAN**, presentation: "Monitorizarea apelor uzate generate de fermele piscicole, pentru protejarea mediului înconjurător" https://www.agir.ro/stiri/invita%C8%9Bie-la-simpozionul-educa%C8%9Aiacomponent%C4%82-esen%C8%9Aial%C4%82-a-politicii-de-mediu_1136.html

**iv.** Awards obtained:
• Participation in the International Invention Exhibition EUROINVENT 2024 Iasi, Romania, June 2024.
Awards - Gold Medal at the 15th European Exhibition of Creativity and Innovation –EUROINVENT, Iasi, Romania, 2024

## Applicability and transferability of the results

- The RASCONTROL project upgrades a recently developed technology that substantially reduces the cost of electrochemical water monitoring and makes it compatible with RAS units;
- Unlike other similar techniques where the number of electrodes is small compared to the number of measuring devices, SPEAR technology selects electrodes electronically by software commands;
- In this way it is possible for a single meter to scan electrodes positioned at many reading points and to operate with many types of electrodes;
- The basic piece of this equipment is a channel selector (multiplexer switch). Although multiplexers have already been developed in the industry, quality multiplexers are very expensive (around $2000). In contrast, SPEAR channel changers are purpose-built, with multi-electrode control, and are produced by RASCONTROL participants for less than $100 a piece.

## Financed through/by

UEFISCDI

## Research Center

Research Center for Hydrotechnics

## Research Team

**Project leader in UPT:**
- Lecturer Dr. Biol. Vasile GHERMAN

**Researchers:**
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# INCREASING THE PERFORMANCE OF THE POLITEHNICA UNIVERSITY TIMISOARA BY CONSOLIDATING THE RESEARCH-DEVELOPMENT AND TECHNOLOGY TRANSFER CAPACITY IN THE FIELD "ENERGY, ENVIRONMENT AND CLIMATE CHANGE" AT THE BEGINNING OF ITS SECOND CENTURY OF EXISTENCE (PERFORM-CDI@UPT$^{100}$)

## Goal of the project

• General objective of the project: **Increasing the institutional performance of the Politehnica University Timisoara**, by developing the research-development and knowledge transfer capacity of the Research Institute for Renewable Energy - ICER, UPT facility, by expanding and consolidating activities in the field of the smart specialization **"Energy, environment and climate change"** in order to serve the innovation requirements of economic operators in the Western Region of Romania in the context of the transition to a circular economy, respectively by intensifying collaborations and improving competitiveness and visibility at national and international level. The general objective of the project is closely correlated with the objectives of **Sub-Program 1.2 – Institutional performance, Program 1 - Development of the national research and development system, National Research-Development and Innovation Plan for the period 2015-2020 (PNCDI III).**

• The **specific objective 1** is focused on expanding and strengthening the research infrastructure in the field of **"Energy, environment and climate change"** by adding the **Research Center for Environmental Science and Engineering** to the multidisciplinary research platform developed by the PERFORM-TECH-UPT project (10PFE/16.10.2018), carried out in 2018-2020 and financed by the *competition Institutional Development Projects for financing excellence in RDI.*

• **Specific objective 2.** Development of mechanisms to ensure the increase of the capacity of the **Politehnica University Timisoara** to disseminate and capitalize on the knowledge and results obtained from RDI activities, which will increase both the visibility of the university internationally, as well as its competitiveness by involvement in research projects with national and European funding.

• **Specific objective 3.** Increasing the quality of research services offered and diversifying the provision of research, development and technology transfer services of UPT towards the economic environment and public administration entities, a continuous to adaptation to the innovation needs of economic operators, especially those in the Western Region of Romania. The professional and innovative potential of UPT specialists will be capitalized on, by stimulating collaborations between the university and the economic environment in order to strengthen the UPT position as its strategic partner.

## Short description of the project

The **PERFORM-CDI@UPT$^{100}$** project is dedicated to the institutional development of UPT through targeted activities on human resources, research and development infrastructure and international visibility.

## Project implemented by

Coordinator: Politehnica University Timisoara

## Implementation period

January 2022 – June 2024 (26 months)

## Main activities

- Project management and coordination;
- Acquisition of significant R&D equipment and services;
- Financial support for attending prestigious international conferences;
- Stimulating the publication of articles in WOS indexed journal, located in the Q1;
- Stimulating the doctoral research activity of the final year of internship for the successful completion of the experimental part of the thesis;
- Identifying funding opportunities for research and the development of successful applications;
- Development of a portfolio of new products / technologies / methods / systems / services, or significant improvement thereof;
- Financial support for the mobility of 3 doctoral students in training stages;
- Organizing a meeting with experts of the European commission and of the **National Contact Point**
- Integration and testing of purchased equipment within research centers / laboratories

## Results

- Creation of the multidisciplinary **research platform**, capable of meeting the requirements and needs of economic operators, including in priority economic sectors, such as "energy and environmental management";
- Development of a **research infrastructure** of the highest level in the field of **"Energy, Environment and Climate Change"**, which will allow the participation of the RDI staff of UPT in large-scale projects at national and international level, through the acquisition of equipment, IT services, maintenance, repairs and arrangement of spaces;
- Increasing the number of papers published in journals with a high impact factor, but also international recognition, by funding support grants to stimulate the publication of scientific articles in WOS journals, located in the first 2 quartiles;
- Participation in large-scale national and international invention exhibitions;
- Support grants have been funded for the participation of researchers in prestigious international conferences;
- Project-based hiring of 3 scientific researchers;
- Funding of 3 doctoral internships, for the successful completion of the experimental part of the doctoral theses;

Meetings were held with experts from the European Commission and the **National Contact Points (NCPs)**.

## Research Center

Within the Research Institute for Renewable Energy – ICER the following Research Centers were brought together:

1. Research Center for Materials Mechanics and Structural Safety (CEMSIG);
2. Research Center for the Processing and Characterization of Advanced Materials (CCPCMA);
3. Research Center for Smart Energy Conversion and Storage; "Ştefan Nădașan" Research Laboratory for Strength, Integrity and Durability of Materials, Structures and Conductors;
4. Research Center for Environmental Science and Engineering

## Financed through/by

– Ministry of Research, Innovation and Digitization institutional development project – projects to finance excellence in RDI

## Research Team

**Project leader:**

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- Prof. Dr. Eng. Viorel UNGUREANU,
- Prof. Dr. Eng. Nicolae MUNTEAN,
- Prof. Dr. Eng. Liviu MARSAVINA,
- Prof. Dr. Eng. Petru NEGREA,
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# DEVELOPMENT OF ACTIVE METASURFACES WITH APPLICATIONS IN THE FIELD OF FREQUENCY SELECTIVE SURFACES

## Goal of the project

This interdisciplinary project aims at conception of novel electronically controlled metasurfaces, with targeted applications to frequency selective surfaces. The main objective of this modern research topic is to control at will the electromagnetic wave parameters such as intensity, phase, wavefront, beam direction and polarization by interaction with active metasurfaces. Significant advance is expected from this project in understanding and controlling the dynamic response of the metasurface to stimuli from a properly excited control network; both externally set and measured inputs are considered. Cost-effective systems like spatial filters, polarization converters and absorbers, with applications to screening, shielding and cryptic communication systems are expected to be conceived and prototyped. Outcomes involve publications in high-rank journals, important conferences and research reports.

## Short description of the project

- The main objective of the project is the development of innovative metasurfaces with applications in the field of frequency selective surfaces.

## Project implemented by

**Coordinator:**

Politehnica University Timisoara

Faculty of Electronics, Telecommunications and Information Technologies,

Department of Measurements and Optical Electronics

## Implementation period

01.04.2022 - 31.03.2024

## Main activities

- Theoretical study of passive structures and control networks.

Numerical analysis and optimization of passive structures such as: surfaces with ultra-wide band filtering, absorbers.

- Numerical design and development of innovative configurations such as: structures made only of dielectric material, structures with flexible substrate and active surfaces with controllable geometry.

Numerical optimization by standard techniques of the excitation configuration, for a wide band answer for all the analyzed FSS structures.

- Prototyping, testing and validation of some of the proposed configurations (for example: absorbers, small active FSSs or all dielectric ones); Numerical optimization for a wide band response for the analyzed active FSS structures.

## Results

[I] A. De Sabata, L. Matekovits, A. Buta, G. Dassano, **A. Silaghi**, „Frequency Selective Surfaces for UWB Filtering and Shielding", **MDPI Sensors, 22(5)**, 1896, February 2022

**(WOS:000773637200001, IF=3.847, ISI Q2 indexed journal paper, DOI: https://doi.org/10.3390/s22051896).**

[II] A. De Sabata, L. Matekovits, **A. Silaghi**, L. Kouvalhandi, "Absorber Based on a Frequency Selective Surface Built on FR4 Substrate", **2022 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI 2022)**, Denver, USA, 10 – 15 July 2022, pp. 1-4, 2022

**(DOI: 10.1109/AP-S/USNC-URSI47032.2022.9886569)**.

[III] **A. Silaghi**, A. De Sabata, L. Matekovits, A. Buta, "Ultra-Wide Band Frequency Selective Surface: design and experimental validation of performances for wide incident angle", **2022 International Conference on Electromagnetics in Advanced Applications (ICEAA 2022)**, 5-9 September 2022, Cape Town, South Africa, pp. 1-4, 2022, **(DOI: 10.1109/ICEAA49419.2022.9899941)**

[IV] **A. Silaghi**, A. De Sabata, L. Matekovits, "Design of All Dielectric Frequency Selective Surfaces", **2022 International Symposium on Electronics and Telecommunications (ISETC 2022)**, 14-15 November 2022, Timișoara, Romania, pp. 1-4,2022

**(DOI: 10.1109/ISETC56213.2022.10010290)**

[V] **A. Silaghi**, F. Mir, A. De Sabata, L. Matekovits, "Design and Experimental Validation of a Switchable Frequency Selective Surface with Incorporated Control Network", **MDPI Sensors**, 23(9), 4561, May 2023 **(WOS: 000988076200001 , impact factor 3.847, ISI Q2 indexed journal, https://doi.org/10.3390/s23094561).**

[VI] **A. Silaghi**, C. Pescari, A. De Sabata, L. Matekovits, "Design of Locally Deformed Flexible Frequency Selective Surfaces", **2023 International Symposium on Signals, Circuits and Systems (ISSCS)**, 13-14 July 2023, Iasi, Romania,pp.1-4, 2023 **(DOI:** 10.1109/ISSCS58449.2023.10190917**).**

[VII] A. De Sabata, O. Zeno-Lipan, L. Matekovits, **A. Silaghi**, "Comparison between Frequency Selective Surface with Rectangular and Hexagonal Periodicity Operating as Absorbers", **2023 International Conference on Electromagnetics in Advanced Applications (ICEAA)**, 9-13 October 2023, Venice, Italy, pp. 1-4, 2023 **(DOI:** 10.1109/ICEAA57318.2023.10297723**).**

[VIII] ] **A. Silaghi**, F. Mir, A. De Sabata, L. Matekovits, "Study Regarding the Influence of the Biasing Network in Designing a Switchable Frequency Selective Surface", **2023 International Conference on Electromagnetics in Advanced Applications (ICEAA)**, 9-13 October 2023, Venice, Italy, pp. 1-4, 2023 **(DOI:** 10.1109/ICEAA57318.2023.10297778**).**

[IX] C. Pescari, **A. Silaghi**, A. De Sabata, L. Matekovits, F.Mir, "Designing a Tunable Frequency Selective Surface with Active Components", **2024 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI 2024)**, 14-19 July 2024, Firenze, Italy, pp. 1-2, 2024 **(DOI:** 10.1109/AP-S/INC-USNC-URSI52054.2024.10685885**).**

[X] **A. Silaghi**, C. Pescari, A. De Sabata, L. Matekovits, A. Neiconi, "Study Regarding the Tunability of a Frequency Selective Surface with Active Components and Control Network", **2024 International Conference on Electromagnetics in Advanced Applications (ICEAA 2024)**, 2-6 September 2024, Lisbon, Portugal, pp. 1-4, 2024 **(DOI:** 10.1109/ICEAA61917.2024.10701664**).**

## Applicability and transferability of the results

Results obtained in this research might be useful to:
- EMC Laboratories
- Antenna engineering
- Professionals working in Automotive design
- Legal authorities that regulate spectrum occupancy

## Financed through/by

UEFISCDI, project number PN-III-P1-1.1-PD-2021-0010

## Research Center

Research Center for Intelligent Electronic Systems

## Research Team

**Project leader:**

- Assoc. Prof. Dr. Eng. Andrei-Marius SILAGHI

**Mentor:**

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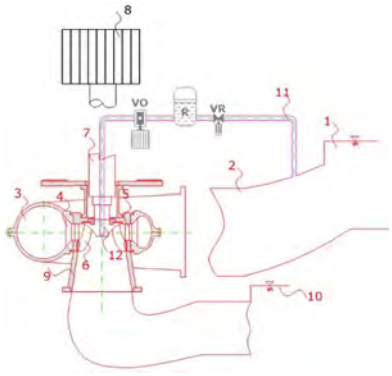
# A NEW TYPE OF VALVE TO CONTROL AND MITIGATE THE SWIRLING FLOW INSTABILITIES FROM THE CONICAL DIFFUSER OF HYDRAULIC TURBINES – HYDROVALVE

## Goal of the project

- The aim of the project is to demonstrate and validate on an experimental test rig the operation of a new type of valve which generates a pulsating water jet in order to eliminate/mitigate, the instabilities associated to the swirling flow from the conical diffuser of hydraulic turbines that operate far from their optimum efficiency point (at partial load). The introduction of the new type of valve is done by bypassing the main hydraulic circuit of the turbine (Fig. 1).




## Short description of the project

- Hydraulic turbomachines can experience severe pressure fluctuations when operated below their design conditions. Hydrodynamic instabilities generate severe pressure fluctuations in the conical diffuser. These pressure oscillations vary in amplitude and frequency depending on the operating point. The causes of these fluctuation changes are e.g. at part load in the 60% flow range, pressure pulsations induced by the helical vortex (or vortex rope). These phenomena have been known for a long time, but their effects are felt more acutely today. The entire academic community and design engineers recognize that the problem of far-from-optimal regimes is still open and await effective technical solutions that can be implemented in hydropower plants to substantially improve flexibility in hydropower exploitation. The rope vortex phenomenon is associated with severe vibrations and pressure pulsations. It can excite all parts of the hydraulic and structural system, leading to serious problems such as: pressure fluctuations, fatigue effects, vibrations, power oscillations, noise. To summarize the above, the aim of the project is to demonstrate and validate on a test rig the operation of a new type of valve that generates a pulsating water jet to eliminate / mitigate the instabilities associated with the swirling flow in the conical diffuser of hydraulic turbines operating at part load.

The introduction of the new type of valve is done by bypassing the main hydraulic circuit of the turbine.

## Project implemented by

**Coordinator:** Politehnica University Timisoara

## Implementation period

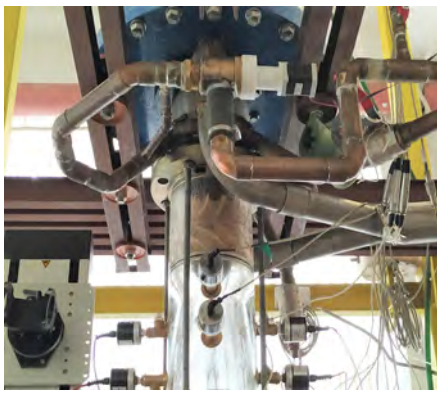
07.2022 - 07.2024

## Main activities

**1.** Manufacturing the new VO.
**2.** Implementing the new VO on the circuit of the test rig.
**3.** Testing the new VO on the test rig.
**4.** Experimental measurements and validation.

## Results

- **Objective 2 and 3** with the planned activities, related to the stage of 2023, were fulfilled, by implementing and testing the new device (Fig. 2). The degree of achievement of the deliverables in this stage was 100% (patent application).



## Applicability and transferability of the results

- Next step is to test the new device to proof the concept by experimental measurements of unsteady pressure field.

## Financed through/by

UEFISCDI

## Research Center

Research Institute for Renewable Energies

## Research Team

**Project leader:**
- Dr. Eng. Constantin TĂNASĂ

**Researchers:**
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- Assoc. Prof. Dr. Eng. Adrian STUPARU
- Assist. Prof. Dr. Eng. Tiberiu CIOCAN
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Universitatea Politehnica Timișoara

# INTERNATIONAL RESEARCH PROJECTS

# MODELLING OF THE KINETICS OF $H_2^+$, $BEH^+$, $NH^+$, AND ISOTOPOLOGUES AT HIGH ENERGY OF THE INCIDENT ELECTRON IN FUSION PLASMA

## Goal of the project

• The project proposes a theoretical study of reactive collisions between electrons and molecular cations: H2 +, BeH +, NH+ and their isotopologues using the Multichannel Quantum Defect Theory method, providing data in terms of cross sections and rate coefficients, usefully for modelling the kinetics of ionized media involving edge fusion plasma at the reactor walls.

## Short description of the project

• The dialogue between scientific communities like experimentalists, theoreticians and modelizers is often far from expectations: our approach, going from fundamental aspects to the applied ones, fills a part of this gap in the field of reactive cold plasmas.

• We perform calculations of cross sections and rate coefficients for a wide range of energies and for a large number of ro-vibration levels, in order to meet the need for rates expressed by different communities of fundamental and applied physics.

## Project implemented by

**Coordinator:** Politehnica University Timisoara

**Partners:**

• International Atomic Energy Agency (IAEA) -Vienna

IAEA International Atomic Energy Agency

## Implementation period

- 11.10.2023-01.11.2028

## Main activities

- All activities included in the planned programme of project are succesfully implemented according with the objectives of the CRP : The Formation and Properties of Molecules in Edge Plasmas:

**1.** Systematic calculations of dissociative recombination (DR), vibrational excitation (VE) and dissociative excitation (DE) cross sections and rate coefficients of BeH+, and its isotopomers: BeD+ and BeT+ by extended the incident electron energy above 2.7eV. The domain of energy will be between 2.7eV-12eV.

**2.** Dynamic calculations of DR și RVE (ro vibrational excitation) cross sections for H2 + , D2 +, HD+ , NH+, will be computed to higher energy. The Maxwell rate coefficients of both rotational and vibrational transitions, and outline several important features, as isotopic and resonant effects will be provided and highlighted.

## Results

- Our previous results of dissociative recombination, vibrational excitation and vibrational de-excitation of the BeH+ ion by electrons, based on the MQDT method, are extended to collision energies above the dissociation threshold, taking into account the vibrational continua of the BeH+ ion and, consequently, its dissociative excitation. The number of dissociative states included in our cross section calculations are also significantly increased.

- The cross sections and Maxwell rate coefficients for $BeH^+$ , $BeD^+$ , $BeT^+$ are suitable for modelling the kinetics in edge plasma in fusion devices.

- Cross sections and rate coefficients for $H2^+$, $HD^+$ taking account of rotational and isotopic effects are provided.

- The project results are disseminated by publication of scientific articles in specialized journals with a high impact factor; participation to the international conferences.

## Applicability and transferability of the results

- These numerical results are usefully for the detailed kinetics modeling, either in astrophysics, or in the cold plasma close to the wall of the fusion devices.

- Many of the project are are highly significant to the international fusion plasma community for the ITER fusion reactor project.

- The numerical results could be included in major international databases such as IAEA database, LxCAT and KIDA (Kinetic Database for Astrochemistry).

## Financed through/by

- International Atomic Energy Agency (IAEA) – Research Contract No 28231

## Research Center

- Research Center for Advanced Study Methods for Physical Phenomena

## Research Team

**Project leader**:
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(Coordinator of Research Center for Advanced Study Methods for Physical Phenomena)
**Researchers**:
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# DECONSTRUCTION AND REFABRICATION FOR THE REUSE OF STEEL BUILDINGS

## Goal of the project

• The project aims to study deconstruction and reuse of steel structures, and addresses the critical technical challenges involved, such as structural safety, reuse techniques, and the implementation of robotic deconstruction.

## Short description of the project

• In the context of reducing significantly energy-intensive recycling of steel elements, deconstruction and reuse represents a more sustainable alternative. Demountable solutions, influence of geometric imperfections accumulated through first operational life of structures and robot assisted deconstruction are part of the expected main results.

## Project implemented by

**Coordinator:** Häme University of Applied Sciences
**Partners:**
- Politehnica University Timisoara
- University of Coimbra
- FERPINTA Group
- ROBOPLAN
- Wurth Oy
- Jupa S. A
- SSAB Europe Oy
- STAR Institute

## Implementation period

- 01.09.2023 – 31.08.2027

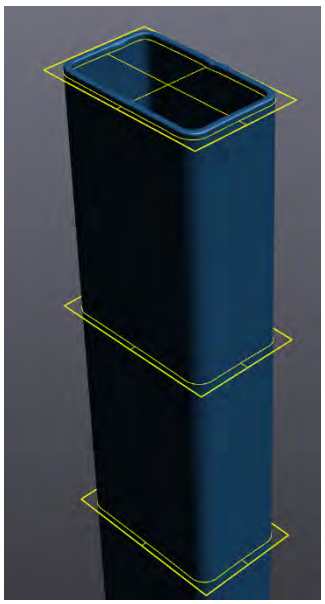
## Main activities

Main activities carried out within the project:
- Analysis of the available deconstruction options for composite construction and tubular truss structures;
- Investigation of the effects of increased geometrical imperfections due to deconstruction, loading during the first life period and refabrications;
- Effect of multiple welding-cutting-welding thermal cycles and development guidelines for structural safety regarding refabrication solutions;
- Development of innovative demountable solutions for composite construction with robot-assisted deconstruction;
- Development of innovative demountable mechanical solutions for tubular roof trusses;
- Development of robot deconstruction methods for demountable steel elements;
- Assessment of improvement strategies of design for deconstruction and environmental impact for the buildings by reuse and re-fabrication.
- Dissemination of results.

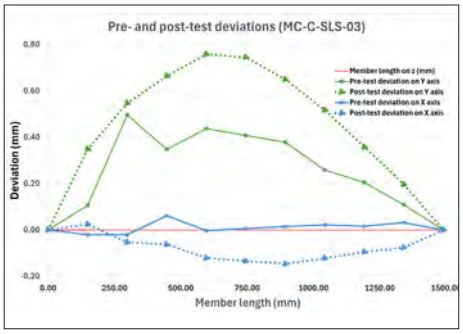
## Results

• Preliminary results include:
- An automated scanning system developed by Politehnica University Timisoara;
- Demountable shear connectors experimentally tested by University of Coimbra;
- Robot assisted deconstruction system developed by ROBOPLAN, STAR Institute and University of Coimbra
- demountable RHS truss joints analyzed numerically by HAMK.
• The automated scanning system was developed for enhancement of scanning the structural element in view of evaluation the geometric imperfections. The system was conceived to scan the external surface of elements and evaluation of thicknesses through top view in case of hollow sections.

- The system was successfully applied to measure geometric imperfections that are related to fabrication and first life cycle, prior and after testing of structural parts of a steel truss, such as top chord, lower chord and web.



In this manner it was evaluated if geometric imperfections can be accumulated during the operational life of truss structures.




## Applicability and transferability of the results

• The benefits of the project include besides cost-reduced structures, business opportunities based on deconstruction and re-fabrications instead of demolition and significant energy savings.

• The whole process becomes faster, safer, and better by the incorporation of robots in the construction and deconstruction of the buildings.

• The faster production cycle and reuse of structures also has the potential of bringing competitive solutions for the steel construction market. The environmental benefits due to the reuse process instead of recycling bring important energy savings and consequently smaller environmental load.

## Financed through/by

European Research Fund for Coal and Steel (RFCS)

## Research Center

Research Center for Materials Mechanics and Structural Safety

## Research Team

**Project leader**: Prof. Dr. Eng. Adrian CIUTINA

**Researchers:**

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- Prof. Dr. Eng. Viorel UNGUREANU
- Prof. Dr. Eng. Florea DINU
- PhD Student Viktor SZALAI

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# ALTERNATIVE EDUCATION METHODS AND INCLUSIVE SOCIAL STRATEGIES FOR CHILDREN AT RISK (HISTORY AND PUBLIC POLICY PROGRAM AT WOODROW WILSON CENTER)


## Goal of the project

• This research project, part of the History & Public Policy program at the Woodrow Wilson Center, explores innovative educational solutions and social strategies for children from vulnerable or at-risk backgrounds. Focusing on alternative education methods, such as informal learning and community-based education, the project examines their impact on the cognitive, emotional, and social development of children.

• Additionally, the history of centers dedicated to children is analyzed in the context of the evolution of the social system in America, which has strongly influenced major social and architectural changes in Romania.

## Short description of the project

- Major political shifts throughout history, both in America and Romania, have had a direct impact on the structure and functioning of these centers, and this research explores how architectural and educational changes over different periods reflected and supported social transformations. The main goal of the project is to identify the most effective educational and social models, considering both the historical context of the communities and the need for adapted architectural solutions that support the full integration and development of children in risk situations.

## Project implemented by

**Coordinator**: Woodrow Wilson for Scholars, Washington D.C.

**Partner:**

Politehnica University Timisoara, Romania

## Implementation period

- 22 September 2024- 22 December 2025

## Main activities

- **Architectural analysis**- Case studies on the design of educational centers for at-risk children in the U.S. and Romania, focusing on social inclusion.

- **Interviews with professionals**

Gathering data from educators, social workers, and policymakers on strategies for at-risk children.

- **Comparative study**- Analyzing the evolution of educational systems in the U.S. and Romania and their impact on vulnerable children.

## Results

• The partial results of the research include identifying the most effective architectural practices in educational centers for at-risk children, highlighted through case studies from the United States and Romania, as well as gathering valuable insights from interviews with professionals in education and social policy.

• Additionally, the comparative study of the educational systems highlights the influence of the American system on the Romanian system in supporting vulnerable children. Moving forward, research in the field of architecture will explore how the design of educational spaces can influence the social integration of children, while in the field of history, the focus will be on analyzing the impact of political changes on educational architecture and the evolution of social strategies, in the context of historical changes across different periods.

## Applicability and transferability of the results

- The research primarily focused on the social and legal changes in America and how these have influenced architecture for children in at-risk situations. The aim is to continue the research by correlating this information with the Romanian system, attempting to analyze the new architectural trends for children from disadvantaged backgrounds in our country and around the world.

## Financed through/by

- The main source of funding was:
• The Romanian Cultural Institute

## Research Center

- The Woodrow Wilson International Center for Scholars
- You can consult the following links:
• https://www.wilsoncenter.org/person/cristina-maria-povian

## Research Team

**Project leader**:

- Prof.Dr.Christian F. OSTERMANN (Director, History and Public Policy Program)

**Researchers:**

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- Prof.Dr. Pieter BIERSTEKER (Program Coordinator, History and Public Policy Program)
- Assoc. Prof. Dr. Arch. **Cristina Maria POVIAN** (History and Public Policy Program Scholar)

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# CIRCULARITY AND INDUSTRIAL SYMBIOSIS IN INDUSTRIAL PARKS AS TOOLS FOR GREEN TRANSITION (CATALYST)

## Goal of the project

The project aims to accelerate the adoption of the circular economy in Romania and to strengthen cross-border cooperation between Romanian and Norwegian industrial actors by providing companies and industrial parks with strategies for the circular economy and practical tools for waste valorization.

## Short description of the project

- Creating a framework for collaboration between Romania and Norway, facilitating the adoption of circular economy models.

## Project implemented by:

**Coordinator:**

- Association National Centre for Sustainable Production and Consumption

**Partners:**

- Norsk Institutt for Vannforskning
- Politehnica University Timisoara, Romania
- Thamsklyngen

## Implementation period

- 01.09.2024-31.01.2025

## Main activities

**1.** Information and research campaign by:

conducting a survey among companies and industrial parks to identify challenges and opportunities in Romania and Norway; organizing an informative webinar for stakeholders in Romania.

**2.** Educational program for industrial facilitators by creating a bilingual educational package (EN, RO, NO), available online

**3.** Accelerating circular economy practices: selecting a pilot industrial park in Romania and conducting a detailed technical analysis to identify waste streams and potential synergies; organizing a workshop for companies using design thinking methodology

**4.** Bilateral Visits: organizing two bilateral visits (in Norway and Romania), involving professionals who will benefit from knowledge transfer and establish new collaboration opportunities.

## Results

- Bilateral exchange of knowledge and practical implementation based on the bilateral study visits organized in Romania and Norway, where industrial park managers, sustainability experts, and industry leaders gathered to exchange best practices.
- Inspired by these experiences, Romanian industrial actors began identifying potential synergies in Cluj Innovation Park, laying the groundwork for the real implementation of industrial symbiosis.
- 20 professionals were trained as industrial symbiosis facilitators, ensuring that companies have the technical expertise necessary to integrate sustainability into their operations.
- Action Plan for resource efficiency and industrial symbiosis, providing a clear guide for expanding circular economy

*Practices in industrial parks in Romania*

## Applicability and transferability of the results

- One of the most important aspects highlighted in the project was that collaboration and trust are essential for the success of industrial symbiosis implementation. Companies need to engage in open dialogue to identify common opportunities, and investing time in collaborative networks and facilitating interactions can reveal synergies where they are least expected.
- Early implementation should focus on identifying resources and needs without overwhelming industrial actors with complicated data collection processes.

A pragmatic and practical approach encourages participation and accelerates the adoption of solutions.

## Financed through/by

- Fund for Bilateral Relations
EEA and NORWAY GRANTS in Romania

## Research Center

- Research Center for Environmental Science and Engineering
https://eertis.eu/errf-2300-000z-1377

## Research Team

**Project leader:**
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**Researchers:**
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- Lecturer Dr. Eng. Anamaria BACIU
- Eng. Lacrima-Crysty IGHIAN
- MsC Student Eng. Costinel FLINTĂ

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https://chim.upt.ro/proiecte-cu-finantare-internationala/

# EMERGE ROMANIA - EMPOWERING COMMUNITIES FOR ENERGY TRANSITION TOWARDS CARBON NEUTRALITY IN ROMANIA

## Goal of the project

• Strengthening the cooperation and increasing mutual knowledge between 6 partners from Romania and Smart Innovation Norway, by developing standardized and feasible models for the foundation and acceleration of energy communities, during the entire project implementation (6 months) and beyond its finalization.

## Short description of the project

- The project develops technical and financial models to analyze energy community opportunities in local communities of the project consortium, which will be essential for complex Feasibility Studies, the first of their kind in Romania.

## Project implemented by:

**Coordinator (Project Promoter)**:
Bucharest University of Economic Studies
**Partners**:
1. Energy Advisor
2. Politehnica University Timisoara
3. Smart Innovation Norway
4. Municipality of Alba Iulia
5. Buteni Commune
6. Crucea Commune

## Implementation period

23.08.2024-31.01.2025

## Main activities

The main activities were:

• Building a comprehensive database regarding the energy behavior and consumption of end users and the basic characteristics of households in a particular geographical area.

• Develop a comprehensive technical study assessing the infrastructure requirements and potential technological solutions for establishing energy communities in the targeted pilot sites.

• Perform an economic study to evaluate the financial viability and potential economic benefits of implementing energy communities within the specified local public entities.

• Developing a Communication Toolkits regarding energy community's establishment and optimizing the prosumer behavior both for Romania and Norway.

## Results

• **R1. Bilateral Learning Workshop** - Enhancing mutual understanding and collaboration between Norwegian and Romanian partners to deepen insights into energy communities within the framework of green transition.
• **R2.** A report consisting of technical economic, and social Norway's experiences in energy communities including three case studies. The report provide concrete examples and actionable recommendations for Romania's energy community ecosystem.
• **R3.** A comprehensive database regarding the energy behavior and consumption of end users and the basic characteristics of households in the MAI, BUT, and CRU pilot sites.
• **R4**. Strengthening the bilateral cooperation between Norway and Romania by empowering project partners with comprehensive insights into the technical feasibility of energy communities tailored to municipalities of varying sizes, particularly to the EMERGE pilot cases.
• **R5**. Strengthening the mutual knowledge of RO and NO partners regarding the economic feasibility of energy communities by developing and testing financial models tailored to the EMERGE pilot case
• **R6**. Elaboration of a Communication Toolkit for Romania and Norway, featuring in-depth guidance on establishing and optimizing energy communities

## Applicability and transferability of the results

• The strategic cooperation between the stated institutions aims to stimulate energy and economic innovation, with an emphasis on energy communities as an emerging innovation. This relationship aims to improve Romanian university education through bilateral knowledge transfer, applied research, and infrastructure development.

• The project formulates technical and financial models to evaluate energy community prospects within the localities of the project consortium, which will be crucial for intricate Feasibility Studies, the first of their kind in Romania.

## Financed through/by

• EEA and Norway Grants, Open Call for Bilateral Cooperation in the Green Transition

## Research Team

**Project leader:**

- Assoc. Prof. Dr. Eng. Attila SIMO

**Researchers:**

- Assoc. Prof. Dr. Eng. Attila SIMO
- Assoc. Prof. Dr. Eng. Florin MOLNAR-MATEI
- Assoc. Prof. Dr. Eng. Alexandru BĂLOI
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# TRUSTWORTHY PNT FOR UNMANNED AERIAL SYSTEMS (TOPASE)

## Goal of the project

• The main objective of **TOPASE (TrustwOrthy Pnt for unmAnned aerial SystEms)** is to leverage innovation to design and develop highly reliable, and integrity compatible UAS PNT navigation solutions.


## Short description of the project

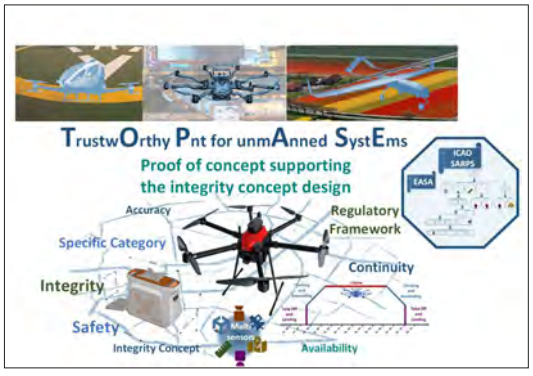
• Unmanned Aerial systems (UAS) industry has undergone significant growth, propelled by advancements in miniaturization, cost-effectiveness and sensor fusion frameworks. However, this market is still lacking trustworthiness as enabler for safety-sensitive operations.

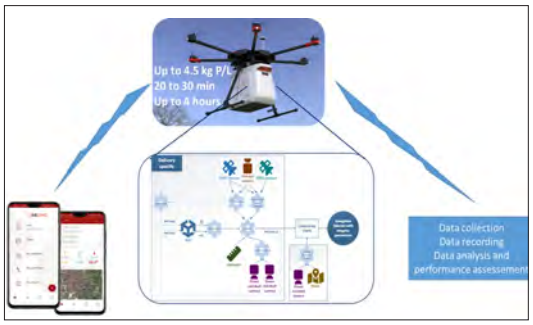
• To achieve scaled adoption, user acceptance, and compliance to regulatory and standardization ecosystem are key considerations, driven by safety.

• **TOPASE (TrustwOrthy Pnt for unmAnned aerial SystEms)** aims at leveraging innovation in designing and developing highly reliable UAS Positioning Navigation and Timing (PNT) solutions. The project's primary focus lies in Beyond Visual Line Of Sight (BVLOS) operations and critical use-cases, such as:

- Critical Infrastructure Surveillance (specific category),
- Delivery of Specific Goods between Two Identified Points (specific category),
- Taxi Drone (certified category).

• TOPASE results are supported by an End to End Proof of concept aligned with a real commercial use case bringing viability of the business plan and maximizing the solution go to market.




Prototype set up high-level overview

## Project implemented by:

**Coordinator:** Thales Alenia Space, France

**Partners:**

- Politehnica University Timisoara, Romania
- ABzero, Italy
- Drone Volt, France

## Implementation period

- 11.07.2024 – 11.07.2025

## Main activities

• A Payload system (equipped with a stereoscopic camera, a sky-facing fisheye camera, and an RTK GNSS system) will be

developed to increase flight stability and achieve better positioning accuracy. The project contains these main phases: payload design, laboratory tests, flight tests, flight recording data (images, GNSS and IMU data), flight algorithm development and training, as well as final flight tests.

## Results

- The UPT Team has started the development of the payload. The UPT team in collaboration with Thales Alenia Space, ABzero and Drone Volt partners helped performed ground tests to capture videos with the Raspberry PI cameras and implement the synchronization system between the video data with the IMU and GNSS measurements.
- The UPT team has developed an algorithm that takes the GPS coordinates from a video footage by comparing them with Google Maps images.

## Applicability and transferability of the results:

The project results will be used by the European Space Agency to improve its drones' ability to navigate and maintain their position and orientation.

## Financed through/by

(European Space Agency Navigation Innovation and Support Programme) NAVISP-EL1-073: TRUSTED PNT FOR UNMANNED AERIAL SYSTEMS, Nr. 1520124514 TAS-24-ACQ-01149

## Research Center

Research Center for Intelligent Signal Processing
(https://shannon.etc.upt.ro)

## Research Team

**Project leader:**
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**Researchers:**
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- Assoc. Prof. Dr. Eng. Cosmin CERNĂZANU-GLĂVAN

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# E³UDRES² ENT-R-E-NOVATORS – BRIDGING THE GAP BETWEEN ENTREPRENEURS, RESEARCHERS, EDUCATORS AND INNOVATORS

## Goal of the project

• **E³UDRES² Ent-Re-Novators project** aims to co-create a more specific joint research and innovation strategy and a common agenda to accelerate the transformation into a European multi-institutional R&I Hub for Smart and Sustainable Regions.

• The project includes, interacts and collaborates with a variety of smart and ambitious people, academic institutions, regional authorities, companies, European R&I networks and regional innovation ecosystems. It is committed to scientific excellence and research integrity and promotes (future) R&I competences, skills, resources, methods, training, services and management for collaborative research and open innovation.

## Short description of the project

The project develops support for enabling scientific communities to fully embrace OS, OI, OE, Engaged Science and Education. **E³UDRES² Ent-r-e-novators** seeks to transform the region into a center of excellence in R&I.

## Project implemented by

**Coordinator:** Polytechnic Institute of Setúbal, Portugal

**Partners:**

- Politehnica University Timisoara, Romania
- St. Pölten University of Applied Sciences, Austria
- Hungarian University of Agriculture and Life Sciences, Hungary
- UC Leuven-Limburg University of Applied Sciences, Belgium
- Vidzeme University of Applied Sciences, Latvia

## Implementation period

01.10.2022 – 30.09.2025

## Main activities

The future of Europe requires knowledge and scientific culture, access to open science and education as an unalienable right for all. The project aims to develop the E³UDRES² R&I dimension, by employing innovative methodologies and environments. Ent-r-e-novators set itself six objectives to reach:

**1.** Co-create a common strategy to unlock the potential for excellence in R&I

**2.** Develop best practices for sharing research infrastructures, expertise, data and resources

**3.** Develop structured support to empower scientific communities to fully embrace OS, OI, OE, Engaged Science and Education

**4.** Achieve institutional strategies for Human Resources for Research, to address challenges such as brain mobility and new career assessment

**5.** Develop a framework to link all our R&I ecosystems and the E³UDRES² alliance's knowledge triangle of education, research and innovation

**6.** Build a common R&I agenda with peer Alliances and HEIs, HEI associations, advocacy groups, and policy-makers

## Results

• On 6-8 March 2024 took place the fourth General Assembly meeting of the Ent-r-e-novators project at the Politehnica University Timisoara, where the work teams presented their progress on project implementation.

• On the same occasion a workshop was organized as part of the **Open Education Week**, with the subject **Challenges in Open Science & Education**. International speakers from the European Universities Association, European Open Science Cloud and from the partner universities presented actualities on the implementation of the EOSC, digital tools for Open Science, the impact of generative artificial intelligence on Open Education and other relevant topics.

• On 2-4 October 2024 took place the fifth **General Assembly meeting** of the Ent-r-e-novators project in Hasselt, Belgium, hosted by UCLL. The implementation results on each work package have been discussed and preparations were made for reaching all planned milestones in due time.

• **A Citizen Science International Workshop** was also organized on October 2nd.

## Applicability and transferability of the results

• Ent-r-e-novators promotes Open Science, Open Innovation, Open Publishing and Citizen Science for the benefit of all members of the community. This is already a transferable goal, that aims at the development of small and medium-sized cities and their rural environments into smart and sustainable regions.

• The project aims to develop further co-operation applications under Horizon Europe, Erasmus+ KA2, Marie Curie doctoral consortiums and other international funded calls.

## Financed through/by

European Commission, Horizon Europe Program,
HORIZON-WIDERA-2021-ACCESS-05

## Research Center

Research Center for Multimedia

## Research Team

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- Assoc. Prof. Dr. Mat. Liviu CĂDARIU-BRĂILOIU
- Prof. Dr. Eng. Daniel DAN
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# EBSI-NE – DEPLOYMENT OF EBSI PRODUCTION NODES AND PROVISION OF SUPPORT SERVICES TO EBSI NETWORK AT THE EUROPEAN LEVEL


## Goal of the project

• **The EBSI-NE project** is a collaborative initiative between 24 organisations from 14 European countries, all renowned for their expertise in Distributed Ledger Technologies and previous EBSI initiatives. The central mission of the project is to fortify the **European Blockchain Services Infrastructure (EBSI) network** by adding 18 new validator nodes to the production network and delivering comprehensive support services to all EBSI relevant stakeholders. By strengthening the EBSI network and providing essential support services, **EBSI-NE** is helping to accelerate the adoption of blockchain technology across Europe.

## Short description of the project

The objective of **EBSI-NE** is to support the development and adoption of the EBSI network at European level by increasing the number of validating nodes in the production network and by providing assistance services for all EBSI stakeholders.

## Project implemented by:

**Coordinator:**

Ministerio de Asuntos Economicos y Transformacion Digital (SGAD), Spain

**Partners:**

- Politehnica University Timisoara, Romania
- UEFISCDI Romania
- TU Delft, Netherlands
- Other 20 organizations from 14 European countries

## Implementation period

01.05.2023 – 31.07.2025

## Main activities

Activities include tasks to deploy an EBSI production node and other voluntary actions: integration of SIEM tools, development of tailored tests to improve robustness, development of framework to qualify EBSI nodes as trusted e-ledgers for eIDAS 2.

The projects' work packages are:

**WP1** – Management
**WP2** – Deployment of EBSI node
**WP3** – Support services to EBSI
**WP4** – Communication & dissemination

**Activities related to WP2**:

• Prepare the infrastructure that meets EBSI Node Operator policy requirements and follows the EBP policy
• Deploy and configure EBSI node software package
• Perform infrastructure tests to ensure reliability and security

**WP3** related activities:

• Create technical competence centers at national level
• Provide security support services
• Create tools to improve the node operation lifecycle
• Organize online technical trainings
• Asses EBSI Network initiatives at national level
• Definition of methodology and approach to qualify EBSI validator nodes as e-ledgers for eIDAS2

## Results

• **EBSI-NE** will provide 18 EBSI production validator nodes and additional support services to contribute towards the deployment and extension of the EBP use cases.

Regional technical and security services will be provided, which are estimated to be up and running as soon as a node is deployed in the network.

• In order to increase the security of the EBSI network as well as its resilience and performance, the project will set-up and integrate with the node a Security Information and Event Management (SIEM) tool.

• Other support services to improve resilience, performance, robustness, security and sustainability of the EBSI network: delivery of EBSI trainings, development of technical tools to support future node operators, reports to cover possible synergies between EBSI and national blockchain initiatives.

In UPT a virtual EBSI Operator Node has been installed through the Cloud UPT centre. The node is fully functional and received the approval from the EBSI services of the European Commission. The node still needs to apply for the **ISO 27001 certification**.

## Applicability and transferability of the results:

- The project is strongly aligned to the EU's long term digital policies and blockchain strategy. It will help establish the required infrastructure for the expansion and adoption of blockchain technology, one of the key digital technologies prioritized by the European Commission to increase the digitalization of the European society.
- The consortium groups organizations from 14 EBP members to collaborate on the development of this infrastructure, avoiding fragmentation of the blockchain landscape in Europe.
- Active cooperation between the participants is sought to create and monitor a blockchain network that promotes a more secure and interoperable infrastructure, further developing the baseline objectives stablished in the EU blockchain strategy.


## Financed through/by

- Digital Europe Programme
- DIGITAL-2022-DEPLOY-02
- European Commission,
- European Health and Digital Executive Agency (HADEA)


## Research Center

- Research Center for Multimedia

## Research Team

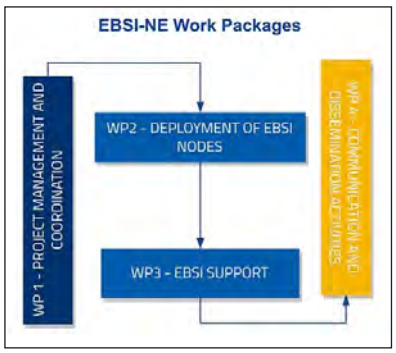
**Project leader:**

- Prof. Dr. Eng. Radu VASIU

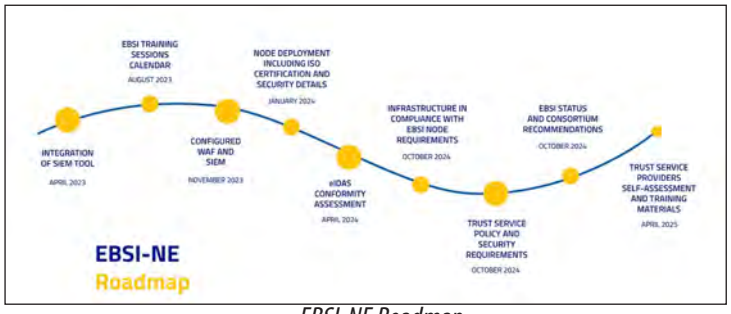
(Director Institute for Digital Transformation, Director Multimedia Research Centre)

**Researchers:**

- Assoc. Prof. Dr. Eng. Diana ANDONE
- Prof. Dr. Eng. Carmen HOLOTESCU
- Lecturer Dr. Eng. Andrei TERNAUCIUC
- Drd. Eng. Victor HOLOTESCU




*EBSI-NE Work Packages*




*EBSI-NE Roadmap*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# EBSI-VECTOR – EBSI ENABLED VERIFIABLE CREDENTIALS & TRUSTED ORGANISATIONS REGISTRIES

EBSI-VECTOR
Education and work reloaded

## Goal of the project

• **EBSI-VECTOR** brings the power of the self-sovereign identity paradigm to the educational and social security context. Defining and implementing the strategy for expanding EBSI capabilities in different countries is essential.
• The project provides the necessary basic elements and tools for citizens and organizations to interact with each other through verifiable credentials and to use the confidentiality-based verification power of the EBSI decentralized trust registers.
• The project is part of an extended ecosystem with other EU projects and initiatives (ESSPASS, EHIC, EUROPASS).

## Short description of the project

**EBSI-VECTOR** contributes to Digital transformation in specific areas (educational credentials, social security) at EU level through blockchain technologies.

## Project implemented by:

**Coordinator:**

Engineering - Ingegneria Informatica SPA (ENG), Italy

**Partners:**

• Politehnica University Timisoara, Romania
• UEFISCDI Romania
• Alma Mater Studiorum – Universita di Bologna (UNIBO), Italy
• KU Leuven, Belgium
• Université de Lille, France
• Other 47 organizations from 20 European countries

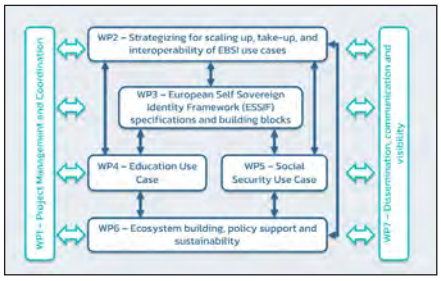
## Implementation period

01.06.2023 – 31.05.2025

## Main activities

The consortium formed by 52 partners from 20 countries strengthens the current capabilities of EBSI regarding verifiable accreditations and trust registers and expands them with new capabilities such as the decentralized identity of legal entities or the revocation functionality. The project partners will transform the digital interaction of citizens studying and working in Europe and will simplify some of the complex verification processes for organizations in a decentralized way.

**EBSI-VECTOR project** work packages are:
**WP1** – Project Management and Coordination
**WP2** – Strategizing for scaling up, take-up, and interoperability of EBSI use cases
**WP3** – European Self Sovereign Identity Framework (ESSIF) specifications and building blocks
**WP4** – Education Use Case
**WP5** – Social Security Use Case
**WP6** – Ecosystem building, policy support and sustainability
**WP7** – Dissemination, communication and visibility




*EBSI - VECTOR WPs*

## Results

The project partnership started working on different Use Cases on the following topics:

- Education
- Social security
- Business registries

UPT is interested and involved in educational applications and in providing training for those skills.
This use case is performed from WP4, and aims to implement new

and current EBSI capabilities through a two-phase approach. The first phase will be focused on implementing current EBSI capabilities and the second one will address new EBSI capabilities. This use case is based on EBSI Diploma use case specifications. At the end, several cross - border journeys for educational capabilities will be deployed.
• **EBSI-VECTOR** received the prize under "Public Sector Innovation" category at the **INATBA Awards Gala in Autoworld**, Brussels.

## Applicability and transferability of the results:

**EBSI-VECTOR** contributes to the following long-term EU policy objectives, ensuring results' transferability:
• Building a pan-European public services blockchain
• Promoting legal certainty, by compliance with eIDAS
• Increasing funding for research and innovation through
**(i)** efforts for scalability
**(ii)** building strong ecosystem with other digital technologies.
• Promoting blockchain for sustainability by reducing the environmental footprint
**(i)** directly – through decentralized solutions
**(ii)** indirectly – through optimization of cross border services interoperability
• Supporting interoperability and standards
• Interacting with community through the creation of future governance framework for EU digital consortium for Blockchain

## Financed through/by

Digital Europe Programme
DIGITAL-2022-DEPLOY-02
European Commission,
European Health and Digital Executive Agency (HADEA)

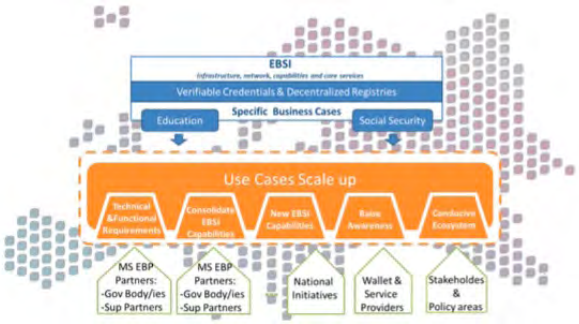
## Research Center

Research Center for Multimedia

## Research Team

**Project leader:**
- Lecturer Dr. Eng. Andrei TERNAUCIUC

**Researchers:**
- Prof. Dr. Eng. Radu VASIU
- Assoc. Prof. Dr. Eng. Diana ANDONE
- Prof. Dr. Eng. Carmen HOLOTESCU
- Drd. Eng. Victor HOLOTESCU

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# DC4EU – DIGITAL CREDENTIALS FOR EUROPE

## Goal of the project

• The **DC4EU project** will focus on the identification and application of all necessary measures to facilitate the issuance of educational credentials and professional qualifications in the Education sector, as well as the issuance of the portable document A1 (PDA1) and the European Health Insurance Card in the Social Security sector.

• The European digital identity wallet will be a key element of hybridization for cross-sectoral and cross-border use cases (identity, signature, educational credentials and social security).

## Short description of the project

**DC4EU** focuses on identifying and applying Digital Europe aspects in education: issuance of educational credentials and professional qualifications by engaging in the execution of the portable document A1 (PDA1).

## Project implemented by:

**Coordinator:**

- Ministerio de Asuntos Economicos y Transformacion Digital (SGAD), Spain

**Partners:**

- Politehnica University Timisoara, Romania
- UEFISCDI Romania
- CertSIGN, Romania
- Other 77 organizations from 23 European countries

## Implementation period

01.04.2023 – 30.06.2025

## Main activities

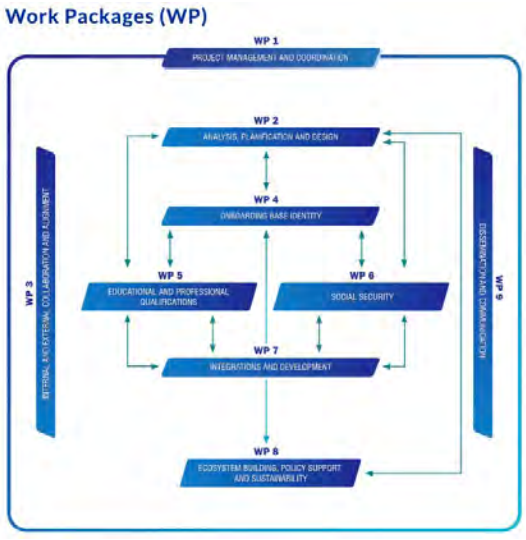
The projects' work packages are:

**WP1**: Project Management and Coordination
**WP2**: Analysis, Planification and Design
**WP3**: Collaboration and Alignment
**WP4**: Onboarding Base Identity
**WP5**: The Education Domain
**WP6**: The Social Security Domains
**WP7**: Integrations and Development
**WP8**: Ecosystem building & policy support
**WP9**: Communications & Dissemination

- UPT is mainly interested in WP5, regarding educational applications. This includes onboarding procedures, identifying educational requirements, implementing interfaces for credential issuers, comprehensive process testing of the systems and evaluation of processes.

- The European Digital Identity Wallet (EUDIW) will be a fundamental element of hybridization for cross-sectoral and cross-border use cases (identity, signature, educational credentials).

**DC4EU** contributes to a new paradigm for citizens in the field of education, which is fully aligned with the European Council requirements for identity and data.




## Results

**The outcomes of DC4EU** will build upon large-scale pilots focusing on education and professional credentials.

The Architecture Reference Framework and the wallet reference implementation are in progress.

- The project is aligned with the EU Digital Strategy, EU Data Strategy, EBSI framework, eIDAS Trust and GDPR.
- The basis is used data models (European Learning Model – ELM), existing EBSI framework, OTSS, EU strategies, and ongoing initiatives such as EWP, eduGAIN, Europass and European Universities initiative.
- The work related to education consists in designing and implementing educational credentials and professional qualifications. This will include onboarding customisation and execution, interoperability of preliminary tasks and identification of opportunities and synergies with domain-related activities.
- The models developed through the **DC4EU project** are piloted on a system of micro-credentials used within the E$^3$UDRES2 2.0 project on European University Alliances.

## Applicability and transferability of the results:

- The project develops digital transformation in education based on trusted registries, onboarding management for wallet users and support for process execution.
- The project completes comprehensive testing of defined cross-border journeys in a pre-production environment of the target systems while coordinating with other ongoing cross-border initiatives and synergies with other educational-related activities: related DGs (H4, F3, EAC, EMPL), EU, and Key education players.
- That's why **DC4EU** will be a catalyst for innovation in education identification requirements and will assist the evolution process from the traditional identification to a reliable digital identity.

The level of standardization ensures transferability of results to any interested actor.

## Financed through/by

Digital Europe Programme
DIGITAL-2022-DEPLOY-02
European Commission,
European Health and Digital Executive Agency (HADEA)

## Research Center

Research Center for Multimedia

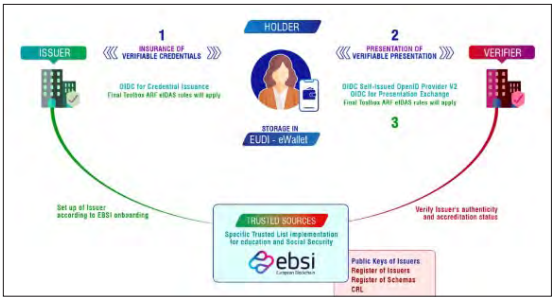
## Research Team

**Project leader:**

- Assoc. Prof. Dr. Eng. Diana ANDONE, Director Digital Education Department

**Researchers:**

- Prof. Dr. Eng. Radu VASIU
- Prof. Dr. Eng. Carmen HOLOTESCU
- Lecturer Dr. Eng. Andrei TERNAUCIUC
- Drd. Eng. Victor HOLOTESCU

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# ACCELERATE_FUTUREHEI – ENTREPRENEURIAL & INNOVATIVE UNIVERSITIES ACCELERATION PROGRAMME

## Goal of the project

• Higher Education Institutions can positively impact regional and Europe-wide social and economic development through education, research and engagement. However, they require targeted support to enhance their capability to fully realise their potential.
**Accelerate Future HEI** will develop and test acceleration services, to equip **HEIs** with the skills and capacity to drive institutional transformation towards becoming more entrepreneurial and innovative institutions over the next four years.

## Short description of the project

HEIs are key drivers of knowledge and innovation ecosystems, but there is a clear need for a targeted support to realize this potential. The project develops and implements a methodology of change by embracing entrepreneurial, engaged, innovative and open spirit.

## Project implemented by:

**Coordinator**: University Industry Innovation Network (UIIN), Netherlands
**Partners**:
Politehnica University Timisoara, Romania
St. Pölten University of Applied Sciences, Austria
UC Leuven-Limburg University of Applied Sciences, Belgium
Universidade da Madeira, Portugal
Hungarian University of Agriculture and Life Sciences, Hungary
Vidzeme University of Applied Sciences, Latvia
Universidad Europea de Canarias, Spain
Université de La Réunion, France
Instituto Superior Tecnico Lisboa, Portugal
TUM International GmbH, Germany
Momentum Marketing Services Limited, Ireland

## Implementation period

01.01.2023 – 31.12.2026

## Main activities

Project work packages:
**WP1** – Management
**WP2** – Scanning & Scoping
**WP3** – Developing
**WP4** – Testing & Implementing
**WP5** – Capacity Building & Knowledge Exchange
**WP6** – Monitoring & Evaluation
**WP7** – Policy Feedback
**WP8** – Quality Assurance
**WP9** – Dissemination
The methodology is designed to build capacity within HEIs to enable them to pursue institutional transformations. The approach is based on a **gap-analysis**, that begins with understanding HEI's desired future / current state (WP2). HEIs are guided to identify the key challenges to be addressed via acceleration services and coaching activities, and develop a roadmap and implementation plan to achieve their desired institutional transformation, and identify the required acceleration services (WP3). Finally, acceleration services are tested within the HEIs to drive entrepreneurial and innovative change, supported by coaching, monitoring and evaluation (WP4).

## Results

The project provides open resources for European HEIs who are interested in transforming to build their capability to drive entrepreneurial change.
Up to the end of 2024, the following results have been shared:
• **Strategic vision statements** of the nine partners' towards becoming Entrepreneurial and Innovative Universities
• **Synthesis Report**: Key findings based on a gap analysis, that begins with understanding the HEI's desired future and current state.
• Main goals of the partners' and **action plans** to achieve their goals

## Applicability and transferability of the results:

The aim of the project is to develop and test a methodology for acceleration services to support HEI institutional transformation, combining coaching services, investment strategy, quality and progress monitoring mechanism, followed by the widespread dissemination and policy feedback of the pilot test results.

The project has been designed using a Logic Model framework, which aligns the aims of the project, with the activities (WPs), the outputs (deliverables), outcomes desired (benefits for the project target groups) and the long-term impacts.

By supporting transformation through university-industry cooperation, engagement, entrepreneurial and innovation spirit, the project ensures a practical transfer of knowledge to other interested institutions.

## Financed through/by

- European Commission,
- Horizon Europe Program,
- HORIZON-WIDERA-2022-ERA-01

## Research Center

Department for Digital Education

## Research Team

**Project leader:**

- Dr. Eng. Diana ANDONE, Director Digital Education Department

**Researchers:**

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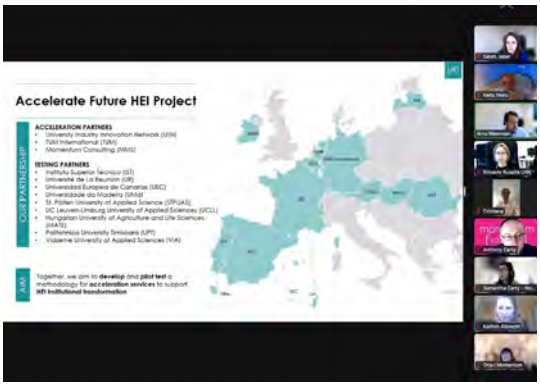
- Assoc. Prof. Dr. Eng. Vlad MIHĂESCU
- Assist. Prof. Drd. Maria-Elena BOATCĂ-BARABAȘ
- Dr. Ec. Roxana SÎRBU
- PhD Student Marius TĂTARU





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# CA20139 - HOLISTIC DESIGN OF TALLER TIMBER BUILDINGS (HELEN)

## Goal of the project

• The main objective of the **HELEN COST Action** is to foster international interest and effort in developing a shared understanding and deriving common guidelines for the Holistic Design of taller timber buildings. The synergistic HELEN network is formed by a large group of experts from a wide field of the built environment sector, where researchers and industrial partners exchange knowledge and skills that have historically been isolated to individual research fields.

## Short description of the project

The **HELEN COST Action** will change the paradigm of building construction research, shifting R&D from isolated topics to an integrated interdisciplinary approach, which is critically necessary to safely design and build as well as correctly maintain and recycle taller timber buildings.

## Project implemented by:

Coordinator: COST Association AISBL

## Implementation period:

October 2021 – October 2025

## Main activities

The very essence and key to a successful **HELEN COST Action** will be intense interdisciplinary work with in-depth discussions and debate over a series of hypothetical and real case studies, followed by focused research work. Contrary to common building research work done in the past, where individual topics were assessed in depth by specialised teams working on isolated topics (i.e. just timber connections or just vibration of floor plates), research within the Action will be intensely collaborative and integrated.
The main activities are:
EG 1: **Timber Engineering.** This expert group will consist of members mastering fields of 1 timber structures, 2 timber connections, 3 fire behaviour, 4 seismic response, 5 wind response, 6 structural reliability, 7 robustness, 8 floor vibration, 9 maintenance, 10 disassembly, and 11 duration of load.
EG 2: **Computational Modelling.** This expert group will consist of members mastering fields of 1 fire spread modelling and 2 seismic modelling as well as 3 general finite element modelling.
EG 3: **Building Physics.** This expert group will consist of members mastering fields of 1 acoustics, 2 volatile organic compounds, 3 indoor air quality and 4 thermal behaviour.
EG 4: **Architecture.** This expert group will consist of members mastering fields of 1 architectural design, 2 room design, 3 facades and 4 urban planning.
EG 5: **Construction Management.** This expert group will consist of members mastering fields of 1 factory management, 2 construction site management, 3 logistics, 4 industrialization, 5 prefabrication and 6 waste management.
EG 6: **Material Science.** This expert group will consist of members mastering fields of 1 material production (engineered wood products), 2 adhesives, 3 coatings and 4 wood modification.
EG 7: **Human Health.** This expert group will consist of members mastering fields of 1 restorative design and 2 ergonomics.
EG 8: **Life Cycle Analysis.** This expert group will consist of members mastering fields of 1 life cycle analysis, 2 life cycle cost and 3 social life cycle analysis.

## Results

Until this point, the research teams were made, the working groups were established and the first common meeting was organized.
During this first meeting, there was made a state-of-the-art report, and the next research steps were established.

## Applicability and transferability of the results

One of the main motivations for establishment of the **HELEN COST Action** consortium is the current lack of an interdisciplinary international expert network that is able to merge and push forward the recent advancements in the various areas related to multi-storey timber design and construction, which have been treated individually due to their diverse specific scientific areas.
The advantage of the **COST Action** is that it provides a platform where the objectives will be dealt with in a holistic approach.

## Financed through/by

**Horizon 2020** Framework Programme of the European Union

## Research Center

Research Center in Urban Planning and Architecture

## Research Team

**Project leader**:
- Prof. Dr. Eng. Marius MOSOARCA (for Romanian team)

**Researchers**:
- Lect. Dr. Eng. Mihai FOFIU
- Assist. Ph.D. Stud. Arch. Bogdan ISOPESCU
- Lect. Dr. Arch. Alexandra KELLER
- Lect. Dr. Arch. Iasmina ONESCU
- Lect. Dr. Arch. Cristina POVIAN
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# ELECTRIC MULTIMODAL TRANSPORT SYSTEMS FOR ENHANCING URBAN ACCESSIBILITY AND CONNECTIVITY

## Goal of the project

• This project aims to develop multimodal transport systems by integrating electric public transit and shared micro-mobility for sustainable, efficient, and equitable urban mobility. A consortium of research institutions, public authorities, and industry partners from Romania, Sweden, and China will drive electrification, connectivity, and sharing innovations. The project focuses on infrastructure planning, system optimization, and vehicle control, ensuring real-life applications that enhance accessibility, climate action, and citizen's well-being.

## Short description of the project

- Improving multimodal e-mobility through electrification, connectivity and sharing for sustainable urban transport

## Project implemented by:

**Coordinator: • Politehnica University Timisoara**, Romania, **Prof. Dr. Eng. Radu-Emil Precup -** director of European coordinator UPT, principal investigator.

Partners:

• **Zhejiang University (ZJU)**, China, Prof. Sheng Jin - director of the project coordinator ZJU. • **Swedish National Road and Transport Research Institute (VTI)**, Sweden, Dr. David Daniels - director of VTI partner. **Chalmers University of Technology (CTH)**, Sweden, Dr. Kun Gao - director of European co-coordinator and partner CTH. • **Chongqing University (CQU)**, China, Prof. Xiaosong Hu - director of CQU partner. • **The Hong Kong Polytechnic University Shenzhen Research Institute (PolyU-SZRI)**, China, Dr. Wen Yi - director of PolyU-SZRI partner. • **WSP Sverige AB (WSP)**, Sweden, Mr. Lars Drageryd - director of WSP partner. • **FellowBot AB (FellowBot)**, Sweden, Ms. Sida Jiang - director of FellowBot partner. • **Hangzhou Comprehensive Transportation Center (HZCTC)**, China, Mr. Haiwei Wu - director of HZCTC partner. • **Enjoyor Ltd Co. (Enjoyor)**, China, Mr. Xiaoyue Wen - director of Enjoyor partner.

## Implementation period:

- 01.05.2024 – 31.12.2026

## Main activities

- **1.1.** Development of the documentation on project coordination, risk management and quality assurance procedures.
- **1.2.** Collecting behavioral data on drivers and developing models of intermodal transport behavior.
- **2.1.** Setting up the model for the energy system by adapting the input-output variables to the other models within the intermodal transportation system.
- **2.2.** Development of an optimal model for the transportation route structure that includes loading facilities, demand distribution, traffic schedule management and existing transportation networks.
- **3.1.** Development of an algorithm for adaptive speed management to optimization (minimization) of energy consumption, deviation from traffic schedules and battery degradation.

Communication and dissemination of the results obtained in each stage of the project.

## Results

- The research team published in 2024 **five journal papers** indexed in Clarivate Analytics Web of Science (**WoS**, with one of the previous names ISI Web of Knowledge) (ASC 2024, ROMJIST(1) 2024 awarded as **Highly Cited Paper** according to Clarivate Analytics Web of Science, ROMJIST(2) 2024, APH 2024, FUME 2024), **one paper published in conference proceedings indexed in WoS** (SACI 2024), **two papers published in conference proceedings** indexed in international databases (IEEE Xplore, INSPEC, Scopus, Sciencedirect, Springer Link, DBLP) (CAS 2024, ITQM 2024), **2 book chapters** published in Springer (TIEI 2024, SSDC 2024)

## Applicability and transferability of the results

- The year 2024 was focused on developing and implementing a mathematical model of an intersection that includes autonomous electric vehicles, human vehicles, buses and traffic lights.
- The year 2024 was also focused on studying and improving data-driven controllers that will be used as controllers in the model of the intersection.

The future work will be focused on implementing the final version of the mathematical model of the intersection and optimizing the energy consumption of electric vehicles via data-driven algorithms.

## Financed through/by

UEFISCDI

## Research Center

- Research Center for Automatic Systems Engineering

## Research Team

**Project leader**:
- Prof. Dr. Eng. Radu-Emil PRECUP

**Researchers**:
- Assoc. Prof. Dr. Eng. Claudia-Adina BOJAN-DRAGOŞ
- Assoc. Prof. Dr. Eng. Adriana ALBU
- Assoc. Prof. Dr. Eng. Anamaria FEIER
- Lect. Dr. Eng. Alexandra-Iulia SZEDLAK-STÎNEAN
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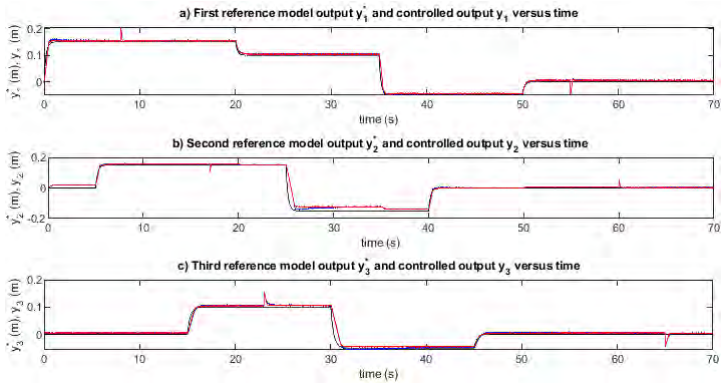
- PhD Student M.Sc. Eng. Monica-Lavinia NEDELCEA
- PhD Student M.Sc. Eng. Alexandru-Marian CHIRU
- M.Sc. Ec. Adina-Elena IVONICIU
- M.Sc. Eng. Ioana BRAZDĂU
- M.Sc. Eng. Agnes STEPANIAN
- M.Sc. Math. Nicolina ADAMESCU
- M.Sc. Eng. Claudia MICEA
- M.Sc. Ec. Casandra CESĂREAN PLESNECUTE
- M.Sc. Eng. Loredana-Claudia COROBAN

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# DEVELOPMENT OF A COST-EFFECTIVE ANODE FOR PEM WATER ELECTROLYSIS

## Goal of the project

- **The DC-PEM project** aims to develop a new cost-effective anode for PEM water electrolysis. Through further development, and optimization of the well-known fabrication techniques combined with a reduction strategy in the use of catalytic materials, the costs of the electrodes should be significantly decreased, and thus, such technologies may become of great importance in the storage of regenerative energies. The project is rounded off with the creation of a recycling concept for the individual fabrication steps, to realize a sustainable material cycle.

## Short description of the project

- The project promises a more cost-efficient production route for the anodes involved in the PEM water electrolysis.

## Project implemented by:

**Coordinator:**

• Hochschule Mittweida, Germany

**Partners:**

- Politehnica University Timisoara, Romania
- Fraunhofer-Institut für Fertigungstechnik und Angewandte Materialforschung, Germany
- University of Chemistry and Technology Prague, Czech Republic
- LeanCat Prague, Czech Republic

## Implementation period:

- 01.07.2023 – 30.06.2026

## Main activities

- **The DC-PEM project** is divided into 8 work packages. The project starts with investigations into the state of the art and definition of the specification and technical requirements (WP1). WP 2 deals with the development and fabrication of the porous transport layer (PTL) by different sintering processes and its structural characterization. WP3 covers the processing of the PTL by hydridation and the immobilization of the precious metal catalyst for the OER, while WP4 focuses on the chemical and electrochemical characterization of the resulting anode.
- To ensure a holistic approach, WP 5 is dedicated to the recovery of the involved resources. Finally, WP 6 aims at the fabrication of an MEA to study the catalytic properties and the manufacture of a demonstrator. The global WP 7 and WP 8 deal with Communication, Dissemination, and Exploitation and the accompanying Project Management.

## Results

- During the project, the resulting electrodes are characterized through various modern analysis methods so that the anode can be manufactured and deployed with minimal use of materials, presenting a good catalytic activity, and reliability. The main findings of the project will certainly open up new perspectives regarding the use of recycled materials in various related fields.
- The final goal of the project is to produce a demonstrator that meets the requirements for the inexpensive anode, with costs below 1000€/kW, that can be competitive with state-of-the-art electrolyzers that are currently available on the market.

The results obtained within the project will be capitalized by publishing 2 scientific articles in ISI-indexed journals from the **Q1/Q2 quartile**. It is expected that, following the collaboration with the DC-PEM project partners, the prerequisites for new project proposals in future competitions to be ensured.

## Applicability and transferability of the results

- **The DC-PEM project** aims to transform the PEM electrolyzer market into a more affordable one. The cost-effective generation and storage of energy is an important requirement for making affordable energy available to all end consumers. This is an important factor in securing and even growing business locations and thus jobs.
- Furthermore, product prices might be reduced, and Europe will become less dependent on fossil fuels and better prepared for a possible fuel crisis. At the end of the project, a demonstrator should show that the production of economical PEM electrolyzers can be realized with material savings, further development of production processes, and closed material cycles.

## Financed through/by

This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS/CCDI – UEFISCDI, project number ERANET-M-3-ERANET-DC-PEM, within PNCDI IV.

## Research Center

- Politehnica University Timisoara
- Department of Materials and Manufacturing Engineering
- Laboratory for Electrochemistry, Corrosion, and Electrochemical Engineering
- Research Institute for Renewable Energy

## Research Team

**Project leader**:
- Lecturer Dr. Eng. Roxana MUNTEAN

**Researchers**:
- Assoc. Prof. Dr. Eng. Andrea KELLENBERGER
- Prof. Dr. Eng. Nicolae VASZILCSIN
- Prof. Dr. Eng. Corneliu CRĂCIUNESCU
- Assoc. Prof. Dr. Eng. Mircea DAN
- Dr. Eng. Iosif HULKA
- PhD Student Eng. George DIMA
- PhD Student Eng. Sebastian AMBRUȘ
- PhD Student Eng. Raluca BOJÎNCĂ

***Fig.1.*** *Kick-off meeting in Prague, Czech Republic*

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# ACCOMPANYING MEASURE FOR DISSEMINATION, VALORISATION AND COLLABORATIVE EXPLOITATION OF CIRCULARITY OF CONSTRUCTIONAL STEEL PRODUCTS (ADVANCE)

## Goal of the project

- The main goal of the **ADVANCE project** is to increase the recovery and reuse of constructional steelwork by providing reliable performance data and guidance. This will be achieved by disseminating the information about the products, systems, methods and protocols that facilitate reuse of various components of constructional steelwork using the tools and methodologies developed within the past activities of the consortium partners.
- The outcomes of the project will include recommendations to enable reuse of building components in-situ or in different location(s), and in the original layout or in a different design with the necessary modifications/adaptations to resist the new external loads (due to the relocation) or internal loads (due to the modification of the structural layout).


## Short description of the project

- **ADVANCE project** is RFCS Accompanying Measure that aims to develop and demonstrate circular economy solutions for steel and steel-based components in the construction sector. The project covers different aspects of reuse, such as design, testing, certification, business models, and sustainability assessment, and provides recommendations and best practices for policy makers, industry stakeholders, and researchers.
- The project's ambition is to contribute to greenhouse gas reduction and circular economy goals by addressing these challenges in both deconstruction and reuse of existing steel buildings, and in the design of new buildings, their construction and documentation to facilitate future reuse.
- Its scope includes reuse of constituent products, fabricated components, and reuse of component assemblies. The reused material may originate from primary structures, secondary structures and envelopes.

## Implementation period:

- 01.09.2023-31.08.2025

## Project implemented by:

- VTT Technical Research Centre of Finland Ltd, Finland
- Politehnica University Timisoara, Romania
- European Convention for Constructional Steelwork, Belgium
- University of Coimbra, Portugal
- RWTH Aachen University, Germany
- Finnish Constructional Steelwork Association, Finland
- Czech Technical University in Prague, Czech Republic
- Industrial Technical Centre of Metal Construction CTICM, France
- Purkupiha Group Oy, Finland
- The British Constructional Steelwork Association Ltd, United Kingdom Bauforumstahl e.V., Germany
- ArcelorMittal Belval & Differdange S.A., Luxembourg

## Main activities

- State-of-the-art of steel components reuse;
- Analysis of the different business models and policies;
- Recommendations for Reuse (EN version);
- Translated Recommendations for Reuse (7 EU languages);
- LCA mobile app and web tool;
- Brochure and Presentation materials;
- Dissemination of results. Workshops.

## Results

- Provide guidance for reuse of existing components or structures and design of new ones with improved reusability, introduce recommendations for product / waste status and material testing protocol for recertification of steel products in the Recommendations for Reuse;
- Support declaration of the environ-mental benefits of steel reuse with the methodology to declare LCA beyond the system boundary implemented in the mobile LCA app and web tool;
- Increase awareness about the alternative end-of-life options for constructional steel and steel-based products by sharing information about successful reuse cases and circular business models in 7 workshops;
- Identify the possibilities and roadmaps for scaling up the outcomes of the core background projects beyond their original focus area.

## Applicability and transferability of the results

- The aim is to address wider audience in the member states with the focused workshops, localized Recommendations for Reuse, information brochure, mobile app and presentation materials.

## Financed through/by

- This work was supported by a grant of the European Research Executive Agency, Topic RFCS-02-2022-AM, project number 101112269 – ADVANCE – RFCS-2022.

## Research Center

- Research Center for Materials Mechanics and Structural Safety (CEMSIG), Politehnica University Timişoara

## Research Team

- Prof. Dr. Eng. Viorel UNGUREANU
- Assoc. Prof. Dr. Eng. Ioan BOTH
- Lecturer Dr. Eng. Raluca BUZATU
- PhD student Eng. Alin POPESCU


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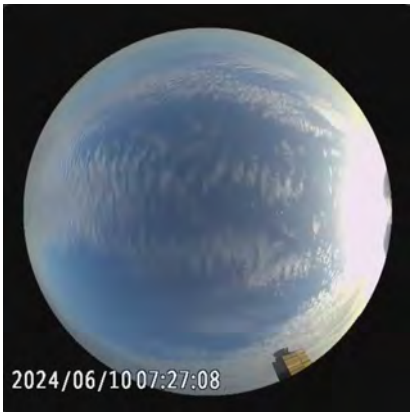
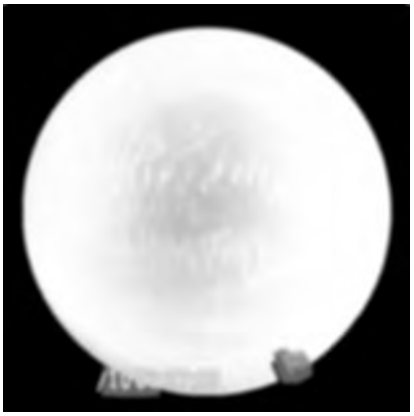
# SBAS ADOPTION ON MULTI-COPTER VTOL AIRCRAFTS (SAMVA)

## Goal of the project

• **The SAMVA project aim** is to increase the adoption of EGNOS technology within the provision of rotorcraft services and to pave the way towards seamless integration of VTOL autonomous aircraft.



*EH216-SAAV at Lleida–Alguaire International Airport, in June 2024 (top), image processing of fish eye camera data resulting into a sky probability map (bottom)*

## Short description of the project

• Based on the performance and integrity provided by EGNOS (European Geostationary Navigation Overlay Service), the safe integration of rotorcraft operations in all-weather conditions and obstacle-rich environments is now feasible through GNSS (Global Navigation Satellite System) RNP (Required Navigation Performance) instrumental procedures.

• However, although most recent helicopter units are units are already equipped to fly these types of procedures, today, Emergency Medical Services (EMS) air operations are mostly restricted in good weather and at daylight.

• Furthermore, the EGNOS integrity concept is inherited from the civil aviation domain, with very high confidence levels on the computed navigation position, and has the potential to enhance eVTOL (electric Vertical Take-Off and Landing) aircraft operations in Urban Air Mobility (UAM) environments.

• In this framework, SAMVA project intends to foster the adoption of EGNOS technology within the provision of rotorcraft and Advanced Air Mobility (AAM) services and U-space integration.

## Project implemented by:

**Coordinator**: Pildo Labs Barcelona – Spain
**Partners**:
Ehang Technologies Spain & LATAM S.L. – Spain
Airport Regions Council – Belgium
Thales Alenia Space France – France
Eliance Helicopter Global Services S.L. – Spain
Aeroports Públics De Catalunya Slu – Spain
**Subcontractors:**
Politehnica University Timisoara – Romania

## Implementation period:

03.10.2022-30.09.2024

## Main activities

• In addition to GNSS and GNSS augmentation-based sensors, other sensors can be used to improve the accuracy and the integrity of the positioning solution. In VTOL context, the fish-eye camera is very relevant to identify the GNSS satellites masked by obstacles. In collaboration with Thales Alenia Space France, UPT is in charge of processing the fish eye camera collected data and provides the needed outputs in terms of image segmentation and masking angles that are fed to the hybridization algorithm in order to detect and exclude multipaths.

## Results

• The UPT team in collaboration with Thales Alenia Space, Pildo and EHang partners helped performed ground tests to capture videos with the installed VIVOTEK FE9380-HV fish-eye camera and synchronize the video data with the GNSS measurements. Consequently, tests were made during flights at the first EGNOS-enhanced vertiport at Lleida-Alguaire Airport (LEDA) in June 2024.
• The data was then processed by the UPT team to create a visibility map of the sky, indicating the probability of sky, vegetation or buildings. The data is then fused with the GNSS measurements in order to detect and exclude multipaths by the Thales Alenia Space team. These tests, comprising over 27 flights and more than four hours of total flight time, have confirmed the readiness of SAMVA's solutions for real-world deployment.

## Applicability and transferability of the results

• Through the operational developments proposed, and the engagement with key stakeholders, SAMVA will be a key milestone for the adoption of EGNOS technology in present and future rotorcraft and eVTOL operations.

## Financed through/by

• EUSPA (European Union Agency for the Space Programme), granted under the call for proposals "GSA/GRANT/01/2021 – Acceleration of EGNOS Adoption in Transport".

## Research Center

Research Center for Intelligent Signal Processing (ISPRC)
https://shannon.etc.upt.ro

## Research Team

- **Project leader**: Prof. Dr. Eng. Corina NAFORNITA
**Researchers:**
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- Lecturer Dr. Eng. Ciprian DAVID

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# ENGAGED AND ENTREPRENEURIAL EUROPEAN UNIVERSITY AS DRIVER FOR EUROPEAN SMART AND SUSTAINABLE REGIONS 2.0 - E³UDRES² 2.0

## Goal of the project

• **E³UDRES² 2.0** empowers the further development of E³UDRES², the Engaged and Entrepreneurial European University as Driver for European Smart and Sustainable Regions, to reach a substantial leap in quality, performance, attractiveness and competitiveness of the European University alliance and its individual members. The E³UDRES² alliance started from scratch in October 2020 with initially six higher education institutions. The consortium of E³UDRES² 2.0 unites 10 higher education institutions as well as 36 associated partners. In addition, E³UDRES² 2.0 establishes enhanced partnerships with universities and their local communities from Western Balkans and the Ukraine.

• **E³UDRES² vision** is to promote Smart and Sustainable Regions ($S^2$-Regions) to shape a peaceful and prosperous European future for responsible citizens as a pioneering full-fledged Engaged and Entrepreneurial European University ($E^3$-Universities).

• **E³UDRES² mission** is to inspire open-minded people to co-create solutions for environmental, societal and economic challenges, support individual learners to unleash their talents and develop future-oriented skills, empower creative Ent-r-e-novators (entrepreneurs, researchers, educators and innovators) and act as an inclusive and engaged platform for collaborative innovation that strengthens a smart and sustainable society.


## Short description of the project

The project is one of the 41 university alliances selected for funding as part of the European Commission Initiative towards creating a number of European Universities, that have been approved to enter the second phase of implementation.

## Project implemented by:

**Coordinator:** St. Pölten University of Applied Sciences (STPUAS), Austria

**Partners:**

- Politehnica University Timisoara (UPT), Romania
- Polytechnic Institute of Setúbal (IPS), Portugal
- Hungarian University of Agriculture and Life Sciences (MATE), Hungary
- University College Leuven, Belgium
- University College Limburg, Belgium
- Vidzeme University of Applied Sciences ViA), Latvia
- Saxion University of Applied Sciences (Saxion), Netherlands
- Fulda University of Applied Sciences (HFD), Germany
- Jyväskylä University of Applied Sciences (JAMK), Finland

E³UDRES²
Engaged and Entrepreneurial European University as Driver for European Smart and Sustainable Regions

## Implementation period

01.10.2023 – 30.09.2027

## Main activities

• **E³UDRES²** strives to enable Smart Learners to unfold talents, empowers ent-r-e-novators (entrepreneurs, researchers, educators, innovators) to accelerate future universities, serves as a platform for collaborative innovation to connect entrepreneurial minds, engages in regional communities to contribute to society and shifts to a fully-fledged European university to ensure excellent quality.

• A major change against the first phase of the alliance is a clear sharing of leading and co-leading roles, to better make use of the existing high-level commitment in all institutions. The project planned to have one lead and two co-lead institutions for every WP:

- **WP 1** Project Management and Coordination: STPUAS (lead), HFD & ViA (co-leads)
- **WP 2** Developing Talents: MATE (lead), Saxion & UPT (co-leads)
- **WP 3** Smart Learners: UCLL (lead), JAMK & MATE (co-leads)
- **WP 4** Research and Knowledge Serving Users: UPT (lead), HFD & IPS (co-leads)
- **WP 5** Regional Innovation Hubs: Saxion (lead), STPUAS & UCLL (co-leads)
- **WP 6** Future University: ViA (lead), HFD & STPUAS (co-leads)
- **WP 7** Capacity Building: HFD (lead), Saxion & ViA (co-leads)

- **WP 8** Quality and Evaluation: IPS (lead), JAMK & STPUAS (co-leads)
- **WP 9** Digitalisation and Infrastructure: JAMK (lead), STPUAS & UPT (co-leads)
- **WP 10** Impact and Dissemination: STPUAS (lead), IPS & UCLL (co-leads)

• $E^3UDRES^2$ co-creates its Multi-i-Campus for flexible learning offering joint lectures, modules, internships, micro-credentials and (European) degrees, a talent funnel for smart learners, a joint support centre, joint doctoral programmes and research centres of excellence, an entrepreneurship and innovation network for $S^2$-Regions, interconnected (pre-)incubators fostering startups and entrepreneurial education, an ecosystem for regional partners and citizens, a proactively operating umbrella organisation as a legal entity and a future university model as an updated $E^3UDRES^2$ strategy ensuring a fully-fledged European University sustainably implemented beyond 2030.

• In the first three years, $E^3UDRES^2$ members pooled their expertise and resources into the three Research Networks for Circular Economy, Wellbeing and Active Ageing and Human Contribution to AI, whose thematic orientation shaped the activities for education and innovation, too. With regard to the specific challenges, opportunities and smart specialisation strategies (RIS3) of related regions, the (complementary) strengths and institutional (strategic) interests of its full members and in line with European priorities, missions and policy objectives, $E^3UDRES^2$ 2.0 further develops and supplements these Research Networks into four future-guiding Focus Areas:

**(1)** Health, Wellbeing and Social Inclusion for Regions;
**(2)** Digital Solutions and (Applied) Deep Tech for Regions;
**(3)** Resilient Economy and Innovation for Regions;
**(4)** Creative Industries for Region's Identity.

• These Focus Areas constitute a development of the existing Research Networks, in that they stronger integrate not only research but also education and innovation activities on specific thematic areas based on the needs of the regions and on the main societal and economical challenges and convey efforts and developments along main common paths – be it education-related activities, RDI undertakings, excellence initiatives or innovation pools.

## Results

• **$E^3UDRES^2$ 2.0** measures progress with a set of 20 Core-KPIs and target values that include 50.000 benefitting students, 360 $E^3UDRES^2$ labelled and 20 jointly developed learning activities, 50 associated startups/spin-offs, 200 solutions to regional challenges, 70 services for/with society and 450 submissions to **$E^3UDRES^2$ awards of excellence**.

• The second **$E^3UDRES^2$ 2.0 General Assembly** meeting took place in Timisoara, on 4-6 March 2024 and it hosted an Executive Board meeting, a Board of Coordinators meeting, a Students Representative Board meeting, as well as meetings on all work packages. Some Focus Tables have been organized on the following topics: Digitalization, Talent Funnel, Mobility Models, $E^3UDRES^2$ Label, Student Engaggement and Common Research Strategy.

• The third **$E^3UDRES^2$ 2.0 General Assembly** meeting took place in Fulda, on 30 September – 1 October 2024, hosted by Fulda University of Applied Sciences. Beside the Executive Board meeting, the Site Coordinators meeting, the Board of Coordinators meeting, the Students Board meeting and the Advisory Board meeting, some Panel discussions have been organized on topics like: Intercultural Awareness, Future European University, Core-Objectives and KPIs.

## Applicability and transferability of the results

**$E^3UDRES^2$ 2.0** also integrates HEIs from Western Balkans and Ukraine as associated partners in order to establish an enhance partnership and to successfully transfer project's results:

- University of Shkodra Luigj Guraku (USLG) / Albania
- University of Applied Sciences in Ferizaj (UASF) / Kosovo)
- Aleksander Moisiu University of Durres (AMUD) / Albania
- Bohdan Khmelnytsky National University at Cherkasy (BKNUC) / Ukraine
- Cherkasy State Business College (ChSBC) / Ukraine
- Sumy State University (SSU) / Ukraine

• The project also aims to develop further co-operation applications under Horizon Europe, Erasmus+ KA2, Marie Curie doctoral consortiums and other international funded calls.

## Financed through/by

European Commission, ERASMUS-EDU-2023-EUR-UNIV

## Research Team

**Project leader**
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**Project coordinator:**
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- Assoc. Prof. Dr. Eng. Diana ANDONE
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- Lect. Dr. Eng. Andrei TERNAUCIUC
- Assoc. Prof. Dr. Eng. Silviu VERT
- Prof. Dr. Eng. Dorin LELEA
- Lect. Dr. Eng. Florin VILCEA
- Assoc. Prof. Dr. Eng. Valentin NIȚĂ
- Prof. Dr. Eng. Anca DRAGHICI
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# CONTRIBUTIONS TO CODIMENSION K BIFURCATIONS IN DYNAMICAL SYSTEMS THEORY

## Goal of the project

• The overall project objectives are to produce new knowledge in the area of codim k bifurcations for continuous and discrete (smooth and non-smooth) dynamical systems and provide training in this area of research to early stage researchers.

## Short description of the project

The project objectives are planned to be achieved during secondments.

## Project implemented by

1. Politehnica University Timisoara (Coordinator)
2. Autonoma University of Barcelona
3. Obuda University
4. West University of Timisoara
5. University of Craiova
6. Acmit Gmbh, Austria
7. University North Caroline, USA
8. Shanghai Jiao Tong University, China
9. University of Sao Paulo, Brazil
10. Queen's University, Canada
11. University of Bio-Bio, Chile

## Implementation period

1 April 2018 - 31 March 2024

## Main activities

**1.** Study degenerate Bautin bifurcations;
**2.** Study degenerate Hopf-Hopf bifurcations;
**3.** Study other codimension k bifurcations in continuous (smooth) systems;
**4.** Study other codimension k bifurcations in discrete (smooth) systems;
**5.** Study codim k bifurcations in non-smooth systems;
**6.** Study bifurcations in non-smooth systems with impacts.

## Results

**Published articles:**

**1.** G. Moza, L. F. Vesa, Analysis of interactions between human immune system and a pathogenic virus, Carpathian Journal of Mathematics 39 (2), 411-422, 2023.
**2.** M. Sterpu, C. Rocsoreanu, R. Efrem, S. A. Campbell, Stability and Bifurcations in a Nutrient–Phytoplankton–Zooplankton Model, Mathematics 2023, 11, 2911.
**3.** J. Llibre, C. Valls, Invariants of poly. vector fields, J.D. Eq 365(2023), 895–904.

## Financed through/by

Horizon2020-RISE-777911, "Dynamics"

## Research team

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Universitatea Politehnica Timișoara

# PROJECTS SUPPORTED BY PRIVATE FUNDS

# TOPO GEODETIC MEASUREMENTS, LEVELING AND PLANIMETRY CARRIED OUT ON THE VĂLIUG, TIMIŞ, TREI APE, SECU AND GOZNA DAMS NECESSARY FOR THE PREPARATION OF THE U.C.C. REPORT

## Goal of the project

• The purpose of the project is to carry out topo-geodetic measurements for the dams: Văliug, Timiş-Trei Ape, Secu and Gozna in order to monitoring dams behavior.

## Short description of the project

• The purpose of the project is to carry out topo-geodetic measurements for the dams: Văliug, Timiş-Trei Ape, Secu and Gozna. The results of these measurements consist in determining the coordinates of some mobile planimetry benchmarks placed on the body of the dams to measure displacements and deformations. These measurements are both relative and absolute in nature. The relative character of the measurements corresponds to the situation when measuring the proximity or distance of two or more points subjected to measurements.

• The absolute character of the measurements corresponds to the situation when the displacements of these mobile benchmarks are measured in relation to fixed benchmarks. At the same time, through mobile leveling markers, it is possible to highlight subsidence, or downward vertical displacements, bulges or elevations that represent vertical upward displacements of constructions.

## Project implemented by

**Coordinator**: Politehnica University Timisoara
**Partners:**
TMK HIDROENERGY POWER S.R.L. Reşița

## Implementation period

24.04.2023 – 31.12.2025

## Main activities

• The actions that were taken to produce the proposed results within the project:
- Moving to the objectives subject to monitoring through topographical measurements;
- Design of the support network;
- Checking the support network;
- Inspecting and checking the state of the planimetry and leveling markers;
- Checking the condition of the station points, the pilasters

## Results

• The results consist in the provision to the beneficiary of the tables with the coordinates of the mobile planimetry markers as well as the elevations for the mobile leveling markers located on the project's specific objectives.

• At the same time, these results are accompanied by graphs (displacement graph, leveling graph) to help their interpretation.

## Applicability and transferability of the results

From the problems that have been encountered over time, we can mention:
- The need for much more careful maintenance of the condition of the marks, both planimetry and leveling, in order to obtain the best possible results and which are affected as little as possible by errors;
- Correct maintenance and protection of pilasters, station points;
- Carrying out maintenance work on the dams so that the existing vegetation does not affect the visas to the marks on the body of the dams.
- The accuracy of determining the markers increases as the stations approach the object under measurement, up to an optimal distance, which if reduced further, the aiming errors increase greatly.

## Financed through/by

• TMK HIDROENERGY POWER S.R.L. Reşiţa

## Research Center

• Research Center for Hidrotechnical Engineering and Environmental Protection

## Research Team

- **Project leader**: Assoc. Prof. Dr. Eng. Gabriel ELEŞ

*The position of the mobile planimetric markers for the downstream face of the SECU Dam*

*Crest of the GOZNA Dam, Caraş-Severin County*

*Carrying out topographical measurements for the SECU Dam, Caras-Severin County*

*Leveling landmark, Breazova Dam, Caraș-Severin County*

## Contact information

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# TECHNICAL EXPERTISE ON DN79 KM 4+150 - KM 56+000

## Goal of the project

• The general objective of the technical expertise project is to investigate and establish the causes that have led to the state of viability of the national road DN 79 on the section between km 4+150 and km 56+000, as well as to establish appropriate technical solutions to bring the road to an appropriate state of operation to ensure optimal conditions of safety and comfort for road traffic on it.

## Short description of the project

- The works executed in the year 2022 were subject to acceptance on completion of works in June 2023 when, the reception commission decided to suspend them, the commission's motivation being the appearance of several areas with degradation of the works executed.
- The technical expert report aims to identify the types of immediate intervention works that will bring the road section to an appropriate state of viability.
- By analyzing the types of degradations present on the surveyed sector of the national road DN 79 and in particular the possible causes of their occurrence, it is considered that the degradations can be remedied according to the AND 547/2013.

## Project implemented by

### Contract Manager

- Technical expert A4.1, B2.1, D2.1,
- Assoc.Prof.Dr.Eng. Ciprian COSTESCU
- **Coordinator**: Politehnica University Timisoara

## Main activities

- Investigations and field analysis were carried out, which consisted in the visual assessment of the faults occurring on the surveyed section as well as in the taking of core samples from the executed section.
- In order to identify the causes of the occurrence of the defects and to establish remedial solutions, laboratory determinations were carried out within the Department of Overland Communication Ways, Foundation and Cadastral Survey , on the samples taken.

## Results

- After carrying out the technical expertise it was found that the section between km 4+450 - km 56+000, no longer allowed the road traffic to be carried out in full conditions of safety and comfort, thus it was necessary to apply appropriate technical solutions to bring the road to a state of viability appropriate to the state established after the contract.

## Applicability and transferability of the results

- The beneficiary and the contractor have taken measures to carry out the works recommended in the technical expertise report so that the technical condition of national road 79 is adequate.

## Implementation period

- 15.03.2024-15.04.2024

## Financed through/by

• The National Road Infrastructure Management Company of Romania through DRDP Timișoara, on the basis of contract no. 550/49 of 13.03.2024 (BC 14/14.03.2024)

## Research Center

- Research Center for Infrastructure for Civil Engineering and Transport

## Research Team

**Project leader**:
Assoc. Prof. Dr. Eng. Ciprian COSTESCU
**Researchers**:
- Lecturer Dr. Eng. Andrei FORTON
- Assist. PhD Student Eng. Adelin ȘTIRB

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# CONTINUITY OF WORK PACKAGES DERIVED FROM CONTIVATION RISC-V FROM 2022 TO DS MATRIX BACKLIGHT ASIC 2023, REFERENCE INTEGRATION AND ICS DEMONSTRATORS FOR CONSUMER ELECTRONICS (CES) AND IAA FAIRS 2022 TO 2024

## Goal of the project

• The main goal of our project is the implementation of new architectures based on RISC-V ISA for automotive algorithms in order to accelerate the hardware processing of specific automotive information.

## Short description of the project

The aspects we focus on in our project are the definition, implementation and validation of a set of hardware-optimized RISC-V architectures as well as their related peripherals. The implementations are optimized to reduce the power dissipation and to increase the flop/watt performance.

## Project implemented by:

µETM. Microelectronics Team – Timișoara,
https://uetm-team.upt.ro/

## Implementation period

03.01.2023 – 15.11.2024

## Results

• One of the basic implementations designed in our project was a custom AXI4 Lite peripheral that allows writing and reading of certain registers. For this we used Zynq UltraScale+ MPSoC ZCU102 Evaluation Kit and Jupyter platform. The block diagram for our implementation and the obtained results are presented below:

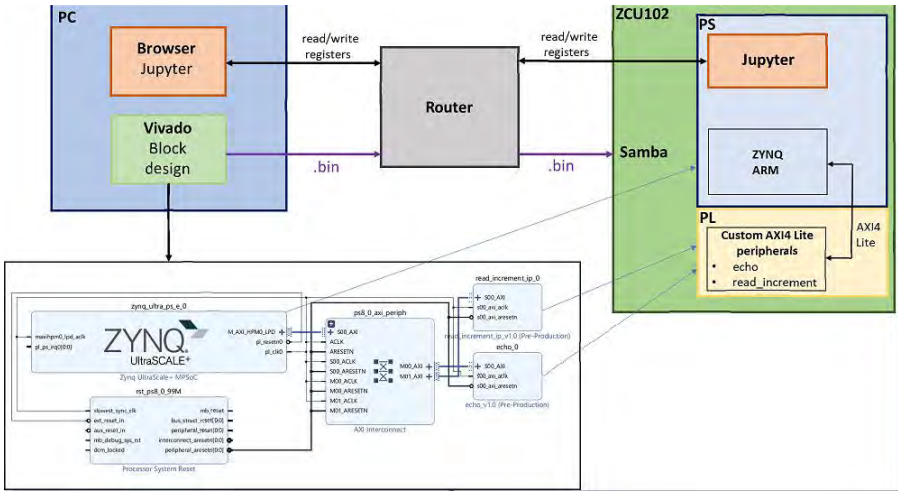


**Figure 1.** *The block diagram for a FPGA implementation of a custom AXI4 Lite peripheral*

## Main activities

The main activities in our research project are:
• Study of RISC-V Vector extension;
• Study of the "Ara" coprocessor specialized for RISC-V Vector extension;
• FPGA implementation of the NOEL-V processor;
• Implementation of a custom peripheral for the NOEL-V processor;
• FPGA implementation of the CVA6 CPU;
• FPGA implementation of the PULPino architecture.

```
# initialize 3 arrays to store the values from reg1, reg2 and reg3
read_inc_arr1 = []
read_inc_arr2 = []
read_inc_arr3 = []
readReg1Offset=0x4 #offset for Reg1 ddress
readReg2Offset=0x8 #offset for Reg2 ddress
readReg3Offset=0xC #offset for Reg3 ddress
# read reg1, reg2 and reg3 in a loop and store the read values
for i in range (20):
    reg1=custom_read_increment_ip.read(readReg1Offset)
    read_inc_arr1.append(reg1)
    reg2=custom_read_increment_ip.read(readReg2Offset)
    read_inc_arr2.append(reg2)
    reg3=custom_read_increment_ip.read(readReg3Offset)
    read_inc_arr3.append(reg3)
# plot the values read from the registers
figure, axis = plt.subplots(1, 3)
figure.subplots_adjust(hspace=0.4, wspace=0.6)
axis[0].plot(read_inc_arr1)
axis[0].set_title("Reg1")
axis[1].plot(read_inc_arr2)
axis[1].set_title("Reg2")
axis[2].plot(read_inc_arr3)
axis[2].set_title("Reg3")
plt.show()
```

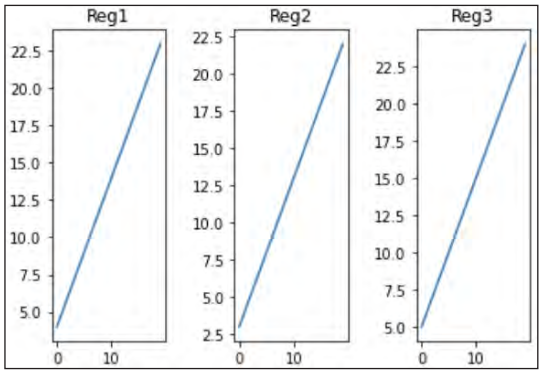


Figure 2. *The results obtained in Jupyter for a custom AXI4 Lite peripheral*

## Applicability and transferability of the results

- Our research project proposes the use of the reconfigurable logic to develop a control solution for head up displays using innovative RISC-V based architectures, evaluated and validated in FPGA.
- Moreover, the project team will develop, test and validate a demonstrator containing the implemented hardware and software modules that can be used at the main exhibitions in the field.

## Financed through/by

• Continental Automotive Timisoara

## Research Center

Research Center for Intelligent Electronic Systems
http://ccsei.upt.ro/

## Research Team

- Prof. Dr. Eng. Aurel – Ștefan GONTEAN
- Eng. Corneliu BĂRBULESCU
- Eng. Magdalena Patricia MARINCA
- Student Albert BARBU
- Student Vasile BOROICA

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# ENERGY MANAGEMENT SERVICES FOR MOSNITA NOUA COMMUNE

## Goal of the project

• The project's goal is to optimize Mosnita Noua Commune's energy use and increase energy efficiency.
• This will result in lower costs, less of an impact on the environment, and more sustainable local energy consumption.

## Short description of the project

- The project involves the assessment, planning, and implementation of energy management strategies for public infrastructure in Mosnita Noua.
- It includes energy audits, efficiency improvement measures, and the integration of renewable energy sources where feasible.

## Project implemented by:

**Coordinator:** Politehnica University Timisoara
- Research Institute for Renewable Energy (ICER)

## Implementation period

- 20.05.2024-31.12.2028

## Main activities

- Develop energy efficiency improvement program;
- Update energy efficiency improvement program;
- Develop executive reports on the impact of energy costs;
- Develop Plans to increase the number of nZEB buildings.

## Results

- Improved energy efficiency in public infrastructure
- Reduced energy costs for the local administration
- Lower greenhouse gas emissions
- Increased awareness and capacity of local authorities regarding energy management
- Feasibility studies for renewable energy implementation

## Applicability and transferability of the results

- The results of this project can serve as a model for other rural and urban communities aiming to enhance their energy efficiency.
- The methodologies and strategies developed can be adapted and applied to similar municipalities, contributing to sustainable development on a broader scale.


## Financed through/by

- Moșnița Nouă Comunne, Timiș, Romania


## Research Center

- Research Institute for Renewable Energies (ICER)
https://www.icer.ro/en/

## Research Team

**Project leader**:
- Assoc. Prof. Dr. Eng. Attila SIMO

**Researchers**:
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- Assoc. Prof. Dr. Eng. Attila SIMO
- Assoc. Prof. Dr. Eng. Florin MOLNAR-MATEI
- Assoc. Prof. Dr. Eng. Ciprian Șorândaru
- Assoc. Prof. Dr. Eng. Simon-Alexandru PESCARI
- Assoc. Prof. Dr. Eng. Gheorghe MARC
- Ec. Anca ROGOZ

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# HYDRAULIC STUDY REGARDING THE PRESUMED FLOODING RISK ON THE PARALLEL AREA OF A RAILWAY WITH THE CRIȘUL REPEDE RIVER

## Goal of the project

• In order to modernize the railway infrastructure between Cluj Napoca and Episcopia Bihorului, the Romanian National Railway Company has to verify and eventually to request river banks defending hydrotechnical works, respectively to protect the tracks embankment, in the immediate vicinity of the Crișul Repede River course, on a length of about 36 km, between the Poieni and Aleșd railway stations.

• Thus, the study carried out within this project had the general purpose of establishing the water transit conditions on the river section under a flow with the occurrence probability of once in a hundred years, so that further on the safe operation of the infrastructure elements – embankment, tracks, bridges – to be analyzed. The study was carried out over a period of about four months.

## Short description of the project

- Once the existing situation has been established, regarding both the configuration of the domain in situ, as well as the updated hydrological and flow data, the project focused on the 3D modeling for the water flow analysis with the specialized HEC RAS 6.5 program.
- The hydraulic model calibration engaged successively two known correlated flow and levels conditions. The flow numerical simulation was carried out twice, under two flood hydrographs of updated shape and values. The results analysis aimed to establish the water levels and to identify the possible flooding areas.

## Project implemented by:

- **Coordinator**: Politehnica University Timisoara
- Partners: National Railway Company ,,CFR"-S.A.;
- "Romanian Waters" National Administration, ABA Crișuri.

## Implementation period

- December 2023 – April 2024

## Implementation period

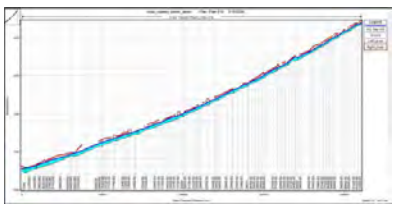
December 2023 – April 2024

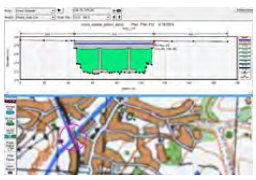
## Main activities

- Analysis of the project goal and gaining general information on the studied subject; obtaining and interpreting specific topo-geometric, hydrological and flow data for the analyzed area; hydraulic model development and calibration;
- Flow numerical simulation under two situations of the imposed boundary conditions;
- Highlighting the necessary results and their interpretation; analysis of the flow phenomenon and formulation of eloquent conclusions, in order to establish the necessary measures for the safe operation of the railway infrastructure in the vicinity of the Crișul Repede River course.

## Results

- The river flow numerical model study led to the establishment of the levels regime and the water surface extension in the area of interest.
- Thus, it was possible to estimate the eventual flood zones, as well as the sensitive points – crossings, bridges, embankments – where the hydraulic load approaches the capacity limit of the respective structural elements.





## Applicability and transferability of the results

- As expected, following the update of the hydrological and flow conditions on the analyzed river section, a significant increase in the concentration of water flows was observed, which led to the expansion of the potential floodable areas, respectively to an increase in the degree of hydraulic load upon the elements of the railway infrastructure in the adjacent area.
- Although the modelling results reveal that at present the respective transport infrastructure can be operated safely, certainly looking for solutions to reduce the risk represented by the few sensitive points, based on the estimation of an increasing evolution of the hydrological phenomenon, research could be carried out in order to establish the moment when the functioning of some infrastructure elements can become problematic.
- As regarding the operation risk reduction for the infrastructure elements, the proposed solutions will have to consider both structural adjustment and flow conditions correction through sustainable hydraulic measures upon the river course.
- The study is certainly an important practical experience for the adjustment and validation of theoretical models for the analysis of the flow under special conditions on the watercourses, with special interest in the vicinity of some economic and social developments.


## Financed through/by

Economic agent (contracts concluded with third parties).


## Research Center

Research Center for Hydrotechnics and Environmental Protection

## Research Team

### Project leader:

- Assoc.Prof.Dr.Eng. Albert Titus CONSTANTIN

### Researchers:

- Assoc.Prof.Dr.Eng. Gheorghe LAZĂR
- Lecturer Dr.Eng. Marie Alice GHIȚESCU
- Lecturer Dr.Eng. Alina-Ioana POPESCU-BUȘAN
- Lecturer Dr.Eng. Șerban-Vlad NICOARĂ
- Assist.Prof.Dr.Eng. Mircea VIȘESCU

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# EXPERTISE OF NINE HYDROTECHNICAL WORKS IN ORDER TO RENEW THE SAFE OPERATION PERMITS

## Goal of the project

• The safe operation of the hydrotechnical infrastructure is a mandatory requirement, both for the social and economic framework in which it was built, and for the optimal functioning of the facilities that compose it.

• The study general purpose was to evaluate the safety status in operation of nine hydrotechnical works in the western and south-western area of the country, part of them functioning correlated in the Hydrotechnical Interconnection System of the Timiș – Bega basins, Coșteiu Hydrotechnical Arrangement, Repaș, Hodoș, Iosifalău, Șuștra and Recaș, while the rest being operated relatively independently, Murani Dam on Măgheruș River, Buhui Dam on Buhui River, respectively Oravița Mare Dam on Oravița River (the last two in the Caraș River basin).

• The study, requested by the Romanian water administrator through the electronic public procurement system, with the practical objective of renewing the operating permits in appropriate safety conditions, was carried out over a period of about two months.

## Short description of the project

- The project implied the specialized expertise of nine hydrotechnical works – dams with water reservoirs – in order to establish the state of safety in their operation, based on the reached conclusions establishing the conditions of authorization for safe operation. The study concluded with the assertion of the practical measures necessary to remedy the structural and operational deficiencies for each of the nine works.
- The project is part of the general context of monitoring and safe operation of the national hydrotechnical infrastructure, in order to socio-economic optimization of its operation.

## Project implemented by

**Coordinator:** Politehnica University Timisoara,
**Partners:** "Romanian Waters" National Administration, ABA Banat

## Implementation period

September – November, 2024

## Main activities

- The project work started by specific technical and operational data gathering, regarding every analyzed objective.
- Besides obtaining the information regarding the operation from the manager of the hydrotechnical facilities – Banat Water Administration – and, respectively, the specific updated hydrological data from the accredited institution in this regard in Romania – the National Institute of Hydrology and Water Management, field visits were carried out to establish the actual way in which each of the objects that make up the analyzed facilities presents itself and fulfills its aim.
- Further on, by specific structural and hydraulic modeling, there were verified the dam's behavior under load and, respectively, the water discharge capacity under current hydrological conditions, which are significantly different from those at the time of the arrangements' development.
- Based on direct in situ observations and the obtained results, respectively analyzing the evolution of the specific parameters registered over time to monitor the arrangements behavior, the safety of the retention structures was assessed and the necessary measures for the proper running were established.
- Along with the conclusions regarding the capacity of the facilities to be safely operated, the recommendations to be respected were issued.

## Results

- Following the structural and hydraulic calculations, it was established that all the arrangements are able to support their loads, respectively the dischargers are capable of evacuating the high waters, even in the conditions of updated increased.
- In the same time, the analysis of the operating status and the evolution of the specific parameters currently monitored led to the conclusion that all nine water retention constructions can be operated safely.
-Of course, the measures established to bring the objects to the optimal operating state must be fulfilled.

## Applicability and transferability of the results

- As expected, following the updated hydrological conditions at the studied arrangements, a significant increase in the concentration of water flows was observed, which in some cases led to the reduction of the accumulations' capacity in high waters attenuation, respectively led dischargers to their running limit.
- Although at this moment, all the analyzed facilities can operate safely, as considering an increasing evolution of the hydrological phenomenon, research could be carried out in order to establish the moment when the exploitation of some elements of hydrotechnical infrastructure can become problematic.
- A first step could be to determine the rank of the loading parameters – water levels and flows in front of the weir structures – which determine in the structural and hydraulic modeling used the achievement of the operating limit capacities.
– The study was also an important practical experience for the adjustment and validation of theoretical models regarding the hydrotechnical facilities behavior. The conclusions highlight both the capacity of the existing hydrotechnical facilities to operate under updated loading conditions, as well as their economic and social importance.

## Financed through/by

- Economic agent (contracts concluded with third parties)

## Research Center

- Research Center for Hydrotechnics and Environmental Protection

## Research Team

**Project leader:**
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**Researchers:**
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- Lecturer Dr.Eng. Marie Alice GHIȚESCU
- Lecturer Dr.Eng. Alina-Ioana POPESCU-BUȘAN
- Lecturer Dr.Eng. Adia GROZAV
- Prof.Dr.Eng. Constantin FLORESCU
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# RESEARCH-DEVELOPMENT AND CONSULTING AGREEMENT FOR CFD HYDRAULIC PERFORMANCE ANALYSIS FOR THE MODEL AND PROTOTYPE OF A HYDROKINETIC TURBINE

## Goal of the project

• The project aims to develop, build and install hydrokinetic turbines (HK-T-DR) (approx. 200) on the Congo River. The UPT research team had the task to perform the analysis of the hydrodynamics of the hydrokinetic turbine runner, analysis in different operating scenarios and to validate the data obtained from numerical simulations with the data obtained from experimental measurements.

## Short description of the project

- The project was focused on determining the operating characteristic curves (thrust, axial force and power curve) of the HK-T-DR model with ANSYS Fluent and calibrating the numerical set-up by comparing the numerical results with experimental data. A very good agreement was obtained between the numerical and experimental data.
- The operating characteristic curves for the HK-T-DR prototype were determined with numerical simulations for a one-blade channel domain and the scale-up factor was determined.
- Finally, the performance of the full-scale turbine prototype was numerically tested, considering the entire turbine assembly and the velocity distribution of the river flow.

## Project implemented by

**Coordinator**: Research Center for Complex Fluid Systems Engineering from Politehnica University Timisoara

**Partner**: ARECOR Pty Ltd Sydney, Australia

## Implementation period

- 15.03.2024 – 31.07.2024

## Main activities

• CFD analysis of turbine model, one-blade periodic domain with dynamometer, 1 towing velocity, turbine placed at 600 mm below surface;

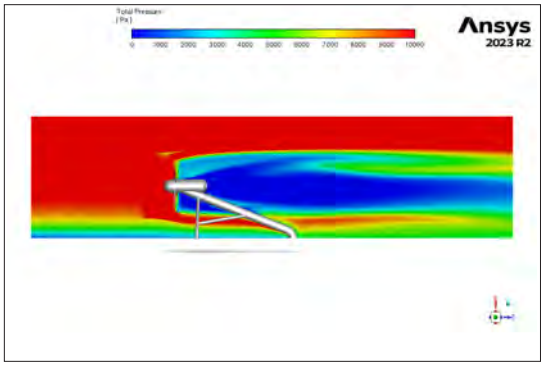
• CFD analysis of turbine model, full domain with mast, dynamometer and strut, 2 towing velocities turbine placed at 600 mm below surface and 1 towing velocity turbine placed at 200 mm below surface;

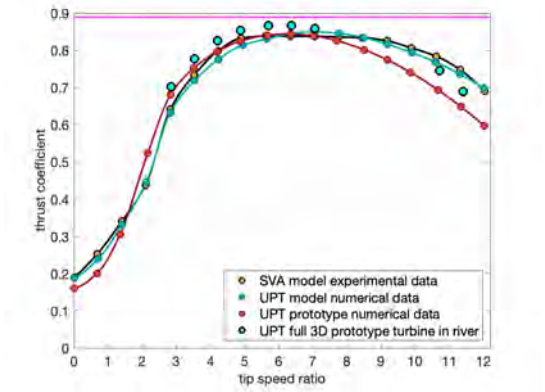
• CFD analysis of turbine prototype, full domain with mast, dynamometer and strut, uniform flow, 2 inlet velocities;

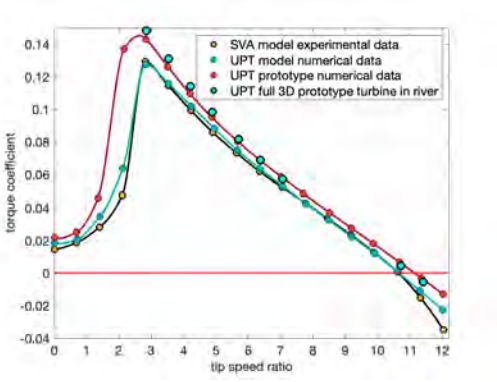
• CFD analysis of turbine prototype, full domain with entire foundation, measured inlet velocity profile.

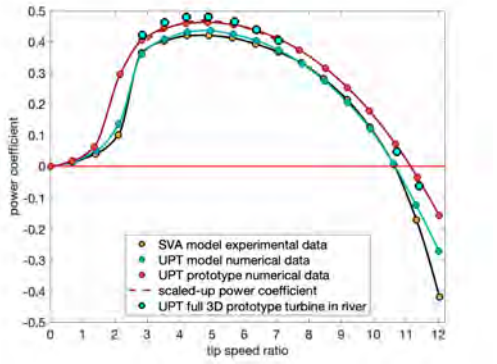
## Results

- The numerical investigations to determine the operation curves for the HK-T-DR prototype were carried out for a 3D domain with only one blade, representing 1/3 of the turbine prototype, identical as the one used for investigating the flow over the model.
- The main operating parameters were determined from CFD for the model and prototype and the results were compared to experimental measurements performed on the model.
- In another chapter it is assessed the three-blade hydrokinetic turbine performance is a channel that mimics as close as possible the conditions in the actual Congo river.






## Applicability and transferability of the results

- The manufacturing of the first deep-river hydrokinetic turbine (HK-T-DR) should be finalized in Germany in 2025 and the turbine should be installed on the Congo river in 2026.

## Financed through/by

• Research-Development and Consulting Agreement BCI 1/2024 between ARECOR Pty Ltd and Politehnica University Timisoara

## Research Center

- Research Center for Complex Fluid Systems Engineering

## Research Team

- Project leader: Assoc. Prof. Dr. Eng. Adrian STUPARU
- **Researchers**:
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- Assist. Prof. Dr. Eng. Tiberiu CIOCAN

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# RESEARCH SERVICES REGARDING THE ENERGY VALORIZATION OF BIOGAS PRODUCED FROM THE ANAEROBIC DIGESTION OF SLUDGE, AT THE TIMISOARA WASTEWATER TREATMENT PLANT

## Goal of the project

• The **main objective** of the research consists of using the data / information resulting from the experimental campaign, to carry out a feasibility study aimed at implementing a biogas production and recovery facility in the Timisoara wastewater treatment plant.
• The **secondary objective** of the research consists of experimental testing on the stand of at least eight co-substrate recipes for biogas production through anaerobic digestion, which are based on the sludge produced in the wastewater treatment plant, in combination with organic waste and wastewater with high organic load taken from local companies operating in the agri-food industry.

## Short description of the project

- The analysis and experiments carried out on the laboratory stands aim to determine the biogas production capacity for sludge resulting from the purification process. The specific biogas production of the analyzed samples is related to the volatile / organic substance (VS) content of the composition of the analyzed samples.
- For the biogas production, two high-precision laboratory reactors were used, manufactured by Bioprocess- control, namely: 1 x Bioreactor -simulator BRS III with 6 bioreactors with a volume of 2 liters/piece (https://bpcinstruments.com/bpc_products/brs-iii/);
- 1 x Continous Stiring Reactor CSTR with 1 x bioreactor with a volume of 5 liters (https://bpcinstruments.com/bpc_products/bioreactors/) – see **Figure 1**.
- The samples analyzed combined:
• **Dewatered sludge** (probe A) - from the addition of electrolytes for coagulating excess sludge from the gravitational settling tanks, followed by a centrifugation;
• **Dewatered sludge (probe B)** - collected from a landfill;
• **Fats (probe C)** – collected from the grit and grease removal station.

*Figure 1. Experimental reactors used for the experiments*

## Project implemented by:

**Service provider**: Politehnica University Timisoara
**Beneficiary**: AQUATIM SA

## Implementation period

- September 2024 - August 2025

## Main activities

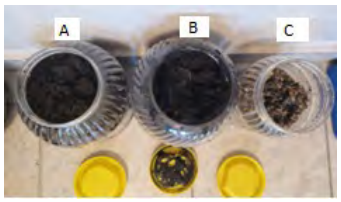


*Figure 2. The three basic materials used in mixture, to create the recipe for testing the biogas production.*

## Results

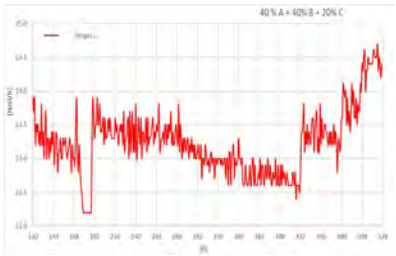

*Figure 3. Biogas production for a mixture of three waste sludges, as produced by AQUATIM.*

## Applicability and transferability of the results

- The conducted research aims to valorize the residues from the technological process of the structures within AQUATIM for biogas production. The novelty and transferability lie in the developed formulations. The combinations of sludge (Type A samples) and fats (Type C samples) are useful.
- However, dehydrated sludge (Type B), used alone, cannot be economically valorized. The mixtures generate a high methane content in the biogas and can therefore be used for energy generation through internal combustion engines. The methane content in the biogas obtained through the co-fermentation of treatment sludge, sample D = A + B + C, shows a good biogas concentration, with values ranging from 48% to 60%.
- This indicates that the produced biogas can be used as a gaseous fuel for Diesel engines specific to cogeneration units used in industrial biogas production and utilization facilities.
- Of course, further research is necessary to ultimately validate the technology on a large industrial scale and thus generalize its application.

## Financed through/by

Research contract funded by the beneficiary economic agent

## Research Center

Research Center for Machines and Thermal Equipment, Transportation, and Pollution Control,
Web: http://mettcp.mec.upt.ro/

## Research Team

**Project leader:**
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**Researchers:**
- Lecturer Dr. Eng. Daniel BISORCA
- Assoc. Prof. Dr. Eng. Ramon Mihai BALOGH
- Assoc. Prof. Dr. Eng. Delia TRIF-TORDAI
- PhD Student Eng. Ioana Ancuta HALMACIU

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# HARDWARE VERIFICATION MANUAL UPDATE AND IMPLEMENTATION

## Goal of the project

• Updating the existing hardware verification manuals of components and electronic control units and creating manuals for the newly introduced circuits used by Vitesco Technologies Engineering company.

## Short description of the project

- Update or generate, as appropriate, hardware verification manuals for specific ASICs used in Automotive (Powertrain).

## Project implemented by:

**Coordinator:**
Politehnica University Timisoara

## Implementation period

02.08.2023-02.08.2024

## Main activities

- Update existing hardware verification manuals in accordance with the requirements of the integration plans
- Studying the documents related to the tests / measurements to be performed
- Generation of manuals for newly introduced components to be integrated into the electronic control unit (ECU)
- Participate in online meetings on testing requirements

The updating of the manuals refers both to the steps to be executed and to the experimental setup (how the devices must be interconnected)

- Review of the verification reports generated by colleagues in tests/ measurements performed manually or through semi-automatic tests
- Verifying that the manuals are correctly understood
- Changes to the hardware verification manuals for a better understanding of the test mode

## Results

- Hardware verification manual updates for:

• DC-DC circuits
• Power supply and voltage monitoring unit
• High/Low side driver
• H-Bridge driver

- Start of a new manual referring on a e-fuse circuit.

## Applicability and transferability of the results

- In the generation of a new hardware verification manual or updating an existing one, it is useful to collaborate with colleagues who carry out the necessary measurements in tests / hardware verifications to establish in detail how they should be carried out.
- The documents are used within Vitesco, at all branches where ECU checks are performed.

## Financed through/by

- Vitesco Technologies Engineering Romania SRL

## Research Team

**Project leader:**
- Lecturer Dr. Eng. Robert PAZSITKA

**Researcher:**
- Lecturer Dr. Eng. Robert PAZSITKA

## Contact information

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# THEORETICAL AND APPLIED RESEARCH REGARDING THE PHOTOVOLTAIC AND WIND POWER PLANTS' INTEGRATION IN COMPLEX POWER SYSTEMS. CASE STUDIES FOR THE ROMANIAN POWER SYSTEMS, PHOTOVOLTAIC POWER PLANTS [...] AND WIND POWER PLANT ORAVITA (46.2 MW) FROM PUBLIC POWER CORPORATION(PPC), ELECTRICAL NETWORKS BANAT DISTRIBUTION SYSTEM OPERATOR

## Goal of the project

• Currently, there is a very increased interest for unconventional power producers' integration in the Romanian National Power System. The project deals with power system analysis and optimization for the photovoltaic (PV) and wind power sources' integration in the Romanian Power System (Banat area Distribution System Operator). The Western part of Romania (named Banat area) has been used as case study.

• The corresponding distribution network is managed by the Electrical Networks Banat Distribution System Operator. The goal of the project is to perform the power system operating conditions analysis in order to integrate within the Romanian Power System the following PV power producers: Sanandrei (rated power 49.6 MW), Uivar (rated power 300 MW), Gataia (rated power 92 MW), Rusor (rated power 43.2 MW), Peciu (rated power 49.8 MW), Beregsau Mare (rated power 2.366 MW) and Paltinis (rated power 46.2 MW), respectively wind power producer Oravita (rated power 46.2 MW).

## Short description of the project

- The unconventional power producers represent an important issue for the Romanian and EU energy policy and sustainable development strategy.
- The project refers to photovoltaic and wind power sources integration in the Western area of the Romanian Power System. Various scenarios considering the consumption forecast for 2026 and 2031 years have been considered, taking into account all the renewable energy sources (wind, photovoltaic, biomass, hydro).
- The analyses have been performed for the transmission and distribution networks from the interest area, in order to highlight the influence of the new power producers on the distribution network.

## Project implemented by:

**Coordinator:**
Politehnica University Timisoara
**Partner:**
- S.C. Electroechipament Industrial S.R.L., Resita

## Implementation period

07.V.2024 – 07.VIII.2024

## Main activities

- Modeling all the unconventional power producers that have to be taken into consideration for the involved power system area;
- Power system operating conditions analysis considering various scenarios;
- Banat area distribution network modelling and power system operating conditions analysis;
- Steady-state power system analyses;
- Contingencies analyses for the power systems area where the new unconventional power producers are going to be integrated;
- Voltage regulation and reactive power variation analysis;
- Transient stability analyses;
- Analysis of the electrical network reinforcement works' necessity.

## Results

- Methodology elaborated for unconventional power producers' integration;
- Artificial intelligence based power flow computing algorithms development;
- Power flow computing corresponding to the 2026 and 2031 years forecasting scenarios (transmission and distribution network levels), considering the absence / presence of the new unconventional power producers;
- Voltage value variation considering the absence / presence of the new unconventional power producers;
- Power flow though the power system elements and loading level;
- Analysis of the new power producers' influence on the technical losses;
- Contingencies analyses considering the presence / absence of the new unconventional power producers;
- Network integration solution validation and electrical network reinforcement recommendations (if necessary).

## Applicability and transferability of the results

- Applicability for unconventional power producers' integration in actual, complex, power systems.

Knowledge transfer to other photovoltaic power plants developers, respectively to the electrical distribution network operators (Electrical Networks Banat Distribution System Operator, DEO, DelGaz Grid, DEER) and to the transmission system operator.

## Financed through/by

- Private sources
(S.C. Electroechipament Industrial S.R.L., Resita)

## Research Center

- Research Centre for Power Systems Analysis and Optimization

## Research Team

**Project leader:**

- Prof. Dr. Eng. Stefan KILYENI

**Researchers:**

- Assoc. Prof. Dr. Eng. Constantin BARBULESCU
- PhD Student Eng. Alex BITTENBINDER
- PhD Student Eng. Marin SALINSCHI
- Assoc. Prof. Dr. Annamaria KILYENI
- PhD Student Eng. Flavius TODERICA
- PhD Student Eng. Andrei STELESCU
- PhD Student Eng. Alexandru STOIAN
- PhD Student Eng. Marilena ZAMFOR
- PhD Student Eng. Radoslav RAICOV
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# THEORETICAL AND APPLIED RESEARCH REGARDING THE PHOTOVOLTAIC AND WIND POWER PLANTS' INTEGRATION IN COMPLEX POWER SYSTEMS. CASE STUDIES FOR THE ROMANIAN POWER SYSTEMS, PHOTOVOLTAIC POWER PLANT [...]FROM DELGAZ GRID DISTRIBUTION SYSTEM OPERATOR; PHOTOVOLTAIC POWER PLANT[...], WIND POWER PLANTS COBADIN [...] FROM PUBLIC POWER CORPORATION (PCC), ELECTRICAL NETWORKS DOBROGEA DISTRIBUTION SYSTEM OPERATOR; PHOTOVOLTAIC POWER PLANT TROIANU

## Goal of the project

• Currently, there is a very increased interest for unconventional power producers' integration in the Romanian National Power System. The project deals with power system analysis and optimization for the photovoltaic (PV) and wind power sources' integration in the Romanian Power System. The Eastern, South-Eastern and Southern areas have been used as case studies. The corresponding distribution networks are managed by the **Delgaz Grid Distribution System Operator (DSO)**, **Electrical Networks Dobrogea DSO**, respectively **Oltenia Energy DSO.**

• The goal of the project is to perform the power system operating conditions analysis in order to integrate within the Romanian Power System the following PV power producers: **Deleni (rated power 15 MW)**, **Deleni 1+2 (rated power 131 MW)** and **Troianu** (rated power 40 MW), respectively the following wind power producers: **Deleni (rated power 62.4 MW)**, **Scobinti (rated power 114 MW)** and **Cobadin 1+2+3 (rated power 378 MW)**.

## Short description of the project

The unconventional power producers represent an important issue for the Romanian and EU energy policy and sustainable development strategy. The project refers to photovoltaic power sources integration in the North and South Transilvania, respectively North Muntenia areas of the Romanian Power System. Various scenarios considering the consumption forecast for 2026 and 2031 years have been considered, taking into account all the renewable energy sources (wind, photovoltaic, biomass, hydro). The analyses have been performed for the transmission and distribution networks from the interest areas, in order to highlight the influence of the new power producers on the distribution network.

### Project implemented by:

**Coordinator:**
Politehnica University Timisoara
**Partner**:
- S.C. Romproiect Electro S.R.L., Cluj-Napoca

## Implementation period

07.V.2024 – 07.VIII.2024

## Main activities

- Modeling all the unconventional power producers that have to be taken into consideration for the involved power system areas;
- Power system operating conditions analysis considering various scenarios;
- The Eastern, South-Eastern and Southern area distribution network modelling and power system operating conditions analysis;
- Steady-state power system analyses;
- Contingencies analyses for the power systems' areas where the new unconventional power producers are going to be integrated;
- Voltage regulation and reactive power variation analysis;
- Transient stability analyses;
- Analysis of the electrical network reinforcement works' necessity.

## Results

- Methodology elaborated for unconventional power producers' integration;
- Artificial intelligence based power flow computing algorithms development;
- Power flow computing corresponding to the 2026 and 2031 years forecasting scenarios (transmission and distribution network levels), considering the absence/ presence of the new unconventional power producers;
- Voltage value variation considering the absence/ presence of the new unconventional power producers;
- Methodology elaborated for unconventional power producers' integration;
- Artificial intelligence based power flow computing algorithms development;
- Power flow computing corresponding to the 2026 and 2031 years forecasting scenarios (transmission and distribution network levels), considering the absence/ presence of the new unconventional power producers;
- Voltage value variation considering the absence/ presence of the new unconventional power producers;

- Power flow though the power system elements and loading level;
- Analysis of the new power producers' influence on the technical losses;
- Contingencies analyses considering the presence / absence of the new unconventional power producers;
- Transient stability analyses;
- Network integration solution validation and electrical network reinforcement recommendations (if necessary).

## Applicability and transferability of the results

- Applicability for unconventional power producers' integration in actual, complex, power systems.
- Knowledge transfer to other photovoltaic power plants developers, respectively to the electrical distribution network operators (DEER, Electrical Networks Banat Distribution System Operator, DEO, DelGaz Grid) and to the transmission system operator.

## Financed through/by

- Private sources (S.C. Romproiect Electro S.R.L., Cluj-Napoca)

## Research Center

- Research Center for Power Systems Analysis and Optimization

## Research Team

**Project leader:**
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- PhD Student Eng. Marin SALINSCHI
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- PhD Student Eng. Radoslav RAICOV
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# THEORETICAL AND APPLIED RESEARCH REGARDING THE PHOTOVOLTAIC AND WIND POWER PLANTS' INTEGRATION IN COMPLEX POWER SYSTEMS. CASE STUDIES FOR THE ROMANIAN POWER SYSTEMS, PHOTOVOLTAIC POWER PLANTS PARTA (49.95 MW), LUGOJ (2.5 MW), GIULVAZ (2.8 MW), VISAG (2.5 MW), SANDRA ATOMIC (7.26 MW) AND SANDRA MARACANA (3.253 MW) FROM PUBLIC POWER CORPORATION (PPC), ELECTRICAL NETWORKS BANAT DISTRIBUTION SYSTEM OPERATOR

## Goal of the project

• Currently, there is a very increased interest for unconventional power producers' integration in the Romanian National Power System. The project deals with power system analysis and optimization for the photovoltaic (PV) power sources' integration in the Romanian Power System (Banat area Distribution System Operator). The Western part of Romania (named Banat area) has been used as case study. The corresponding distribution network is managed by the Public Power Corporation (PPC), Electrical Networks Banat Distribution System Operator.

• The goal of the project is to perform the power system operating conditions analysis in order to integrate within the Romanian Power System the following PV power producers: Parta (rated power 49.95 MW), Lugoj (rated power 2.5 MW), Giulvaz (rated power 2.8 MW), Visag (rated power 2.5 MW), Sandra Atomic (rated power 7.26 MW) and Sandra Maracana (rated power 3.253 MW).

## Short description of the project

- The unconventional power producers represent an important issue for the Romanian and EU energy policy and sustainable development strategy. The project refers to photovoltaic power sources integration in the Western part of the Romanian Power System.
- Various scenarios considering the consumption forecast for 2026 and 2031 years have been considered, taking into account all the renewable energy sources (wind, photovoltaic, biomass, hydro). The analyses have been performed for the transmission and distribution networks from the interest area, in order to highlight the influence of the new power producers on the distribution network.

## Project implemented by:

**Coordinator:**
Politehnica University Timisoara
**Partner:**
- S.C. M.D. Electric S.R.L., Sag

## Implementation period

07.V.2024 – 07.VIII.2024

## Main activities

- Modeling all the unconventional power producers that have to be taken into consideration for the involved power system area;
- Power system operating conditions analysis considering various scenarios;
- Banat area distribution network modelling and power system operating conditions analysis;
- Steady-state power system analyses;
- Contingencies analyses for the power systems' areas where the new PV power producers are going to be integrated;
- Voltage regulation and reactive power variation analysis;
- Transient stability analysis;
- Analysis of the electrical network reinforcement works' necessity.

## Results

- Methodology elaborated for unconventional power producers' integration;
- Artificial intelligence based power flow computing algorithms development;
- Power flow computing corresponding to the 2026 and 2031 years forecasting scenarios (transmission and distribution network levels), considering the absence / presence of the new PV power producers;
- Voltage value variation considering the absence / presence of the new PV power producers;
- Power flow though the power system elements and loading level;
- Analysis of the new power producers' influence on the technical losses;
- Contingencies analyses considering the presence / absence of the new PV power producers;
- Transient stability analyses;
- Network integration solution validation and electrical network reinforcement recommendations (if necessary).

## Applicability and transferability of the results

- Applicability for unconventional power producers' integration in actual, complex, power systems.
- Knowledge transfer to other photovoltaic power plants developers, respectively to the electrical distribution network operators (Electrical Networks Banat Distribution System Operator, DEO, DEER, DelGaz Grid) and to the transmission system operator.

## Financed through/by

- Private sources (S.C. M.D. Electric S.R.L., Sag)

## Research Center

- Research Centre for Power Systems Analysis and Optimization

## Research Team

**Project leader:**
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**Researchers:**
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# THEORETICAL AND APPLIED RESEARCH REGARDING THE PHOTOVOLTAIC AND WIND POWER PLANTS' INTEGRATION IN COMPLEX POWER SYSTEMS. CASE STUDIES FOR THE ROMANIAN POWER SYSTEMS, PHOTOVOLTAIC VICTOR VLAD DELAMARINA (147.63 MW) FROM "REȚELE ELECTRICE BANAT" DISTRIBUTION SYSTEM OPERATOR

## Goal of the project

• Currently, there is a very increased interest for unconventional power producers' integration in the Romanian National Power System. The project deals with power system analysis and optimization for the photovoltaic (PV) power sources' integration in the Romanian Power System (Banat area Distribution System Operator). The Western part of Romania (named Banat area) has been used as case study. The corresponding distribution network is managed by the "Rețele Electrice Banat" Distribution System Operator.
• The goal of the project is to perform the power system operating conditions analysis in order to integrate within the Romanian Power System the following PV power producers: Victor Vladdelamarina (147.63 MW).

## Short description of the project

- The unconventional power producers represent an important issue for the Romanian and EU energy policy and sustainable development strategy. The project refers to photovoltaic power sources integration in the Western area of the Romanian Power System.
- Various scenarios considering the consumption forecast for 2026 and 2031 years have been considered, taking into account all the renewable energy sources (wind, photovoltaic, biomass, hydro).
- The analyses have been performed for the transmission and distribution networks from the interest area, in order to highlight the influence of the new power producers on the distribution network.

## Project implemented by:

**Coordinator:**
Politehnica University Timisoara
**Partners:**
- VLA SMART Efficiency S.R.L.

## Implementation period

27.09.2024 – 27.11.2024

## Main activities

- Modeling all the unconventional power producers that have to be taken into consideration for the involved power system area;
- Power system operating conditions analysis considering various scenarios;
- Banat area distribution network modelling and power system operating conditions analysis;
- Steady-state power system analyses;
- Contingencies analyses for the power systems area where the new PV power producers are going to be integrated;
- Voltage regulation and reactive power variation analysis;
- Transient stability analysis;
- Analysis of the electrical network reinforcement works' necessity.

## Results

- Methodology elaborated for unconventional power producers' integration;
- Artificial intelligence based power flow computing algorithms development;
- Power flow computing corresponding to the 2026 and 2031 years forecasting scenarios (transmission and distribution network levels), considering the absence / presence of the new PV power producers;
- Voltage value variation considering the absence / presence of the new PV power producers;
- Power flow though the power system elements and loading level;
- Analysis of the new power producers' influence on the technical losses;
- Contingencies analyses considering the presence / absence of the new PV power producers;
- Network integration solution validation and electrical network reinforcement recommendations (if necessary).

## Applicability and transferability of the results

- Applicability for unconventional power producers' integration in actual, complex, power systems.
- Knowledge transfer to other photovoltaic power plants developers, respectively to the electrical distribution network operator ("Rețele Electrice Banat") and to the transmission system operator.

## Financed through/by

- Private sources (VLA SMART Efficiency S.R.L.)

## Research Center

- Research Center for Power Systems Analysis and Optimization

## Research Team

**Project leader:**
- Lecturer Dr. Eng. Nicolae CHIOSA

**Researchers:**
- Assoc. Prof. Dr. Eng. Constantin BARBULESCU
- Prof. Dr. Eng. Ștefan KILYENI
- PhD Student Eng. Alex BITTENBINDER

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# DESCRIPTION OF SPECIFICATIONS AND FINITE ELEMENT MODELING OF AN ACCELEROMETER FOR MEASURING CUTTING VIBRATIONS

## Goal of the project

• The project aims, in a first stage, to define the specifications of accelerometers used to measure vibrations in cutting processes.
• The second stage of the project is focused on the modeling and simulation of an accelerometer used in the study of cutting processes.

## Short description of the project

- The project defines the necessary characteristics of accelerometers used in the study of cutting.

## Project implemented by:

**Coordinator:** Politehnica University Timisoara

## Implementation period

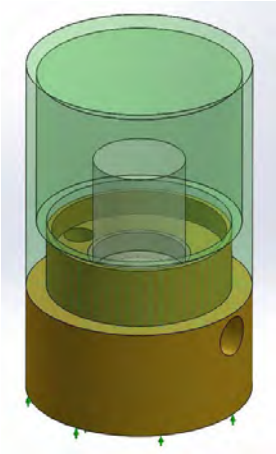
- 30.05.2024 -30.11.2024

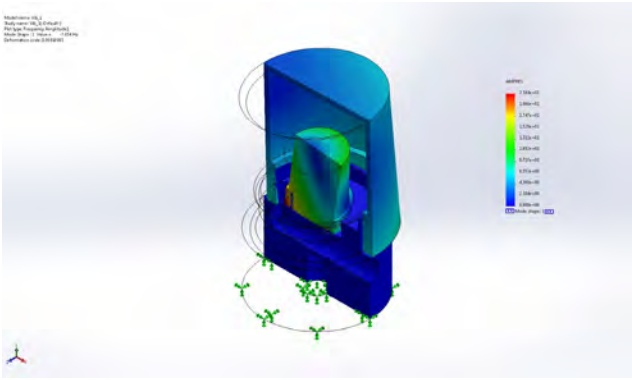
## Main activities

The main activities in our research project are:
- Description of the processes and relevant cases from the industry;
- Detailed analysis of the cutting parameters and environmental conditions specific to these processes;
- Establishment of the technical requirements of the system;
- Definition of the specific requirements necessary for sufficiently detailed vibration monitoring in cutting processes on machine tools;
- Finite element modeling of an accelerometer for measuring cutting vibrations;
- Finite element analysis of the accelerometer;
- Identification of potential problems in the design of the accelerometer in order to optimize its performance.

## Results

- A bibliographic research was conducted on the requirements that accelerometers used in the study/monitoring/control of machining processes must meet. Turning and milling machining processes were mainly targeted. Thus, the working areas of accelerometers (accelerations, frequencies) were identified, as well as the operating requirements in the specific working environment of turning and milling machine tools.
- Based on this, a 3D model of an accelerometer was created and then the way in which it responds to the mechanical stresses to which it is subjected was analyzed (see the accompanying figures).
- The static and dynamic analysis of the accelerometer operation allowed the formulation of the following recommendations:
• Minimizing the mass of the accelerometer components;
• Using materials with the lowest possible density;
• Sizing the system components to minimum values.





## Financed through/by

- MONITRON SRL, București

## Research Center

- Research Center for Integrated Engineering
http://imf.upt.ro/CCII/index.html

## Research Team

**Project leader:**
- Assoc. Prof. Dr. Eng. Cristian-Gheorghe TURC

**Researcher:**
- Assoc. Prof. Dr. Eng. George BELGIU

## Applicability and transferability of the results

- The accelerometer modeling allowed highlighting some design requirements for accelerometers used for monitoring machining processes by cutting.
- This allows avoiding working regimes in which vibrations occur that can damage the quality of the machined part, the tool and the machine tool used.
- The physical realization of such an accelerometer and its implementation in a system for monitoring and controlling machining processes on milling and turning machine tools is considered.

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Universitatea
Politehnica
Timișoara

# GRANTED PATENTS

INVENTORS: SUSAN-RESIGA ROMEO-FLORIN, TĂNASĂ CONSTANTIN, BOSIOC ILIE ALIN

PATENT NO. RO 137523 B1/ 2024

# DEVICE FOR MITIGATION OF THE SWIRLING FLOW INSTABILITIES FROM THE CONICAL DIFFUSER OF HYDRAULIC TURBINES

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

*Brevet de invenție*

**Nr. 137523**

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 "POLITEHNICA" DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenției: DISPOZITIV PENTRU REDUCEREA INSTABILITĂȚILOR CURGERII CU ROTAȚIE DIN DIFUZORUL CONIC AL TURBINELOR HIDRAULICE

Inventatori: SUSAN-RESIGA ROMEO-FLORIN, TIMIŞOARA, TM, RO; TĂNASĂ CONSTANTIN, TIMIŞOARA, TM, RO; BOSIOC ILIE ALIN, TIMIŞOARA, 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 07/10/2022, cu condiția plății taxelor anuale de menținere 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 30/09/2024

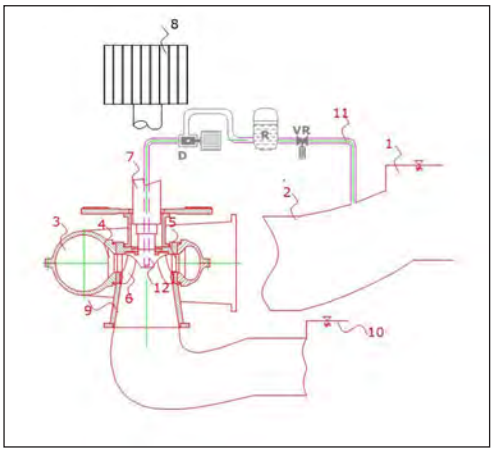
Tipărit la Tipografia OSIM

• The invention relates to **a device** for mitigation of the swirling flow instabilities from the conical diffuser of hydraulic turbines, mounted in the hydraulic system of the turbine.

• The device (D) is made up of 2 cylindrical parts with axial or oblique slots in the body of the device **(13)**, a fixed one **(14)**, jointly with the body of the device and a rotating one **(15)** which is driven in rotational motion by means b of a direct current motor, with variable rotation speed, so that the water flow passing through the device is fragmented due to the relative movement of the slots on the two cylindrical parts **(14)** and **(15)** generating, through a closing/opening effect of the flow path, a pulsating jet at an intensity and frequency effective for the annihilation of the vortex sheet that appears when the turbine operates at partial flow rate.

• The operation of the device can be controlled by an automation module that monitors the operating characteristics of the turbine and incrementally controls the control valve (VR) and the motor rotation speed to a convenient value for optimizing the turbine output parameters.
• The pressure fluctuations with the associated FFT for the original measurements, with helical vortex (left) and pulsating water jet (right), Qnom = 30l/s.

Contact: constantin.tanasa@upt.ro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9
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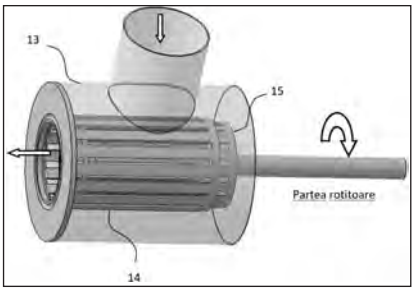
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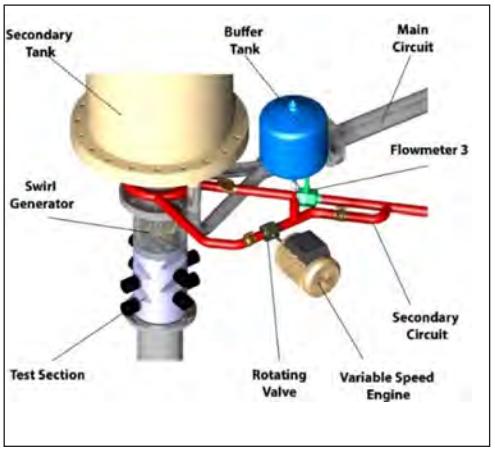
Partea rotitoare
14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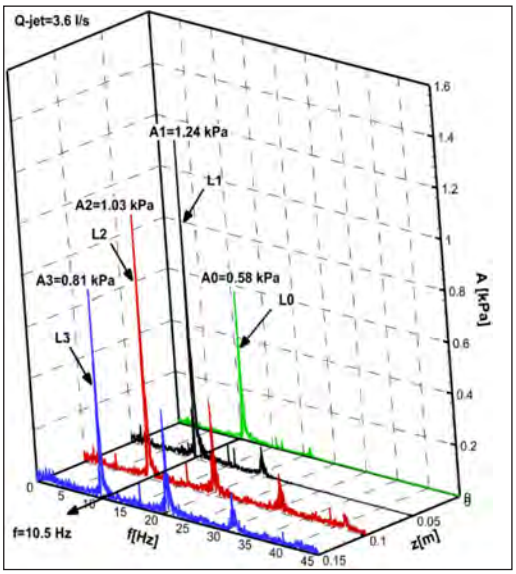
Buffer Tank
Main Circuit
Flowmeter 3
Swirl Generator
Secondary Circuit
Test Section
Rotating Valve
Variable Speed Engine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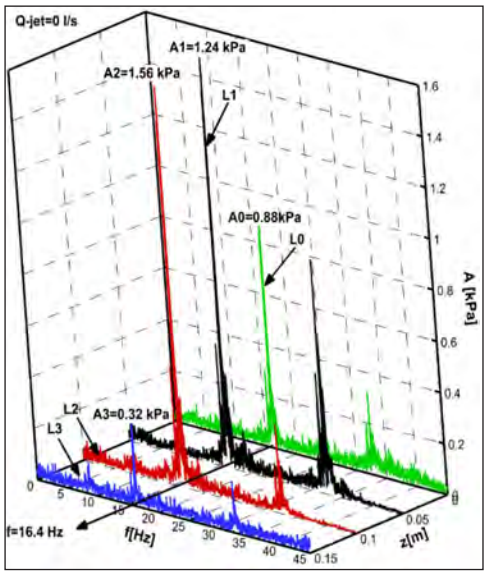
A1=1.24 kPa
L1
A2=1.03 kPa
L2
A3=0.81 kPa
A0=0.58 kPa
L0
L3
f=10.5 Hz
f[Hz]
z[m]
A [kPa]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A1=1.24 kPa
A2=1.56 kPa
L1
A0=0.88kPa
L0
L2
A3=0.32 kPa
L3
f=16.4 Hz
f[Hz]
z[m]
A [kPa]

INVENTORS: L.V. ORDODI, D. VATĂU, M. SALINSCHI, A.F. OLARIU, G.A. DUMITREL, A.M. PANĂ, N. VASZILCSIN, M. L. DAN, L. MÂȚIU-IOVAN, R. C. IONEL, I.A. UDREA, D.D. BONCIOG, D.A. VEREȘ, C.M. STĂNESE, V. PĂUNESCU, M.F. BOJIN, O.I. GAVRILIUC, A.T. LUKINICH-GRUIA, Ș. NEGRU, D. CRÎSNIC, G.V. FRUNZĂ

PATENT NO. RO 137476 B1/ 2024

# ELECTROSTATIC DEVICE FOR MEASURING ELECTRIC VOLTAGE WITH OPTICAL INDICATOR ELEMENT

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

Brevet de invenție

Nr. 137476

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 "POLITEHNICA" DIN TIMIȘOARA, TIMIȘOARA, TM, RO; ASOCIAȚIA ONCOGEN, TIMIȘOARA, TM, RO; ASOCIAȚIA ONCOHELP TIMIȘOARA, TIMIȘOARA, TM, RO; BIODIM S.R.L., TIMIȘOARA, TM, RO

Titlul invenției: DISPOZITIV ELECTROSTATIC PENTRU MĂSURAREA TENSIUNII ELECTRICE

Inventatori: ORDODI LAURENȚIU VALENTIN, TIMIȘOARA, TM, RO; VĂTĂU DORU, TIMIȘOARA, TM, RO; SALINSCHI MARIN, MOȘNIȚA NOUĂ, TM, RO; OLARIU ADRIAN FLAVIUS, CARANSEBEȘ, CS, RO; DUMITREL GABRIELA ALINA, TIMIȘOARA, TM, RO; PANĂ ANA-MARIA, TIMIȘOARA, TM, RO; VASZILCSIN NICOLAE, TIMIȘOARA, TM, RO; DAN MIRCEA LAURENȚIU, MOȘNIȚA NOUĂ, TM, RO; MÂȚIU-IOVAN LILIANA, MOȘNIȚA NOUĂ, TM, RO; IONEL RAUL CIPRIAN, TIMIȘOARA, TM, RO; UDREA IOAN ALEXANDRU, DEVA, HD, RO; BONCIOG DANIEL DUMITRU, COMUNA MALOVAT, MH, RO; VEREȘ DENISA ALEXANDRA, TIMIȘOARA, TM, RO; STĂNESE CRISTIAN MARCEL, TIMIȘOARA, TM, RO; PĂUNESCU VIRGIL, TIMIȘOARA, TM, RO; BOJIN MARIA FLORINA, TIMIȘOARA, TM, RO; GAVRILIUC OANA ISABELA, TIMIȘOARA, TM, RO; LUKINICH-GRUIA ALEXANDRA TEODORA, TIMIȘOARA, TM, RO; NEGRU ȘERBAN, TIMIȘOARA, TM, RO; CRÎSNIC DANIELA, TIMIȘOARA, TM, RO; FRUNZĂ GIGEL VIOREL, DEVA, HD, 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 14/10/2022, 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 30/12/2024

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI • ROMÂNIA •

• The invention relates to an electrostatic device that allows the measurement of high electric voltage, direct or alternating with the industrial frequency of 50 Hz, which is applied by means of an input terminal **(4)** insulated with Teflon **(5)** to the device ground **(14)**, a copper electrode in the form of a disk **(3)**, placed in a sealed polypropylene tube **(I)** with removable side covers (for maintenance) and a glass window **(1)**, the electrode produces a uniform electric field in the lines of which an optical indicator element **(8)** slides, a neon discharge tube at low pressure connected to the device ground, positioned at the end of a sliding rod **(7)** coaxial with the disk electrode **(3)**, until the neon tube emits a red-orange light (when it is in an area of the electric field with a sufficiently high intensity to generate a luminescent discharge) thus so that, after reading the distance D on the graduated ruler **(10)** with the help of an indicator needle **(11)** rigidly fixed on the sliding rod and based on a calibration curve established when the device was put into operation, the applied electrical voltage can be estimated.

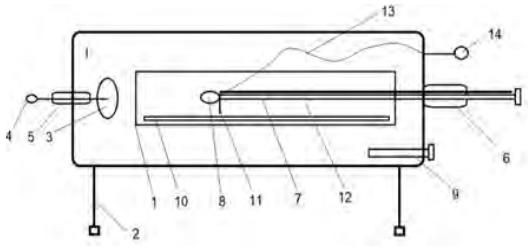



*Fig.1. Electrostatic device for measuring electric voltage with optical indicator element*

- In order to improve the quality, reproducibility and ease of performing measurements and for the linear dependence of the device indications with the applied voltage according to the calibration curve established when the device was put into operation, the proposed technical solution aims to:
- Limit potential losses through the Corona effect, take over and discharge to the device mass of the residual electric field, avoid variations in air humidity in the sealed tube of the device.

INVENTORS: SUSAN-RESIGA ROMEO-FLORIN, BOSIOC ILIE-ALIN, TANASA CONSTANTIN, STUPARU ADRIAN-CIPRIAN, RAUL-ALEXANDRU SZAKAL

## PATENT NO. RO 135938 B1/ 2024

# EQUIPMENT FOR REDUCING HYDRAULIC INSTABILITIES GENERATED BY THE SWIRLING FLOW FROM THE CONICAL DIFFUSER OF HYDRAULIC TURBINES

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

Brevet de invenție

Nr. 135938

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 "POLITEHNICA" DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenției: ECHIPAMENT PENTRU ELIMINAREA INSTABILITĂȚILOR GENERATE DE CURGEREA CU VÂRTEJ DIN DIFUZORUL CONIC AL TURBINELOR HIDRAULICE

Inventatori: SUSAN-RESIGA ROMEO-FLORIN, TIMIŞOARA, TM, RO; BOSIOC ILIE ALIN, TIMIŞOARA, TM, RO; TĂNASĂ CONSTANTIN, TIMIŞOARA, TM, RO; STUPARU ADRIAN-CIPRIAN, TIMIŞOARA, TM, RO; SZAKAL RAUL-ALEXANDRU, COMUNA BARU, HD, 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 08/04/2022, 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 30/07/2024

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI · ROMÂNIA ·

Tipărit la Tipografia OSIM

• The invention refers to a new equipment for eliminating/ reducing the pressure fluctuations associated with the vortex rope, which appear at partial discharge in the conical diffuser of hydraulic turbines, especially those with fixed blades (ex: Francis turbines).

• The main element of the invention is the so-called free runner, which connected to a shaft passing through the turbine rotor, eliminates the rope vortex and the pressure fluctuations associated with it, which are very harmful to the hydraulic turbines.

• The proposed equipment for controlling the vortex flow in the conical diffuser of hydraulic turbines according to the invention is interposed between an upstream lake **3** and a downstream lake **11** and consists of an intake pipe **5** connected to a spiral case **6** leading to a stator **7** and a guide vane apparatus **8** that guides the water towards a runner **4** coupled with an output shaft **12** and mechanically coupled to an electric generator **13**.

• Upon exiting the runner **4**, the water passes through a conical diffuser **9** whose role is to transform the kinetic energy of the water into potential energy and in this area, when the turbine operates at a point far from the maximum efficiency point, the phenomenon of "vortex rope" appears accompanied by pressure fluctuations and vibrations harmful to the turbine system.

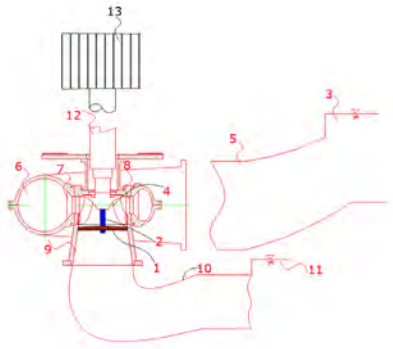



*Fig.1. Equipment with a freely rotating rotor*

- To solve this problem, in the conical diffuser **9** of the turbine, coaxial with the runner **4** of the turbine and towards the outlet of it, two components are placed:
- An additional rotor that rotates freely **1**, under the action of the water flow that passes through it, on a shaft **2** that connects the upstream lake **3** and the downstream lake **11**.
- Thus, by introducing the equipment with a freely rotating rotor (Fig. 1), the rope vortex disappears, respectively the pressure fluctuations related to it.
- More precisely, the stagnant region that leads to the formation of the vortex rope when the turbines operate at partial load break up and thus the flow instability is eliminated.
- Pressure fluctuations can produce variations in head, flow, torque, and power, and blade cracks.
- The new equipment for controlling the vortex rope in the turbine draft tube cone can be installed on both new and existing turbines.

INVENTORS: PAVEL ȘTEFAN, LUPA LAVINIA AFRODITA, MOCAN MARIAN LIVIU, UNGUREANU DANIEL-VIOREL, DOBOȘI IOAN SILVIU, MOLDOVAN AUREL, SIMINA ALINA GEORGIANA, BÎNZAR ALEXANDRU, SUCIU SILVIU CRISTIAN

## PATENT NO. RO 133891 B1/ 2024

# INSTALLATION FOR THE EVALUATION OF THE MAGNETIC FIELD EXPOSURE EFFECTS

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

*Brevet de invenție*

**Nr. 133891**

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 POLITEHNICA DIN TIMIȘOARA, TIMIȘOARA, TM, RO

Titlul invenției: INSTALAȚIE PENTRU EVALUAREA EFECTELOR EXPUNERII LA CÂMP MAGNETIC

Inventatori: PAVEL ȘTEFAN, TIMIȘOARA, TM, RO; LUPA LAVINIA AFRODITA, TIMIȘOARA, TM, RO; MOCAN MARIAN LIVIU, TIMIȘOARA, TM, RO; UNGUREANU DANIEL VIOREL, TIMIȘOARA, TM, RO; DOBOȘI IOAN SILVIU, TIMIȘOARA, TM, RO; MOLDOVAN AUREL, TIMIȘOARA, TM, RO; SIMINA ALINA GEORGIANA, DEVA, HD, RO; BÎNZAR ALEXANDRU, TIMIȘOARA, TM, RO; SUCIU SILVIU CRISTIAN, DUMBRĂVIȚA, 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 15/05/2018, 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 29/03/2024

• The invention relates to **an installation** which can be used to evaluate the effects of a oscillating, pulsed, low frequency magnetic, 20÷70 Hz, and adjustable intensity on the cells of a biological sample: extracted tissue, organic fluid, living organism, seeds.

• The installation according to the invention consists of **a support plate** on which at least two perpendicular supports are positioned, depending on the number of workstations required to perform the study.

• On each arm attached to the support it is fixed an inductance, which can be positioned and fixed both in perpendicular plane for approach or distancing of the work sample so as to obtain the desired intensity of the magnetic field, as well as horizontally plane by sliding or (and) by rotation on the mounting support in front of the studied sample.

• The adjustable power source is controlled by a scheduler and connected to a variable frequency rectangular pulse generator.

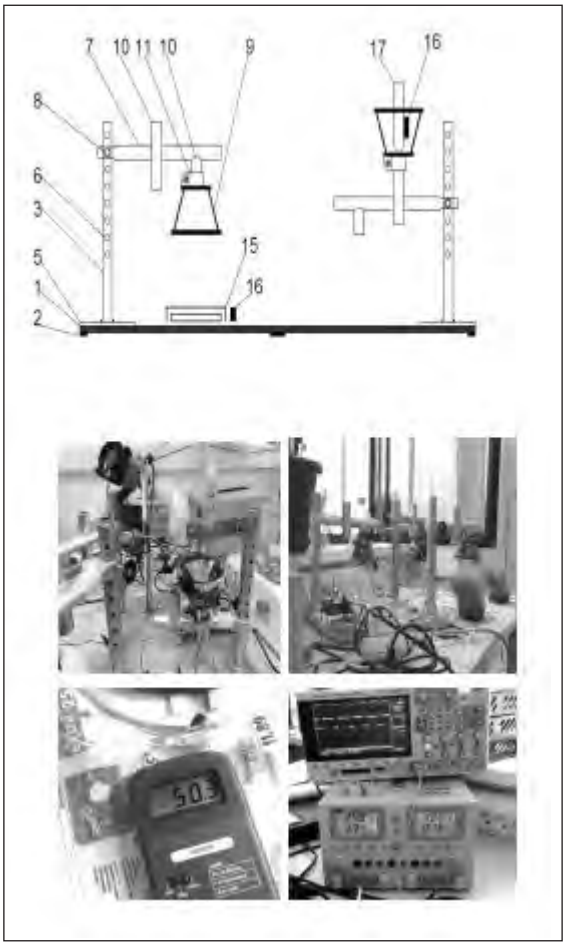
**Advantages:**

• Ensures the possibility of performing experiments under controlled exposure conditions;

• Allows evaluation of the effects of a low frequency magnetic field, 20 ÷ 70 Hz, on the sample cells under specific exposure conditions;

• It is a compact, unitary, portable investigation tool and it doesn't require any auxillary measuring and recording equipment;

• It provides flexibility in configuration, depending on the investigation needs, simplicity and safety in operation.




*IDEA Club 13 Association, Hódmezővásárhely (Hungary), September 17-18, 2021*

INVENTORS: MANEA FLORICA, ORHA CORINA, LAZAU CARMEN, PODE RODICA, URSU DANIEL, POP ANIELA

## PATENT NO. RO 133757 B1/ 2024

# PHOTOCATALYTIC-ASSISTED FILTERING INSTALLATION FOR DRINKING WATER TREATMENT

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

*Brevet de invenție*

**Nr. 133757**

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 POLITEHNICA DIN TIMIȘOARA, TIMIȘOARA, TM, RO; INSTITUTUL NAȚIONAL DE CERCETARE-DEZVOLTARE PENTRU ELECTROCHIMIE ȘI MATERIE CONDENSATĂ - INCEMC TIMIȘOARA, TIMIȘOARA, TM, RO

Titlul invenției: INSTALAȚIE DE FILTRARE ASISTATĂ FOTOCATALITIC PENTRU TRATAREA APEI ÎN SCOP POTABIL

Inventatori: MANEA FLORICA, TIMIȘOARA, TM, RO; ORHA CORINA, TIMIȘOARA, TM, RO; LAZAU CARMEN, TIMIȘOARA, TM, RO; PODE RODICA, GIROC, TM, RO; URSU DANIEL, TIMIȘOARA, TM, RO; POP ANIELA, SATU MARE, SM, 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 25/06/2018, cu condiția plății taxelor anuale de menținere 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 29/03/2024

Tipărit la Tipografia OSIM

• The invention relates to a multi-layer based photocatalytically-assisted filtering installation with a dual role of retaining pollutants from water as a filtering system and/or degrading pollutants from water as a fixed-bed photocatalytic system that requires using an immersible UV light source and composite materials based on $TiO_2$ and activated carbon/granular natural zeolite.

• The photocatalytically-assisted filtering installation for the treatment of drinking water according to the invention uses a photocatalytically-assisted filtration system (Figure 1) with a bifunctional sorbent-photocatalytic role consisting of a multi-layer filtering column **(5)** equipped with three filtering layers: quartz sand layer **(10)**, zeolite layer modified with $TiO_2$ **(11)** and activated carbon modified with $TiO_2$ **(12)**, provided with a central cylindrical quartz tube equipped with a cooling system **(7)** in which the lamp **(6)** powered by the power source **(8)** is immersed.

• The filtration system is fed with raw water from the supply tank **(1)** through the pump **(2)** and is passed through a flow control **(3)** to the lower part of the column and rises through the filtering layers to the upper part of the column, from where the treated water is collected in the storage tank **(9)**. Optionally, air can be bubbled through the photocatalytically-assisted filtering system through the air compressor **(4)**. The washing/regeneration of the filtering layer is performed with counter current water under conditions of lamp on and air bubbling at a pressure of 1 bar.

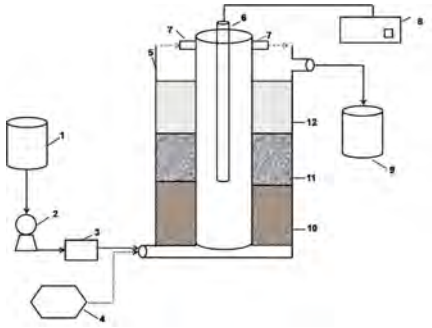


*Fig.1. Schematic representation of the photocatalytically-assisted filtering installation*

- The elimination of pollutants/impurities dissolved in water is based on the retention capacity of the filtering material, activated carbon and/or zeolite, which presents a selectivity for certain dissolved impurities under conditions of lamp off operation. By turning on the lamp, $TiO_2$ on the surface of the activated carbon and zeolite acts through photocatalytic activity generating oxidation and reduction processes that produce the degradation and mineralization of dissolved organic compounds and the transformation of inorganic contaminants into compounds that can be retained on the filtering material or compounds that do not affect water quality.
- Also, the oxidation and reduction processes that occur under UV illumination conditions allow the destruction of contaminants and implicitly, the cleaning of the filtering layer. The system can be used in two ways, depending on the characteristics of the water:
- For water lightly loaded with contaminants that can be retained on the filter material, the UV lamp is not turned on during the system's operation but only during the washing/regeneration stage, thus avoiding the generation of washing water loaded with contaminants;
- For water highly loaded with contaminants that cannot be adsorbed on the filter material, the system operates with the lamp on, ensuring water decontamination and self-cleaning during operation, due to the oxidation/reduction processes that degrade the contaminants in the water.

- The photocatalytically-assisted filtration installation for drinking water treatment according to the invention has the following advantages:
- Wide versatility (can be applied both as a simple filtering system, or as an advanced oxidation system applicable either to improve the efficiency of the process or to wash/regenerate the filter material);
- Avoiding the generation of filtering system wash water loaded with contaminants (as results in the case of conventional filtering) due to the degradation of contaminants by photocatalysis and not their simple retention in the filter layer;
- Long lifetime;
- Minimizing the loss of filter/photocatalytic material;
- Simple operation;
- Applicability for a wide variety of water types (drinking, industrial, wastewater);
- Applicability for the removal of a wide spectrum of contaminants;
- Possibility of application as a single system or integrated into a complex technological flow as a finishing step.

Universitatea Politehnica Timișoara

# HONORARY MEMBERS

# DOCTOR HONORIS CAUSA
# Professor Dan FRANGOPOL, Lehigh University, Bethlehem, Pennsylvania (USA)

• **Prof. Dr. Dan FRANGOPOL** was born in Bucharest in 1946. He graduated with exceptional results from the Institute of Civil Engineering in Bucharest in 1969 (currently the Technical University of Civil Engineering Bucharest), where he made his career debut as an assistant professor. In 1976 he obtained the title of Doctor of Applied Sciences "Magna Cum Laude" at the University of Liège, Belgium.

• Between 1979 and 1983 he held the position of structural design engineer at A. Lipski Consulting Engineers, Brussels, Belgium. Until 2006 he was Professor of Structural Engineering at the University of Colorado at Boulder, USA, becoming Professor Emeritus of this prestigious university.

• Currently, Professor **Dan FRANGOPOL** is the first holder of the Fazlur R. Khan Endowed Chair, Chair of Structural Engineering and Architecture at Lehigh University, Bethlehem, Pennsylvania, USA.

• The field of research in which Professor **Dan FRANGOPOL** excels includes the application of probabilistic concepts and methods in civil and maritime engineering, aiming at structural safety, reliability-based design, optimization of building structures, bridges and ships, monitoring of structures and maintenance of their performance throughout the life cycle, risk management of structures and infrastructures, risk-based assessment, infrastructure sustainability as well as resilience to natural disasters.

• Professor **Dan FRANGOPOL** enjoys wide scientific recognition, is the holder of outstanding national and international awards, including: 2014 ASCE J. James R. Crose Medal, 2012 IALCCE Fazlur R. Khan Life-Cycle Civil Engineering Medal, 2012 ASCE Arthur M. Wellington Prize, etc.

• At the initiative of Professor **Dan FRANGOPOL**, president and founding member of the International Association for Life-Cycle Civil Engineering, several professors from the Politehnica University Timișoara were invited to establish the IALCCE Romania Working Group, in order to strengthen the scientific collaboration with the association, the countries and the IALCCE component members.

# DOCTOR HONORIS CAUSA
## Professor Marco CECCARELLI, Tor Vergata University, Rome (Italy)

- **Prof. Dr. Marco CECCARELLI** was born in Rome in 1958 and obtained the Diploma of Mechanical Engineer "Magna Cum Laude" in 1982 at the University "La Sapienza" in Rome.
- Since 1990 he has taught courses in Mechanics of Machines and Mechanisms and Mechanics of Robots at the University of Cassino, Italy and since September 2018 at the University of Rome Tor Vergata.
- From 1996 to 2018 he was Director of the Laboratory of Robotics and Mechatronics at the University of Cassino and Southern Lazio and since 2019 he has been Director of the Laboratory of Robotics and Mechatronics at the University of Rome - Tor Vergata (LARM2).
- Since 2001 he has been a full professor of Mechanics of Machines and Mechanisms at the University of Cassino and Southern Lazio, and since 2019 he has been a full professor at the University of Rome Tor Vergata, Italy.
- **Professor Marco CECCARELLI** has carried out a long and significant activity within the International Federation for the Promotion of the Science of Machines and Mechanisms (IFToMM). He was Secretary General of IFToMM (2004-2007) and President of IFToMM (2008-2011 and 2016-2019). Between 1998 and 2004 he was the President of the Permanent Commission for the History of Machine Science and Mechanisms of IFToMM, since 1999
- He was also a member of the IFToMM Technical Committee for Mechatronics and Robotics and a member of the IFToMM Technical Committee for Computational Kinematics. He was also president of the Mechatronics Commission of FeIbIM, Federaciòn Iberoamericana de Ingenieria Mecànica until 2016.
- The scientific and technical activity of **Prof. Marco CECCARELLI** includes the fields of Machine and Mechanism Science, Mechatronics and Robotics. His specific topics of interest are workspace analysis, design, and handling; mechanical design of manipulators; walking robots; service robots, medical devices; gripping devices; the mechanics of the grip; MMS history; and the design of mechanisms.
- **Prof. Marco CECCARELLI** has contributed over the years to a substantial increase in the international visibility of the Department of Mechatronics within the Politehnica University Timisoara. His efforts have created the basis for major international collaborations, directly supported the internationalization of domestic scientific events, and in general contributed to increasing the international prestige of the Department of Mechatronics.

# HONORARY PROFESSOR
# Dr. Eng. Andreas Anton WILD, date of award: 21.03.2024

- **Dr. Eng. Andreas Anton WILD** was born in 1950 in Bucharest. He graduated in 1974 from the Physical Engineers section, which became the Electronic Devices and Components section of the Faculty of Electronics and Telecommunications of the Polytechnic Institute of Bucharest.
- The beginning of his professional career was at the "Băneasa Radio and Semiconductor Parts Enterprise" – IPRS Băneasa, in 1974, where he worked for 7 years; in parallel, he was also an associate assistant at the Polytechnic Institute of Bucharest, today the Polytechnic University of Bucharest.
- At the end of 1981 he emigrated to Germany. He worked at Motorola GmbH in Munich as a quality assurance engineer, where he identified corrections based on about 1500 defect analyses and redesigned the LS-TTL (Low Power Schottky) family, improving quality and profitability. He also worked in the Semiconductor Products Sector of the Motorola company; he led design laboratories, then research and development laboratories in Europe, the United States and Latin America (Mexico, Brazil, Chile).
- In 1993 he was appointed manager of the Low Power Technologies Laboratory of the Semiconductor Products (SPS) sector at the Motorola Company in the USA and, for five years, he was a member of the committee that awards the "Cledo Brunetti" prize for miniaturization of the Institute of Electrical and Electronics Engineers (IEEE).
- In 2001, after returning from the USA, he became European Research Director, led the Power Electronics Laboratories in Toulouse, France and the Silicon-Germanium Encapsulation and Radio Frequency Laboratories - SiGe in Munich, Germany and contributed to the establishment of the Software Center in Bucharest. In Romania, he contributed to the evolution of the system methodology and held a one-semester course at the Polytechnic University of Bucharest and was a visiting professor at the "Transilvania" University of Brasov. He is a member of the Microsystems Science and Technology Commission of the Romanian Academy. He has constantly supported the Politehnica University Timisoara and the Faculty of Electronics, Telecommunications and Information Technologies in integrating into the Microelectronics ecosystem in Romania.

- **Dr. Andreas Anton WILD** has over 80 publications and 36 patents (of which 6 in Romania and 22 in the USA).

Universitatea
Politehnica
Timișoara

# HABILITATION THESIS

# EXPERIENCING BUILT HERITAGE IN THE CONTEXT OF THE CULTURAL LANDSCAPE

Author: Gabriela DOMOKOS – PAȘCU

## Abstract

• This thesis was completed for habilitation in the field of architecture. It is the result of twelve years of sustained activity in the field of heritage and cultural landscape. The importance of the subject does not stem from the novelty of the basic concepts, but from the way they are understood both separately and together; and even more so from the ways in which they can be applied in Romania.

• This thesis presents various approaches that have contributed to the understanding and application of the two concepts across multiple scales—territorial, urban, rural, site-specific, ensemble, and architectural object.

• The projects and studies discussed address heritage concerns through individual architectural elements within the broader landscape context, heritage networks within extensive settings, and experimental initiatives at a large territorial scale. In order to make the subject explicit and to treat it correctly, the thesis is structured in five chapters dealing with the subject from:

- **Chapter I** provides the theoretical framework, defining the concept of built heritage and cultural landscape, including landscape typologies, key terms and concepts, and the main dimensions of cultural landscapes as applied in projects and studies.

- **Chapters II and III** explore the application of these concepts across various projects and intervention scales (territorial, architectural, research, and cultural), focusing on baseline studies and projects aimed at enhancing heritage and cultural landscapes.

- **Chapter IV** focuses on extracurricular and academic activities, highlighting summer schools and workshops I have participated in or organized. These activities foster progress in the field through interaction with professionals from various disciplines. They also offer students hands-on experience, bridging theory with practice.

- **Chapter V** highlights the courses, seminars, and projects coordinated in the field of heritage and cultural landscape.

- **Chapter VI** presents a proposal for academic, scientific, and professional career development, with a focus on heritage and cultural landscape, areas closely interconnected in architecture.

• The thesis summarizes key projects, extracurricular activities, and results, without covering all the work completed. It also provides references to online sources for further exploration of publications and projects.

**The full abstract at:**
https://www.upt.ro/img/files/2023-2024/doctorat/abilitare/Domokos/Rezumat_Domokos_ro.pdf

## Habilitation Commission

**Prof. Dr. Arch. Teodor Octavian GHEORGHIU**
Politehnica University Timisoara, President
**Prof. Dr. Arch. Nicolae LASCU**
"Ion Mincu" University of Architecture and Urbanism Bucharest, Member
**Assoc.Prof.Dr.Arch. Dan Ionuț JULEAN**
Technical University of Cluj-Napoca, Member

Universitatea
Politehnica
Timișoara

# PhD THESIS

## Systems Engineering

| | |
|---|---|
| **Vlad-Ilie UNGUREANU**<br>PhD adviser prof. I. SILEA | *Cercetări și soluții aplicabile la diminuarea unor efecte dăunătoare conducerii autovehiculelor în anumite condiții meteorologice*<br>(Research and solutions applicable to the reduction of some harmful effects of driving motor vehicles in certain weather conditions) |
| **Adrian-Ioan ARGEȘANU**<br>PhD adviser prof. G.D. ANDREESCU | *Sistem bazat pe inteligență artificială pentru analiza avansată a datelor de detectare a fisurilor în conducte de transport fluide*<br>(AI-based system for advanced analysis of pipeline crack-detection data in fluid transportation) |

## Computers and Information Technology

| | |
|---|---|
| **Christian-Daniel CURIAC**<br>PhD adviser M. V. MICEA | *Sistem de recomandare integrat pentru asistarea identificării și abordării temelor de cercetare utilizând metadate bibliografice și inteligență artificială*<br>(Multi-recommender framework to aid identifying and addressing research themes using bibliographic metadata and AI) |
| **Sebastian Mihai ARDELEAN**<br>PhD adviser M. UDRESCU-MILOSAV | *Dezvoltarea metodelor euristice de calcul pe platforme computaționale reversibile și cuantice*<br>(Development of heuristic methods on reversible and quantum computers) |
| **Emilian-Erman MAHMUT**<br>PhD adviser V. STOICU-TIVADAR | *Contribuții la screeningul dislaliei la copiii de vârstă școlară mică (6-10 ani)*<br>(Contributions to the screening of dyslalia in early-school - aged children (6-10-year olds)) |
| **Tudor-Sebastian ANDREICA**<br>PhD adviser B.I. GROZA | *Funcționalități îmbunătățite de securitate cu dispozitive Android în vehicule*<br>(Enhanced Security Functionalities with Android Devices inside Vehicles) |

## Chemical Engineering

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|---|---|
| **Ioana-Cristina BENEA**<br>PhD adviser prof. F. PETER | *Căi de sinteză verzi pentru oligoesteri si oligoesteramide inovative și biodegradabile*<br>(Green routes for the synthesis of innovative biodegradable oligoesters and oligoesteramides) |

## Civil Engineering and Building Services

| | |
|---|---|
| **Adrian ALIONESCU**<br>PhD adviser prof. I. COSTESCU | *Cercetări și rezultate privind metodele și modelele geospațiale utilizate pentru urmărirea în timp a construcțiilor*<br>(Research and results regarding geospatial methods and models used for construction monitoring over time) |
| **Cristian MOISESCU-CIOCAN**<br>PhD adviser prof. I. I. POPESCU | *Analiza implementării în România a indicatorilor de dezvoltare durabilă pentru mediu*<br>(Analysis of the sustainable development indicators implementation in Romania) |
| **Andra-Daniela FLORICEL**<br>PhD adviser prof. D.V. UNGUREANU | *Soluții structurale metalice pentru mansardarea clădirilor de locuit din panouri mari prefabricate din beton armat*<br>(Steel over-roofing solutions for existing prefabricated concrete buildings) |
| **Liliana COTOARBĂ**<br>PhD adviser prof. C. FLORESCU | *Influența schimbărilor climatice asupra modului de gospodărire al apelor meteorice de pe vatra localităților rurale și urbane*<br>(The influence of climate changes on the management of stormwater from the hearth of rural and urban localities) |
| **Raul Cătălin ENE**<br>PhD adviser prof. D. DAN | *Sustenabilitatea unui sistem de izolare termică cu straturi paralele de aer pentru clădiri eficiente energetic - studii teoretice și experimentale*<br>(The sustainability of an insulation system with parallel air layers for energy efficient buildings - theoretical and experimental studies) |
| **Daniel Luis NUNES**<br>PhD adviser prof. A. CIUTINA | *Comportarea îmbinărilor grindă-stâlp cu placă de capăt extinsă și patru șuruburi pe rând*<br>(Behaviour of beam-to-column connections with extended end-plate with four bolts-per-row) |

## Electrical Engineering

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|---|---|
| **Marian-Claudiu ȘOLEA**<br>PhD adviser prof. D. TOADER | *Analiza nesimetriilor provocate de defecte în instalațiile electrice trifazate*<br>(Analysis of non-simmetries caused by faults in three-phase electrical installations) |

## Electronic Engineering Telecommunications and Information Technologies

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|---|---|
| **Septimiu LICA**<br>PhD adviser prof. D.F. LASCU | *Dezvoltarea unor noi arhitecturi de convertoare CC-CC. Modelare, comandă și aplicații*<br>(Development of new DC-DC converter architectures. Modeling, control and applications) |
| **Ioan LUCAN-ORĂȘAN**<br>PhD adviser prof. C.D. CĂLEANU | *Sisteme de procesare locală a algoritmilor de învățare automată*<br>(Local processing systems for machine learning algorithms) |
| **Corneliu-Alexandru BOBARU**<br>PhD adviser prof. C.A. NAFORNIȚĂ | *Contribuții la îmbunătățirea adaptivității sistemelor de senzori radar în domeniul automotive*<br>(Contributions to improving the adaptability of radar sensor systems in the automotive field) |
| **Dumitru-Daniel BONCIOG**<br>PhD adviser prof. M.R. LASCU | *Dispozitiv experimental prevăzut cu sistem de analiză computerizată de imagini biomedicale pentru obținerea biomatricilor cardiace*<br>(Experimental device provided with a computerized analysis system of biomedical images for obtaining cardiac biomatrices) |

## Engineering and Management

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|---|---|
| **Silviu Nicușor SURU**<br>PhD adviser prof. G. I. PROȘTEAN | *Instrumente inteligente de eficientizare a modelelor de predare și învățare pentru studenții din generația "Z"*<br>(Intelligent Tools to make Teaching and Learning Models more efficient for Generation "Z" Students) |
| **Rebecca-Ioana CHINCEA**<br>PhD adviser prof. M. TĂMĂȘILĂ | *Managementul comunicării organizaționale între provocare și adaptabilitate*<br>(Organizational Communication between Challenge and Adaptibility) |
| **Markus Josef Heinrich NIEHAUS**<br>PhD adviser prof. M.L. MOCAN | *Modele de adaptare a organizațiilor în condiții de risc și incertitudine*<br>(Models of adaptability of organizations in conditions of risk and uncertainty) |
| **Vladimir-Virgil VOICU**<br>PhD adviser prof. A. DRĂGHICI | *Model de inteligență artificială pentru eficientizare protecției muncii în șantierele de cale ferată*<br>(Artificial intelligence model for an improved occupational safety in railroad maintenance) |

## Mechanical Engineering

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|---|---|
| **Călin-Ioan BIRDEAN**<br>PhD adviser prof. A.V. CERNESCU | *Performanța mecanică a îmbinării ascunse în linie pentru secțiunile tubulare*<br>(The mechanical performance of the hidden in-line connection for hollow section) |
| **Maria - Laura JURCA**<br>PhD adviser prof. N. HERIȘANU | *Studiul analitic al sistemului dinamic al corzilor vocale umane*<br>(Analytical study of the dynamic system of the human vocal cords) |
| **Diana-Marieta SAVU**<br>PhD adviser prof. V. DOLGA | *Analiza și sinteza sistemelor robotice mobile*<br>(Analysis and synthesis of mobile robotic systems) |
| **Ana-Maria STOIAN (married SCURT)**<br>PhD adviser prof. I. MANIU | *Dezvoltarea unor dispozitive modulare în robotica medicala*<br>(Development of modular devices used in medical robotics) |
| **Maria-Cristina IONCICA**<br>PhD adviser CS1. S.I. BERNAD | *Ghidarea și depunerea particulelor magnetoresponsive în prezența unui câmp magnetic extern pentru proceduri terapeutice de stentare cardiovasculară*<br>(Magnetoresponsive particle targeting and deposition in the presence of an external magnetic field for cardiovascular stenting therapy) |
| **Andrei Tiberiu BORBOREAN**<br>PhD adviser prof. D. LELEA | *Studiul injecției de apă în interiorul unui cilindru al unui motor cu ardere internă cu aprindere prin scânteie*<br>(The water injection analysis inside the cylinder of the spark ignition internal combustion engine) |
| **Iulian-Ionuț AILINEI**<br>PhD adviser prof. L. MARȘAVINA | *Caracterizarea anizotropiei oțelului S600MC prin metode numerice validate experimental*<br>(Characterization of the anisotropy of S600MC steel by experimentally validated numerical methods) |
| **Alexandru-Nicolae LUCA**<br>PhD adviser prof. I. BORDEAȘU | *Cercetarea rezistenței la eroziunea prin cavitație a unor aliaje cu bază de aluminiu cu tratament termic de îmbrătrânire artificială*<br>(Research of cavitation erosion resistance of some aluminum base alloys with artificial aging heat treatment) |

## Materials Engineering

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| **Petru HIDIDIS**<br>PhD adviser prof. V.A. ȘERBAN | *Cercetări privind procesarea, caracterizarea și domeniile de aplicare ale aliajelor amorfe de diferite forme pe bază de Cu-Zr-Al-Ag*<br>(Research on the processes, characterization and application areas of Cu-Zr-Al-Ag based various forms amorphous alloys) |
| **Laurențiu ZGRIPCEA**<br>PhD adviser prof. T. HEPUȚ | *Cercetări privind îmbunătățirea calității îmbinărilor metalice sudate*<br>(Researches regarding the quality improvements for metal welded assemblies) |
| **Claudiu Ștefan CEPAN**<br>PhD adviser C.S.I I. GROZESCU | *Obținerea de materiale avansate cu aplicații în epurarea apelor uzate prin valorificarea superioară a unor deșeuri*<br>(Obtaining advanced materials with applications in wastewater purification through superior recovery of some waste) |

## Industrial Engineering

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| **Ileana TIMIȘ (married MOGOȘANU)**<br>PhD adviser prof. T. SLAVICI<br>PhD adviser prof. R. MOTICA | *Optimizarea relațiilor de muncă și a securității și sănătății în muncă desfășurată în regim de telemuncă în contextul globarizării pieței muncii*<br>(Optimizing labor relations and of safety and health in work carried out in the regime of telework in the context of the globalization of the labor market) |
| **Raul-Bogdan MIRCEA**<br>PhD adviser prof. D. ȚUCU | *Îmbunătățirea continuă a proceselor de fabricație din întreprinderile mici și mijlocii*<br>(Continuous improvement of production processes in small and medium enterprises) |

## Architecture

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|---|---|
| **Ionuț Ciprian MATIEȘ**<br>PhD adviser prof. S.M. BICA | *Tehnologii contemporane la locuințele individuale în prezent și viitor*<br>(Contemporary technologies in individual dwellings present and future) |

Universitatea Politehnica Timișoara

# SCIENTIFIC CONFERENCES

**Building Services and Environmental Comfort (ICCA 2024)**
10th-11th April 2024, Politehnica University Timisoara, Romania, Central Library, Hybrid (in presence and on-line)
**Organizer(s):** • AIIR - Romanian Association of Building Services; • Politehnica University Timișoara - Department of Civil Engineering and Building Services Engineering
Web: http://www.aiir-timisoara.ro

• The BSAC (Building Services and Ambiental Comfort) conference, now in its 33nd edition, offered to specialists from research, execution, maintenance and education, concerned with ensuring a healthy ambiental comfort by harmonizing indoor climate parameters with those from outdoor, depending on to local conditions, the material base and the best quality technology, all put at the service of the final beneficiary: MANKIND.
• To ensure this approach, they participated experienced and/or younger specialists (that want to affirm themselves) as well as those in training (today's students).
• The topics addressed, essential and multiple, discussed/informative level stuff/techniques/performances provided a starting/continuing basis depending on the specifics/areas of interest of the participants.
• Programming and digitization could not be missing; the conclusions were in favor of efficiency, safety, and security, ensuring by using of high-performance (and durable) materials, the optimization of all types of installations and equipment, compliance with the conditions of production, commissioning and use.

**Publication of papers:**
• Conference Proceedings, Publishing House Matrix Rom, Bucharest, 2024, ISSN 1842-9491
• Conference series **"Building Services and Environmental Comfort"**

**"SIT WITH ME"- "WE WILL DESIGN: CONVIVIAL LABORATORY" - Milano Design Week 2024**
15th-21th April 2024, Milano, Italy, physical participation
**Organizer(s)**: • BASE Milano, Romanian Institute of Culture and Humanistic Research in Venice; • Faculty of Architecture and Urban Planning- Politehnica University Timisoara
Web: https://base.milano.it/series/design-week-2024/
https://base.milano.it/en/in-difference-design-spatial-activism-convivialism/

The Faculty of Architecture and Urban Planning at the Polytechnic University Timisoara, with the support of the Romanian Institute of Culture and Humanistic Research in Venice, participated in the Milan Design Week, from 15th-21th April 2024, with the project "SIT WITH ME", presented at BASE Milano.
• In a world dominated by technology, the exhibition showcases small, original, student-made statues that reinterpret the traditional Romanian chair from the perspective of various concepts and themes such as **recycling**, **relaxation**, and **style**. Over the past six years of this project's development, the main concept has remained an invitation to everyone who spends a lot of time on gadgets to take a seat and admire the art created by Timisoara students.
• The project includes stools created by students Antoci Daniel, Foltean Roxana, Milko Bogdan, Munćan Nikoleta, and Pop Emilia-Edith, as well as 3D-printed objects made by students Balla Marta, Besenyei Hilda, Bota Ariadna, Brasovan Antonela, Buiciuc Vanessa, Balanici Alina, Cenadan Gabriela-Olimpia, Clipei Paula, Cotut Adrian, Faricea Aura, Iacob Cristina, Ionescu Alex, Iovan Alexandru, Lazau Maria, Meixensberger Astrid, Mirzoi Elena, Rumseavicius Elena, Suba Miriam, Sztarna Gabriela, Tcaci Evelina, and Tîrziu Anda.
• The project is part of the exhibition titled **"WE WILL DESIGN: CONVIVIAL LABORATORY"** and is coordinated by Assoc. Prof. Dr. Arch. Cristina-Maria Povian, Assoc. Prof. Dr. Arch. Camil Milincu, Lecturer Dr. Arch. Andreea Anghel, and Dr. Arch. Mihai Donici.
• Adjacent to the exhibition, a masterclass took place for the students of the Faculty of Architecture and Urbanism at the Polytechnic University Timisoara, including a series of documentary activities and lectures organized with the support of the Romanian Institute of Culture and Humanistic Research in Venice. The masterclass is part of the annual collaboration program with the Polytechnic University Timisoara.
**BASE Milano** is a creative hub in Milan that includes exhibition spaces, coworking areas, a sound and image recording studio, accommodation for residencies, and other facilities that provide all the necessary conditions for a creative community and cultural exchange.

**Welding 2024,** 18th-19th April 2024, Faculty of Mechanical Engineering (1, Mihai Viteazu blvd., Timisoara)

**Organizers:**

- Romanian Welding Society
- Politehnica University Timisoara
- Technical Sciences Academy of Romania -Timisoara Branch

**Web:** https://asr.ro/conferinta-sudura-2024/

- The conference was addressed to specialists from industry, research and higher education and has a broad thematic focus on the latest developments in the field of welding in terms of processes, materials and applications.
- The conference had a broad theme generally covering novelties in the development of processes, materials and industrial applications in the field of welding, with emphasis on the following directions:

- Current status and trends in the development of welding and joining techniques;
- Robotization and artificial intelligence in welding;
- Additive manufacturing and related processes;
- Computerization and digitalization in welding;
- Modeling and simulation of welding processes and material behavior in welding;
- Green manufacturing, environmental and health aspects in manufacturing engineering;
- Advanced methods in quality and non-destructive inspection of welded joints;
- Design and art in welding engineering; Quality management

**Publication of papers**:

All papers have been published in the conference Proceedings and some papers have been selected for publication in Sudura, an EBSCO indexed journal (https://asr.ro/revista-sudura/)

**IEEE 18th International Symposium on Applied Computational Intelligence and Informatics (SACI 2024)**

21th-25th May, 2024, Siófok, Hungary and Timisoara, Romania

**Organizers:**

- Óbuda University, Budapest, Hungary,
- Politehnica University Timisoara
- IEEE Chapter of Systems, Many and
- Cybernetics Society, Romania

**Web:** https://conf.uni-obuda.hu/saci2024/

- **SACI 2024** has featured several kinds of presentations, including invited talks, contributed papers and posters.
- The outcome of **SACI 2024** is a better understanding of some leading research areas, as already Computational Intelligence and Informatics have demonstrated.

SACI 2024 has welcomed papers on the following topics:

- Computational Intelligence,
- Intelligent Mechatronics,
- Systems Engineering,
- Intelligent Manufacturing Systems,
- Intelligent Control,
- Intelligent Robotics,
- Informatics.

**Publication of papers:**

- IEEE Xplore Digital Library, please visit -https://ieeexplore.ieee.org/xpl/conhome/10619709/proceeding
- The papers are also indexed in Clarivate Analytics Web of Science

**The 4th International Conference on the COORDINATING ENGINEERING FOR SUSTAINABILITY AND RESILIENCE – CESARE'24 & Midterm Conference of CircularB "IMPLEMENTATION OF CIRCULAR ECONOMY IN THE BUILT ENVIRONMENT",** 29th – 31th May, Central Library of the Politehnica University Timisoara, Romania 2024

**Organizers:** • Politehnica University Timisoara, Romanian Academy, • School of Engineering of the University of Birmingham, • Faculty of Engineering of the Jordan University of Science and Technology, • COST ACTION CA21103 "Implementation of Circular Economy in the Built Environment" and the Technical Sciences Academy of Romania

•Web: https://www.ct.upt.ro/cesare24/

The conference is devoted to presenting the most recent results and discussing key issues concerning engineering's contribution to sustainability, resilience, and a circular economy in built environment, construction, and infrastructure. In particular, the conference will cover the following topics, but not limited:

- Structural materials • Structural engineering
- Structural robustness • Earthquake engineering
- Fire engineering • Risk assessment
- Impact of climate change on the built environment
- Sustainable resilience of systems in the built environment
- Building physics
- Environmental engineering
- Smart cities
- Circular economy
- Sustainable product design
- Design strategies for product design and engineering
- Innovation in materials, products and systems
- Integration of renewable energy at building and small urban area scales • Restoration and rehabilitation of monuments and historical buildings • Sustainable infrastructures • Wind energy structures
- Facade engineering • Green technology for civil engineering
- Green buildings •Waste management

**Publication of papers**:

- 4th International Conference "Coordinating Engineering for Sustainability and Resilience" & Midterm Conference of CircularB "Implementation of Circular Economy in the Built Environment" (Open access book), Editors: Viorel Ungureanu, Luís Bragança, Charalambos Baniotopoulos, Khairedin M. Abdalla, https://link.springer.com/book/10.1007/978-3-031-57800-7

**10th International conference on Advanced Materials and Structures – AMS 2024**

30 May – 01 June 2024, Timisoara, Romania (on-site event)

**Organizer(s)**: The conference **Advanced Materials and Structures (AMS'24)** was organized by the Department of Materials Engineering and Manufacturing and the Department of Mechanics and Strength of Materials with the support of the Politehnica Foundation, Technical Sciences Academy of Romania and Romanian Academy - Timisoara Branch

**Conference Website**: https://ams.upt.ro

The conference aimed to promote international collaboration, share current knowledge and discuss the latest advancements in the field of materials science and engineering. The scientific event focused on the following topics:

- Advanced materials - amorphous, nano-structured materials, composites, cellular materials, biomaterials etc.
- Surface engineering
- Modern fabrication, additive manufacturing, joints and recycling technologies
- Materials damage under time-dependent-actions (fatigue, creep, impact, corrosion)
- Computational techniques for advanced engineering materials and structures

**Publication of papers:**

- The papers presented at the AMS 2024 conference were peer-reviewed, and those accepted have been published in the volume of IOP: Materials Science and Engineering (MSE)

https://iopscience.iop.org/issue/1757-899X/1319/1

**International Conference on Applied Sciences – ICAS2024**
May 30–June 01, 2024, Travnik, Bosnia & Herzegovina (face-to-face and on-line)
**Organizers:** • Politehnica University Timisoara and • University of Vitez in Travnik , in cooperation with:
• Ministry for Scientific and Technological Development, Higher Education and Information Society of the Republica Srpska, • Academy of Romanian Scientists, • Academy of Sciences and Arts of the Republica Srpska ,
• Academy of Technical Sciences of Romania – Timisoara Branch,
• General Association of Romanian Engineers – Hunedoara Branch and • Association Universitaria Hunedoara
Web: https://icas.fih.upt.ro/

The conference serves as a platform for exchange of information between various areas of applied sciences, and to promote the communication between the scientists of different nations, countries and continents.
Topics of the conference covers a comprehensive spectrum of issues from:

- Fundamental Sciences
- Computers Engineering
- Electrical Engineering
- Mechanical Engineering
- Materials Engineering

**Publication of papers:**
- Proceedings of **ICAS 2024** have been published in the volume of the **Journal of Physics: Conference Series, vol.2927**, indexed by Scopus. (https://iopscience.iop.org/issue/1742-6596/2927/1)

**6th IFToMM Symposium on Mechanism Design for Robotics, MEDER 2024**
27th-29th June, 2024, the UPT Conference Center and the buildings of Mechanical Faculty of Politehnica University Timisoara, Romania
**Organizers:**
• Politehnica University Timisoara, • Faculty of Mechanical Engineering, Department of Mechatronics, with organizing support of: • ARoTMM – Romanian Association of Mechanism and Machine Science,
• ASTR – Technical Sciences Academy of Romania, • SRR – Robotics Society of Romania
Web: https://meder2024.upt.ro/

• The aim of the Symposium on Mechanism Design for Robotics **(MEDER 2024)** is to bring together researchers, industry professionals and students from a broad range of disciplines related to mechanisms and robotics, to share the latest developments and discuss the directions for the future of mechanism and robotics research.
**MEDER 2024** continues a successful series of Symposiums that has been started in Mexico 2010, continued in China 2012, in Denmark 2015, in Italy 2018 and in France 2021 .
**Topics**: • Mechanism design • Mechanism education and history of MMS • Theoretical and computational kinematics
• Experimental mechanics • Mechanics of robots • Control issues of mechanical systems
• Machine intelligence • Innovative mechanisms and applications • Linkages and manipulators • Micro-mechanisms
• Dynamics of machinery and multi-body systems.

**Publication of papers:**
- Mechanism Design for Robotics, MEDER 2024, MMS series Springer, ISSN 2211-0984, ISSN 2211-0992 (electronic) Mechanisms and Machine Science ISBN 978-3-031-67382-5 (printed book), ISBN 978-3-031-67383-2 (eBook)
https://doi.org/10.1007/978-3-031-67383-2
https://link.springer.com/book/10.1007/978-3-031-67383-2

**33rd European Systemic Functional Linguistics Conference: Accessibility and Appliability in Systemic Functional Linguistics**

10-12 July 2024, Conference Centre of Politehnica University Timisoara (in presence)

**Organizers:**

- European Systemic Functional Linguistics Association
- Politehnica University Timisoara

Web: https://sites.google.com/view/33rd-esfl-conference/home

• Considering the dialogue across disciplines, interdisciplinarity and transdisciplinarity, the 33rd European Systemic Functional Linguistics Conference aims to shed light on the current status of Systemic Functional Linguistics in terms of accessibility and appliability, and also to identify ways to increase both, for example by compiling multilingual resources (including glossaries and parallel texts), initiating international collaboration and launching virtual research networks.

• It intends to explore how accessible SFL is across users of various languages, to students and scholars in neighbouring disciplines, and to different professionals and how appliable it is in contexts such as education, health, tourism, communication and translation & interpreting. In addition, participants are invited to discuss the (in)visibility of SFL in linguistics and other relevant disciplines and to consider its legacy and transmission to future generations.

**Publication of papers:**

1. Special issue in Language, Context and Text, to appear next year
https://benjamins.com/catalog/langct?srsltid=AfmBOopx-bLZV9FadXx7VYkWO7LBpOTGraNyYjhSa-384Mx3CWF_tIAm
2. Edited book in work – to appear next year

**Impact and Legacy of the European Capital of Culture Programme**

9-11 October 2024, Timisoara.

Each day was hosted, on-site, by a different organizing partner (UMFT – October 9, UPT – October 10, UVT – October 11)

**Organizers:**

- UNeECC (University Network of European Capitals of Culture)
- ATU (Alliance of Timișoara Universities – UMFT, UPT, UVT, USVT) and
- The Center for Projects of the Municipality of Timisoara

Web: https://uneecc2024.org/

• A programme of public events, academic sessions and networking opportunities to highlight the value of dialogue between researchers, cultural practitioners and policy-makers for a better understanding of the effects of the ECoC programme and more impactful and sustainable cultural practices.

**Topics:**

1. Assessing community building and public participation in ECoC cities
2. Art and technology – new forms of cultural expressions
3. Impact of culture for the future of urban services
4. Sustainable practices in ECoC ecosystems
5. Governance of recent ECoC programmes
6. Building capacities within the cultural sector and beyond

**Publication of papers:**

- **Impact and legacy of the European Capital of Culture Programme - Book of Abstracts**, Mariana Cernicova-Bucă, Daniela Șilindean, Corina Turșie (coord.), Editura Universității de Vest, 2024.
- A Springer volume with the works of 23 of the conference participants is also being published.


**The XIV International Conference "INDUSTRIAL ENGINEERING AND ENVIRONMENTAL PROTECTION" (IIZS2024),** October 3 – 4, 2024, Zrenjanin, Serbia

**Organizers:** • University of Novi Sad, Technical Faculty "Mihajlo Pupin", Zrenjanin, SERBIA, in cooperation with partners: University Politehnica Timisoara, Faculty of Engineering, Hunedoara, ROMANIA, University "St. Kliment Ohridski", Technical Faculty, Bitola, MACEDONIA, "Aurel Vlaicu" University of Arad, Faculty of Engineering, Arad, ROMANIA, University of East Sarajevo, Faculty of Mechanical Engineering East Sarajevo, BOSNIA & HERZEGOVINA and University of Giresun, Faculty of Engineering, Giresun, TURKEY

Web: http://www.tfzr.uns.ac.rs/iizs/

The main goals of the conference are: innovation and expansion of knowledge engineers in industry and environmental protection; support to researchers in presenting the actual results of research projects, establishing new contacts with leading national and international institutions and universities; popularization of the faculty and its leading role in our society and the immediate environment, in order to attract quality young population for studying at our faculty, cooperation with other organizations, public companies and industry; initiative for collecting ideas in solving specific practical problems; interconnection and business contacts; introducing professional and business organizations with results of scientific and technical research; presentation of scientific knowledge and exchange of experiences in the field of Industrial Engineering.

Framework topics: • INDUSTRIAL ENGINEERING: • Mechanical Engineering, • Energetics and process technique, • Designing and maintenance, • Oil and gas engineering • ENVIRONMENTAL ENGINEERING: • Health and environmental protection, • Environmental Management, • Occupational Safety

**Publication of papers:**

• **Proceedings of INTERNATIONAL CONFERENCE INDUSTRIAL ENGINEERING AND ENVIRONMENTAL PROTECTION** (14; 2024; Zrenjanin), ISBN 978–86–7672–376–8, published by University of Novi Sad, Technical Faculty "Mihajlo Pupin", Zrenjanin, SERBIA (https://doi.ub.kg.ac.rs/iizs2024/)• Selected papers in **ANNALS of Faculty Engineering Hunedoara – International Journal of Engineering**, ISSN: 1584–2665, ISSN: 2601–2332, ISSN–L: 1584–2665, published by Politehnica University Timisoara, Faculty of Engineering, Hunedoara, ROMANIA, http://annals.fih.upt.ro/

• Selected papers in **ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering**, e–ISSN: 2067–3809, published by Politehnica University Timisoara, Faculty of Engineering, Hunedoara, ROMANIA, http://acta.fih.upt.ro/

**28th International Conference on System Theory, Control and Computing (ICSTCC 2024)**

October 10 - 12, 2024, Sinaia, Romania

**Organizers:** • Faculty of Automation and Computers, • Faculty of Automation, Computers and Electronics of University of Craiova; • Faculty of Automation and Computer Science, • Technical University of Cluj-Napoca; • Faculty of Automatic Control and Computer Engineering of Gheorghe Asachi Technical University of Iasi; • Faculty of Control Systems, Computers, Electrical and Electronics Engineering of "Dunarea de Jos" University of Galati; • Department of Automation and Applied Informatics and • Department of Computers and Information Technology of Politehnica University Timisoara, Web: https://icstcc2024.ace.ucv.ro/

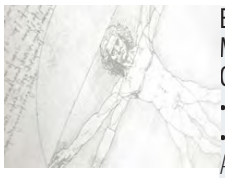
**ICSTCC 2024** has featured several kinds of presentations, including invited talks, contributed papers and special sessions.

The outcome of **ICSTCC 2024** has been a better understanding of some leading research areas, as already System Theory, Control and Computing have demonstrated.

- **Automation and Robotics**: Linear and Nonlinear Control System Design, System Identification and Process Modeling, Robust and Adaptive Control, Robotics and Intelligent Control, Applications and Case Studies in Automation and Robotics, Embedded Systems;
- **Computer Science and Engineering**: Distributed Systems and Software Engineering, Databases, Systems of Programs and Expert Systems, Web Services, Internet Security, Software Tools and Methods, Grid Computing, Artificial Intelligence, Computer Architectures;
- **Electronics and Instrumentation**: Modeling, Simulation and CAD Tools, Signal Processing and Communication Systems, Linear and Nonlinear Circuits and Systems, Evolutionary Electronics.

**Publication of papers**:

- The proceedings, which include the papers presented at **ICSTCC 2024**, will be submitted to **IEEE Xplore Digital Library**.



ErgoWork
Ergonomics & Workplace Management Society

**ErgoWork 2024 - 3rd International Conference of the Romanian Society on Ergonomics and Workplace Management,** October 31 – November 1, 2024, Bucharest, Romania

**Organizers:** • Politehnica University Timisoara, • Romanian Society on Ergonomics and Workplace Management; • National University of Science and Technology Politehnica Bucharest; • Technical University of Cluj-Napoca; • Bucharest National University of Arts; Green Forest Ltd. Timisoara, in collaboration with: IEA - International Ergonomics Association; FEES - Federation of European Ergonomics Societies; ROFMA - Romanian Association of Workplace and Facility Management; INCDPM - Romanian National Research and Development Institute of Occupational Safety - INCDPM "Alexandru Darabont" Bucharest; HES - Hungarian Ergonomics Society; BAEHF - Bulgarian Association of Ergonomics and Human Factors; SESS - Serbia Ergonomics Society of Serbia; CES - Croatian Ergonomics Society;

Web: https://mpt.upt.ro/ergowork2024/

• **ErgoWork 2024** is designed to connect the Romanian community of ergonomists, designers, occupational psychologists and therapists to others internationally via sharing, dissemination and networking activities to support their research visibility and impact. The main topics of the articles presented were Ergonomics Analysis; Human-technology interaction; Occupational Health and Safety; Workplace Aesthetics and Ergonomic Design; Biomechanics and Modelling in Ergonomics; Cognitive Ergonomics in Teleworking and Online Education; Special Application of Ergonomics, Assistive Technologies; Ergonomics for Sustainable Workplaces, Green Workplaces and Green Mobility (ergonomics approaches for workplace wellbeing) and Education and Training Programs in Ergonomics, Workplace Management and Occupational Health and Safety (dissemination of good practices and experiences; future learning environments).

**Publication of papers:**

- **ACTA TECHNICA NAPOCENSIS SERIES-APPLIED MATHEMATICS, MECHANICS AND ENGINEERING** journal (ISSN 1221-5872, emergent ISI Thomson/Clarivate Analytics journal) (https://atna-mam.utcluj.ro/index.php/Acta)

**SCIENTIFIC BULLETIN of Politehnica University Timisoara – Transactions on ENGINEERING AND MANAGEMENT** (ISSN 2392-7364, ISSN-L 2392-7364) (https://mpt.upt.ro/buletin-stiintific/, and https://www.editurapolitehnica.upt.ro/ro/)

- Special Issue "Sustainable Higher Education: Innovative Teaching and Learning, and Leadership for Creating Impacts on Local Society and Globally" https://www.mdpi.com/journal/sustainability/special_issues/2047ISC822

ISETC 2024

**International Symposium on Electronics and Telecommunications 2024 (ISETC'24)**

November 7-8, 2024 , Politehnica University Timisoara, in-person presentations with just few online presentations (prior approval of the organizing committee required)

**Organizers:**

• Faculty of Electronics, Telecommunications and Information Technologies from the Politehnica University Timisoara Romania and

• The Association of Electrical Engineers from Timișoara in cooperation with • IEEE România Section, Com Chapter, SP/IT/COM Joint Chapter, and • the Romanian Academy of Technical Sciences

Web: https://isetc.upt.ro/

The **ISETC'24** tracks were: • Artificial Intelligence and Computer Vision, • Instrumentation and Measurements, • Open Education and Emerging Technologies, • Power Electronics, • Signal Processing, • Telecommunications, • Microelectronics.

• Among distinguished key speakers ISETC'24 one could mention Peter van Duijsen, The Hague University Applied Sciences, Delft, the Netherlands, Sabin Totorean, Country Manager of Nokia Romania and Jeremy McClain Global VP and Head of Systems & Software Business - Business Area Autonomous Mobility at Continental, Frankfurt, Germany. At the same time, along with the scientific component, the following events take place:

- **The 2nd edition of the "Industry 4.0 Workshop"** which proposes a series of exhibition stands presented by the partner companies as well as interventions within the specialized sections on the latest trends in the implementation of industrial applications.

- **A joint event, the Romanian Academy-UPT-Continental-NXP**, dedicated to the large-scale project **"Important Projects of Common European Interest (IPCEI) on Microelectronics"**. This year, the ISETC'24 conference benefits from the support of established partners such as Nokia, Continental, Forvia-Hella, HUF, Magna, Schaeffler-Vitesco, Deltatel, Eviden, Lasting, Hamilton, Flex, NXP, Alfa Test.

**Publication of papers:** All papers were electronically handled and reviewed using **EDAS** platform. Accepted papers, presented at the symposium, were submitted for inclusion/indexing into major databases. Since 2010, **ISETC Proceedings** have been indexed into **IEEE Xplore Digital Library**, Web of Science, SCOPUS, etc. Extended versions of some selected papers from ISETC'24 will be published in a special issue of the Sensors journal (IF 3.4), (https://www.mdpi.com/journal/sensors/special_issues/92Z4W52C0P).

**The 15th International Conference "Innovative Technologies for Joining Advanced Materials" TIMA24**

7th-8th November, 2024, University Politehnica Timisoara, Faculty of Mechanics, N110 (participation face-to-face and online)

**Organizers:**

• National R&D Institute for Welding and Material Testing- ISIM Timisoara;
• Politehnica University Timişoara; • Technical Sciences Academy of Romania – Timisoara Brach

Web: https://www.isim.ro/ro/transfer-tehnologic/tima/tima24

Conference main topics:

• New joining technologies, • Modelling and simulation of welding processes,• Specific problems in advanced materials joining, • Characterization of advanced materials and joints,• Fracture mechanics, damage of advanced materials and remaining life assessment, • Quality of welded joints and welded structures, • Engineering applications of surface coatings, • Non-Destructive Testing (NDT), • Nanoscience, nanotechnology and composites

**Publication of papers:**

Selected papers of the Conference will be indexed in major international databases, ISI or SCOPUS.
(https://www.scientific.net/)

**EDEN 2024 Research Workshop & PhD Schools' Masterclass in Timisoara - Emerging Technologies, Challenges and Opportunities in Education and Research**

16-18 October 2024, Politehnica University Timisoara, Conference Centre & Department of ID/IFR and Digital Education UPT

**Organizers:** • EDEN Digital Learning Europe; • Department of ID/IFR and Digital Education UPT

Web:
- https://eden-europe.eu/event/eden-2024-research-workshop-in-timisoara/
- https://elearning.upt.ro/en/comunitate/eden/eden-2024-research-workshop-amp-phd-schools-masterclass-zeci-de-lucrari-sute-de-participanti-din-15-tari/#

• The 13th edition of the **EDEN 2024 Research Workshop** was organized by EDEN Digital Learning Europe together with the Department of ID/IFR and Digital Education UPT, for three days, from 16 to 18 October 2024, in Timisoara, with more than 70 researchers from 15 countries, presenting a series of over 50 scientific papers on emerging technologies and opportunities in education and research. The plenary sessions, open to the general public, gathered more than 300 participants, both physically and online, in plenary sessions with keynote guests such as Teemu Roos, the main creator of the online course Elements of AI, with over 1.4 million users, classified as the best online computer science MOOC in the world, and Carmen Holotescu, a world-class expert in blockchain implementation in education.
• The panel discussion "Emerging best practices in research methods" brought on stage Prof. Wim Van Petegem, Dr. Eng. Diana Andone, Assoc. Prof. Dr. Eng. Silviu Vert, Assoc. Prof. Antonella Poce, Prof. Albert Sangra Morer, who exchanged ideas and examples of practices in research methods from their own experience, in a discussion moderated by Prof. Dr. Eng. Radu Vasiu.
• The conference provided a comprehensive exploration of the latest advancements and challenges in educational technology, with a special focus on the integration of AI in education, European University Alliances and their roles in research and digital education, the burgeoning concept of micro-education and microcredentials, as well as the application of AR/VR technologies in educational settings.
Before the conference the EDEN PhD Schools' Masterclass was organized with the theme Digital Education and gathered 25 participants from different universities around Europe.

**Publication of papers:**
- Ubiquity proceedings: - https://eden-europe.eu/wp-content/uploads/2024/11/2024-RW-proceedings_short-papers.pdf
- Springer Open: - https://link.springer.com/conference/eden


**9th DigiSkills International Workshop 2024: Digital Competences in Artificial Intelligence and Citizen Science**

22 November 2024, Timisoara, Hybrid: Zoom and C401 Department of ID/IFR and Digital Education UPT

**Organizers:** • Department of ID/IFR and Digital Education UPT
• The Multimedia Center, together with the Alliance of European Universities E$^3$UDRES$^2$
• The HE project Ent-r-e-novators, with the support of the Accelerate Future HEI project

Web: https://elearning.upt.ro/en/event/workshop-competente-digitale-in-inteligenta-artificiala-si-comunitate-digiskills-2024/#

• The 9th edition of the **Digital Competencies Workshop in Artificial Intelligence and Community - DigiSkills 2024** focused on the transformative potential and challenges of **Generative AI (GAI)** in education, research, and community engagement.
• Addressing a diverse audience of stakeholders in education, research, and the wider community, the workshop brought together national and international experts who delved into the profound changes **GAI** can bring to education, revolutionizing how we teach, learn, and interact with knowledge. Key questions explored included: What skills will be essential for educators and students in the future? How are open education and open science practices being reshaped by **GAI**? And, what regulations and guidelines are necessary for the responsible use of GAI in higher education?
• The event aroused the interest of over 300 national and international participants from more than ten countries, both in-person and virtually. Presentations, delivered in both Romanian and English, covered a range of topics, including future educator and student competencies in the age of AI; the development of appropriate regulations and guidelines for **GAI** in higher education; and effective strategies for citizen science engagement. Discussions explored how artificial intelligence is impacting traditional teaching and learning paradigms, knowledge acquisition, and community interaction. Participants attending virtually received online **Open Badges for the DigiSkills 2024** workshop, supported by IEEE Romania, while physical attendees also received **Certificates of Participation** on-site.
• **Publication of papers:**
• The presentations are published as open educational resources with creative commons license in the UniCampus.ro, open online learning platform.


**11th Open Education Week International Workshop 2024. Challenges in Open Science & Education Conference**

8 March 2024, Room K1, Conference Center of Politehnica University Timisoara and online

**Organizers:**
• Department of ID/IFR and Digital Education UPT, together with • the Alliance of European Universities E$^3$UDRES$^2$ and • the HE project Ent-re-novators, with the support of • IEEE Romania, within the Open Education Week 2024

Web: https://elearning.upt.ro/en/event/open-education-week-workshop-2024/

• The 11th edition of the **International Workshop 2024 Open Education Week** was under the theme **Challenges in Open Science & Education**, organized for the first time as part of the **Ent-r-e-novators Horizon Europe project** and of the **E$^3$UDRES$^2$ European Universities Alliance**, a hybrid event, proved to be a success, drawing significant participation from a diverse international audience, engaging over 440 participants (360 participants joined the event online, while 80 participants chose to attend in person), fostering interaction and networking.
• The workshop featured 11 internationally recognized experts who shared their valuable insights and expertise on topics related to Open Science and Open Education, delivering engaging presentations on a variety of topics, including practical applications, digital tools and effective methodologies for research and education. Presentations and panel discussions addressed European initiatives (E$^3$UDRES$^2$ and Ent-r-e-novators), providing attendees with valuable information on current developments and future directions in the field. • Furthermore, the event addressed the challenges and opportunities associated with the implementation of Open Science principles, creation and use of Open Educational Resources (OER), Open Pedagogies and collaborative knowledge. • In addition, the event explored the role of emerging technologies in shaping the future of education, with a particular emphasis on the transformative potential of generative AI ad the blockchain and its implications for Open Education practices.
• The workshop engaged a diverse audience, with participants from Romania, Austria, Belgium, Latvia, Portugal, and the Netherlands, encompassing educators, students eager to learn and contribute, IT trainers responsible for equipping individuals with essential digital skills, and HR professionals interested in the evolving landscape of workforce development. The interactive format encouraged active participation both online and in person, through Q&A sessions and networking opportunities. All participants received open badges as microcredentials, supported by IEEE Romania.

**Publication of papers:** The presentations are published as open educational resources with creative commons license in the UniCampus.ro, open online learning platform.

**IEEE Education Society**
March 2024,
Online, Global
**Organizers:**
• IEEE Education Society
Web: • https://ieee-edusociety.org/position/vp-conferences-workshops
• https://elearning.upt.ro/ro/comunitate/noutati-comunitate/universitatea-politehnica-timisoara-continua-sa-consolideze-inovarea-in-inginerie-dr-diana-andone-a-fost-aleasa-pentru-pozitia-de-vice-presedinte-al-ieee-education-society/

**Dr. Diana Andone has been elected as Vice President of the IEEE Education Society**

Elected during 2021-2023 as a member of the IEEE Education Society Board of Directors, Dr. Diana Andone was re-elected in August 2023 to this position and, at the same time, through a global online election, **Vice President of conferences, workshops and events** (2024-2025)**, the first member from Romania in such a position.**
At the end of 2023, IEEE has also designated Dr. Andone as **Distinguished Lecturer for 2024-2025**, through which the most active and well-known professionals are annually recognized.

**European Cultural Tourism Network Awards**
24 October 2024 in Dublin, Ireland
**Organizers:** • European Cultural Tourism Network in partnership with Europa Nostra,
• The European Travel Commission and NECSTouR, in the framework of 'European Capital of Smart Tourism Dublin 2024
Web: • https://www.culturaltourism-network.eu/results-2024.html
• https://elearning.upt.ro/ro/comunitate/noutati-comunitate/spotlight-heritage-timisoara-castigator-la-dublin-la-premiile-european-cultural-tourism-network/
• https://spotlight-timisoara.eu/en/eveniment/proiectul-digital-spotlight-heritage-timisoara-castigator-al-premiilor-ectn/

• The cultural project Spotlight Heritage Timisoara, coordinated by Politehnica University of Timișoara, through the Digital and Distance Education Department and Multimedia Centre won the European Cultural Tourism Network Award, 1st prize in Progress of digitization and digital transition in smart and sustainable cultural tourism. The award was presented to UPT's project coordinator, Dr. Diana Andone, in Dublin, at the International Conference for Cultural Tourism in Europe "European Collaboration for Smart and Sustainable Cultural Tourism Destinations".
Through digital technologies, Spotlight Heritage Timisoara had an impact of almost 2 million users, both on the website, mobile apps and through Augmented reality AR and Virtual reality VR equipment, digital experiences that were used by Timisoara's inhabitants, tourists, virtual tourists, on the streets, in museums and at international festivals in 10 countries.
• During 2024, the Digital and Distance Education Department of the Politehnica University of Timișoara continued its engagement with the Spotlight Heritage Timișoara project, by organizing events and guided tours through the year, in particular at the UPT Technical Museum.In 2024 the project expanded its network of partnerships and broadening the project's impact through the collaborative Creative Schools - Timișoara's Stories initiative, undertaken in partnership with the "Grigore Moisil" Theoretical High School Timișoara and "Avram Iancu" which produced more then 50 drawings by children, 1 VR demo and several guided tours.
• All information is published here: https://spotlight-timisoara.eu/en/

Universitatea Politehnica Timișoara

# SCIENTIFIC JOURNALS


**Transactions on Modern Languages**
**Volume 23, Issue 1, 2024**

www.sc.upt.ro/ro/publicatii/buletinul-stiintific/about

- The Transactions on Modern languages, published by the Department of Communication and Foreign Languages, has its origin in The Social Science and Humanities Series, started in 1991 under ISSN 1223-1959.
- The Transactions of Modern Languages publishes original papers in all areas of theoretical and applied linguistics: Linguistics, Translation and Interpreting Studies, Discourse Analysis, Pragmatics, Rhetoric, Terminology, LSP, Foreign Language Teaching.
- The journal is included in the CEEOL, Fabula and EBSCO data bases.
- ISSN 1583-7467, ISSN-L 1583-7467


**Transactions on Mathematics and Physics**
**Volume 69 (83), Issue 1, 2024**

www.upt.ro/Informatii_seria-matematica_294_ro.html

- The journal "Bulletin Scientifique de l'Ecole Polytechnique de Timişoara" was founded in 1923, when the head of the Polytechnical School of Timişoara was mathematicians Victor Vâlcovici (1885-1970).
- The first two issues appeared in 1925, respectively in 1926. In the first years, the journal has been contained mostly the mathematical articles (the authors being some famous national and foreign mathematicians as well V. Alaci, G. Alexich, M. Ghermănescu, D. Pompeiu, Ch. Brunold, G. Bouligand). This fact confer to actual journal "Transactions on Mathematics and Physics" of the Scientific Bulletin of Politehnica University Timișoara, Romania the justification to realize the continuity of the old "Bulletin Scientifique.
- The **Transactions on Mathematics and Physics** is indexed CNCSIS , B+.
- ISSN 1224-6069, ISSN-L 1224-6069


ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering
http://acta.fih.upt.ro/
Volume XVII (Tome XVII), Year 2024
Issue 1 (Fascicule 1: January-March), Issue 2 (Fascicule 2: April-June), Issue 3 (Fascicule 3: July-September), Issue 4 (Fascicule 4: October-December)

- ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering is an independent, free-access, online, international and multidisciplinary scientific publication edited by the Politehnica University Timişoara, Faculty Engineering Hunedoara and Faculty of Mechanical Engineering Timişoara.
- The Journal is focused on engineering sciences and other innovative allied research areas, in all fields of science and technology based on its originality, importance and timeliness.
- ACTA TECHNICA CORVINIENSIS – Bulletin of Engineering is accredited and ranked in the "B+" CATEGORY Journal by The National University Research Council's Classification of Romanian Journals (CNCSIS), and is indexed by Index Copernicus, Google Scholar, EBSCO Publishing, DOAJ, SCIRUS, EVISA, ProQuest, DRJI, CAS, BASE, ULRICHSweb – Global serials directory, Directory Indexing of International Research Journals, Electronic Journals Library etc.


ANNALS of Faculty Engineering Hunedoara – International Journal of Engineering

http://annals.fih.upt.ro/
Volume XXII (Tome XXII), Year 2024
Issue 1 (Fascicule 1: February), Issue 2 (Fascicule 2: May), Issue 3 (Fascicule 3: August), Issue 4 (Fascicule 4: November)

- ANNALS of Faculty Engineering Hunedoara – International Journal of Engineering is a multi-disciplinary journal, which covers all aspects of scientific, engineering and technical disciplines including applications of scientific inventions for engineering, technological and industrial purposes, advances in engineering, technology and science.
- ANNALS of Faculty Engineering Hunedoara – International Journal of Engineering is accredited and ranked in the "B+" category by The National University Research Council's Classification of Romanian Journals (CNCSIS), and is indexed by Index Copernicus, Google Scholar, EBSCO Publishing, DOAJ, SCIRUS, EVISA, ProQuest, DRJI, CAS, BASE, ULRICHSweb – Global serials directory, Directory Indexing of International Research Journals, Electronic Journals Library etc.


**Nonconventional Technologies Review**
**Volume XXVIII, Issue 1, Issue 2 , Issue 3, Issue 4 , 2024**

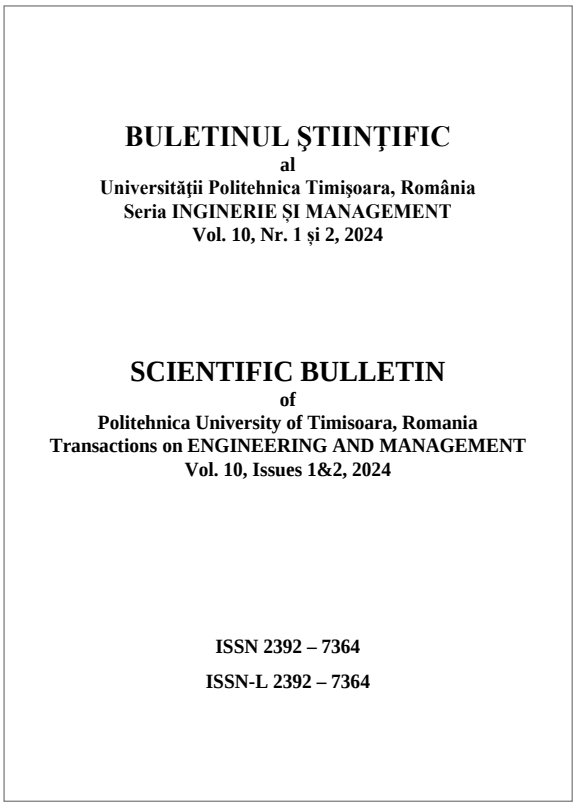
www.revtn.ro

- The Nonconventional Technologies Review is a scientific engineering publication of the Romanian Association for Nonconventional Technologies (ARTN), which has started in 1997, with quarterly appearances. The publication is addressed to all engineers and scientists interested in nonconventional technologies.
- Nonconventional Technologies Review is indexed in ProQuest, EBSCOhost, DOAJ, Google Scholar and Index Copernicus, and is classified as B+ according to the Romanian journal system.
- ISSN codes are:
  Print ISSN: 2359-8646; ISSN-L: 2359-8646
  On-line ISSN: 2359-8654


**Academic Journal of Manufaturing Engineering**
**Volume 22, Issue 1, Issue 2, Issue 3, Issue 4 , 2024**

https://www.ajme.ro

- The Academic Journal of Manufacturing Engineering intends to provide the specialists in the manufacturing engineering field a possibility for sharing and exchanging results and information by publishing the results of their work.
- Academic Journal of Manufacturing Engineering is recognized as a B+ journal by the Romanian National Council of Scientific Research and indexed by Index Copernicus international database.
- ISSN: 1583-7904, Online ISSN: 2601-3045




Transactions on Engineering and Management
Volume 10, Issue 1, Issue 2, 2024

www.mpt.upt.ro/cercetare/buletin-stiintific.html

- The Scientific Bulletin of Politehnica University Timişoara, Transaction on Engineering and Management presents research results in the field of industrial management and business studies that are of significant impact on major contemporary issues.
- The journal welcomes submissions of theoretical, methodological, empirical, policy-oriented, as well as industrial papers in all the field. Additionally, it considers contributions that combine engineering and management studies with any other field of inquiry.
- SCIENTIFIC BULLETIN of Politehnica University Timişoara, Transactions on ENGINEERING AND MANAGEMENT is indexed: Index Copernicus, Google Scholar (under review), Ulrich (under review).


Transactions on Hydrotechnics
Volume 69 (83), Issue 1, 2024

http://www.ct.upt.ro/buletinhidro/index.htm

- The Scientific Bulletin of the Politehnica University Timişoara, Transactions on Hydrotechnics is coordinated since 1992 by the Faculty of Hydrotechnical Engineering. Published papers in the journal focus on engineering sciences, civil engineering, theoretical and applied hydraulic, mathematics and numerical modeling, hydrology and water management, hydrotechnical developments and constructions, land improvement (irrigations, drainage, erosion control), engineering and sustainable rural development, water supply and sewerage systems, wastewater treatment, hydraulic structures and technologies.
- The Journal is published entirely in English, with abstracts and keywords, with international exposure.
- "The revue is known for experts from home and abroad, is accredited and ranked in the "B+" CATEGORY Journal by CNCSIS, and is indexed by EBSCO Publishing."
- ISSN 1224-6042, ISSN-L 1224-6042

Universitatea Politehnica Timișoara

# ISI PAPERS IN HIGHLIGHT

# Web of Science - Clarivate Analytics
# Hot Papers

A paper published in the past two years that received a number of citations in the most recent two-month period that places it in the top 0.1% of papers in the same field.

1

Liga, S., Paul, C., Péter, F. Flavonoids: Overview of Biosynthesis, Biological Activity, and Current Extraction Techniques, PLANTS-BASEL, Volume: 12, Issue: 14, Article Number: 2732, PubMed ID: 37514347, ISSN: 2223-7747, 2023.
Times Cited in Web of Science Core Collection: 90

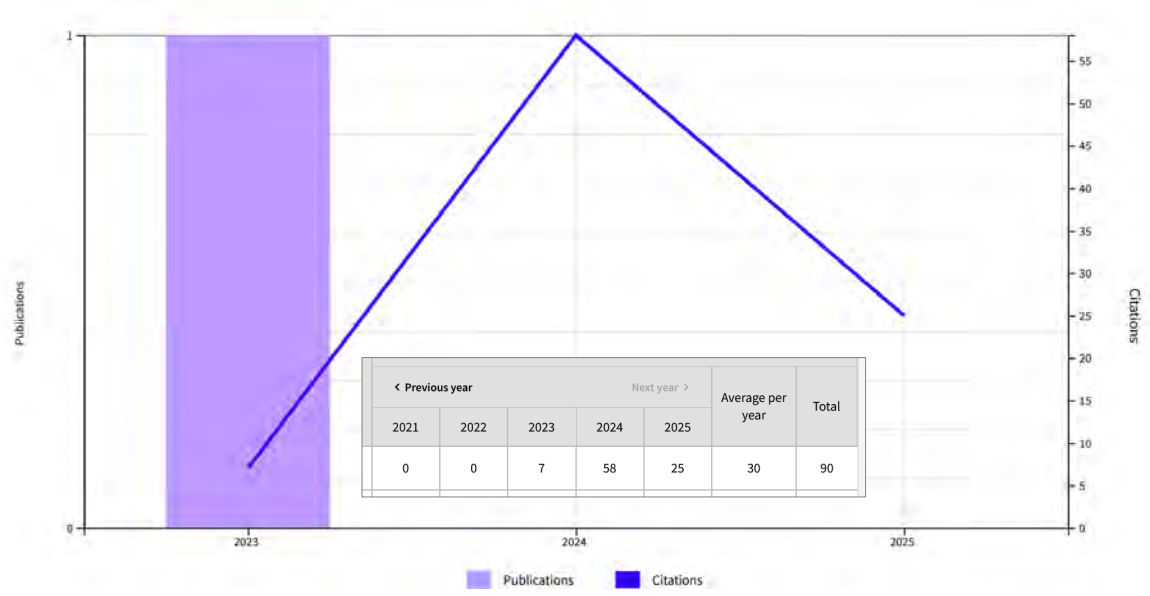
Hot Paper

Hot papers are papers that receive a large number of citations soon after publication, relative to other papers of the same field and age. They are papers published in the past two years that received a number of citations in the most recent two-month period that places them in the top 0.1% of papers in the same field.

* The data was obtained from Web of Science - Clarivate Analytics in 20 March 2025

# Web of Science - Clarivate Analytics
# Hot Paper

This hot paper was published in the past two years and received enough citations in January/June and November/December 2024 to place it in the top 0.1% of papers in the academic field of **Plant & Animal Science.**




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 0 | 7 | 58 | 25 | 30 | 90 |

1

Liga, S., Paul, C., Péter, F. Flavonoids: Overview of Biosynthesis, Biological Activity, and Current Extraction Techniques, PLANTS-BASEL, Volume: 12, Issue: 14, Article Number: 2732, PubMed ID: 37514347, ISSN: 2223-7747, 2023.
Times Cited in Web of Science Core Collection: 90

Abstract: Recently, increased attention has been paid to natural sources as raw materials for the development of new added-value products. Flavonoids are a large family of polyphenols which include several classes based on their basic structure: flavanones, flavones, isoflavones, flavonols, flavanols, and anthocyanins. They have a multitude of biological properties, such as anti-inflammatory, antioxidant, antiviral, antimicrobial, anticancer, cardioprotective, and neuroprotective effects. Current trends of research and development on flavonoids relate to identification, extraction, isolation, physico-chemical characterization, and their applications to health benefits. This review presents an up-to-date survey of the most recent developments in the natural flavonoid classes, the biological activity of representative flavonoids, current extraction techniques, and perspectives.

# Web of Science - Clarivate Analytics Highly Cited Papers

Selected from the most recent 10 years of data, Highly Cited Papers reflect the top 1% of papers by field and publication year. Highly Cited Papers help identify breakthrough research within a research field and are used within Web of Science to identify and refine the most influential research papers.

| | | |
|---|---|---|
| 1 | | |
| | Rajak, D.K., Pagar, D.D., Menezes, P.L., Linul, E. Fiber-Reinforced Polymer Composites: Manufacturing, Properties, and Applications, POLYMERS, Volume: 11, Issue: 10, Article Number: 1667, PubMed ID: 31614875, eISSN: 2073-4360, 2019;<br>Times Cited in Web of Science Core Collection: 874 | Highly Cited Paper |
| 2 | | |
| | Ancuti, C.O., Ancuti, C., De Vleeschouwer, C., Bekaert, P. Color Balance and Fusion for Underwater Image Enhancement, IEEE TRANSACTIONS ON IMAGE PROCESSING, Volume: 27, Issue: 1, Pages: 379-393, PubMed ID: 28981416, ISSN: 1057-7149, eISSN: 1941-0042, 2018;<br>Times Cited in Web of Science Core Collection: 744 | Highly Cited Paper |
| 3 | | |
| | Sarbu, I., Sebarchievici, C. A Comprehensive Review of Thermal Energy Storage, SUSTAINABILITY, Volume: 10, Issue: 1, Article Number: 191, ISSN: 2071-1050, 2018;<br>Times Cited in Web of Science Core Collection: 737 | Highly Cited Paper |
| 4 | | |
| | Boldea, I., Tutelea, L.N., Parsa, L., Dorrell, D. Automotive Electric Propulsion Systems With Reduced or No Permanent Magnets: An Overview, IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, Volume: 61, Issue: 10, Pages: 5696-5711, ISSN: 0278-0046, eISSN: 1557-9948, 2014;<br>Times Cited in Web of Science Core Collection: 596 | Highly Cited Paper |
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| | Sarbu, I., Sebarchievici, C. General review of ground-source heat pump systems for heating and cooling of buildings, ENERGY AND BUILDINGS, Volume: 70, Pages: 441-454, ISSN: 0378-7788, eISSN: 1872-6178, 2014;<br>Times Cited in Web of Science Core Collection: 470 | Highly Cited Paper |
| 6 | | |
| | Covaci, C., Gontean, A. Piezoelectric Energy Harvesting Solutions: A Review, SENSORS, Volume: 20, Issue: 12, Article Number: 3512, PubMed ID: 32575888, eISSN: 1424-8220, 2020;<br>Times Cited in Web of Science Core Collection: 363 | Highly Cited Paper |
| 7 | | |
| | Albulescu, C.T. COVID-19 and the United States financial markets' volatility, FINANCE RESEARCH LETTERS, Volume: 38, Article Number: 101699, PubMed ID: 32837380, ISSN: 1544-6123, eISSN: 1544-6131, 2021;<br>Times Cited in Web of Science Core Collection: 324 | Highly Cited Paper |

Highly Cited Papers received enough citations as of January/December 2024 to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.

* The data was obtained from Web of Science - Clarivate Analytics in 20 March 2025

# Web of Science - Clarivate Analytics Highly Cited Papers

Selected from the most recent 10 years of data, Highly Cited Papers reflect the top 1% of papers by field and publication year. Highly Cited Papers help identify breakthrough research within a research field and are used within Web of Science to identify and refine the most influential research papers.

| | | |
|---|---|---|
| 8 | | |
| Ardean, C., Davidescu, C.M., Nemes, N.S., Negrea, A., Ciopec, M., Duteanu, N., Negrea, P., Duda-Seiman, D., Musta, V. Factors Influencing the Antibacterial Activity of Chitosan and Chitosan Modified by Functionalization, INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES, Volume: 22, Issue: 14, Article Number: 7449, PubMed ID: 34299068, eISSN: 1422-0067, 2021;<br>Times Cited in Web of Science Core Collection: 268 | Highly Cited Paper | |
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| Roman, R.C., Precup, R.E., Petriu, E.M. Hybrid data-driven fuzzy active disturbance rejection control for tower crane systems, EUROPEAN JOURNAL OF CONTROL, Volume: 58, Pages: 373-387, ISSN: 0947-3580, eISSN: 1435-5671, 2021;<br>Times Cited in Web of Science Core Collection: 208 | Highly Cited Paper | |
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| Tmusic, G., Manfreda, S., Aasen, H., James, M.R., Goncalves, G., Ben-Dor, E., Brook, A., Polinova, M., Arranz, J.J., Meszaros, J., Zhuang, R.D., Johansen, K., Malbeteau, Y., de Lima, I.P., Davids, C., Herban, S., McCabe, M.F. Current Practices in UAS-based Environmental Monitoring, REMOTE SENSING, Volume: 12, Issue: 6, Article Number: 1001, eISSN: 2072-4292, 2020;<br>Times Cited in Web of Science Core Collection: 152 | Highly Cited Paper | |
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| Zamfirache, I.A., Precup, R.E., Roman, R.C., Petriu, E.M. Policy Iteration Reinforcement Learning-based control using a Grey Wolf Optimizer algorithm, INFORMATION SCIENCES, Volume: 585, Pages: 162-175, ISSN: 0020-0255, eISSN: 1872-6291, 2021;<br>Times Cited in Web of Science Core Collection: 149 | Highly Cited Paper | |

Highly Cited Papers received enough citations as of January/December 2024 to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.

* The data was obtained from Web of Science - Clarivate Analytics in 20 March 2025

# Web of Science - Clarivate Analytics Highly Cited Papers

Selected from the most recent 10 years of data, Highly Cited Papers reflect the top 1% of papers by field and publication year. Highly Cited Papers help identify breakthrough research within a research field and are used within Web of Science to identify and refine the most influential research papers.

14

Precup, R.E., Teban, T.A., Albu, A., Borlea, A.B., Zamfirache, I.A., Petriu, E.M. Evolving Fuzzy Models for Prosthetic Hand Myoelectric-Based Control, IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, Volume: 69, Issue: 7, Pages: 4625-4636, ISSN: 0018-9456, eISSN: 1557-9662, 2020;
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Zhou, Y.Y., Draghici, A., Abbas, J., Mubeen, R., Boatca, M.E., Salam, M.A. Social Media Efficacy in Crisis Management: Effectiveness of Non-pharmaceutical Interventions to Manage COVID-19 Challenges, FRONTIERS IN PSYCHIATRY, Volume: 12, Article Number: 626134, PubMed ID: 35197870, ISSN: 1664-0640, 2022;
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Highly Cited Papers received enough citations as of January/December 2024 to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.
* The data was obtained from Web of Science - Clarivate Analytics in 20 March 2025

# Web of Science - Clarivate Analytics Highly Cited Papers

Selected from the most recent 10 years of data, Highly Cited Papers reflect the top 1% of papers by field and publication year. Highly Cited Papers help identify breakthrough research within a research field and are used within Web of Science to identify and refine the most influential research papers.

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Liga, S., Paul, C., Péter, F. Flavonoids: Overview of Biosynthesis, Biological Activity, and Current Extraction Techniques, PLANTS-BASEL, Volume: 12, Issue: 14, Article Number: 2732, PubMed ID: 37514347, ISSN: 2223-7747, 2023;
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Zamfirache, I.A., Precup, R.E., Roman, R.C., Petriu, E.M. Neural Network-based control using Actor-Critic Reinforcement Learning and Grey Wolf Optimizer with experimental servo system validation, EXPERT SYSTEMS WITH APPLICATIONS, Volume: 225, Article Number: 120112, ISSN: 0957-4174, eISSN: 1873-6793, 2023;
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Times Cited in Web of Science Core Collection: 83

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Mohsin, M., Jamil, K., Naseem, S., Sarfraz, M., Ivascu, L. Elongating Nexus Between Workplace Factors and Knowledge Hiding Behavior: Mediating Role of Job Anxiety, PSYCHOLOGY RESEARCH AND BEHAVIOR MANAGEMENT, Volume: 15, Pages: 441-457, PubMed ID: 35250318, ISSN: 1179-1578, 2022;
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25

Roman, R.C., Precup, R.E., Petriu, E.M., Borlea, A.I. Hybrid Data-Driven Active Disturbance Rejection Sliding Mode Control with Tower Crane Systems Validation, ROMANIAN JOURNAL OF INFORMATION SCIENCE AND TECHNOLOGY, Volume: 27, Issue: 1, Pages: 50-64, ISSN: 1453-8245, 2024;
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Highly Cited Papers received enough citations as of January/December 2024 to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.
* The data was obtained from Web of Science - Clarivate Analytics in 20 March 2025

# Web of Science - Clarivate Analytics
# Highly Cited Papers

Selected from the most recent 10 years of data, Highly Cited Papers reflect the top 1% of papers by field and publication year. Highly Cited Papers help identify breakthrough research within a research field and are used within Web of Science to identify and refine the most influential research papers.

| | | |
|---|---|---|
| 26 | | |
| Precup, R.E., Duca, G., Travin, S., Zinicovscaia, I. PROCESSING, NEURAL NETWORK-BASED MODELING OF BIOMONITORING STUDIES DATA AND VALIDATION ON REPUBLIC OF MOLDOVA DATA, PROCEEDINGS OF THE ROMANIAN ACADEMY SERIES A-MATHEMATICS PHYSICS TECHNICAL SCIENCES INFORMATION SCIENCE, Volume: 23, Issue: 4, Pages: 403-410, ISSN: 1454-9069, 2022;<br>Times Cited in Web of Science Core Collection: 27 | Highly Cited Paper |
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| Liga, S., Paul, C., Moaca, E.A., Péter, F. Niosomes: Composition, Formulation Techniques, and Recent Progress as Delivery Systems in Cancer Therapy, PHARMACEUTICS, Volume: 16, Issue: 2, Article Number: 223, PubMed ID: 38399277, eISSN: 1999-4923, 2024;<br>Times Cited in Web of Science Core Collection: 26 | Highly Cited Paper |
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| Danila, A.I., Ghenciu, L.A., Stoicescu, E.R., Bolintineanu, S.L., Iacob, R., Sandesc, M.A., Faur, A.C. Aldose Reductase as a Key Target in the Prevention and Treatment of Diabetic Retinopathy: A Comprehensive Review, BIOMEDICINES, Volume: 12, Issue: 4, Article Number: 747, PubMed ID: 38672103, eISSN: 2227-9059, 2024;<br>Times Cited in Web of Science Core Collection: 16 | Highly Cited Paper |
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| Rosu, L.M., Prodan-Barbulescu, C., Maghiari, A.L., Bernad, E.S., Bernad, R.L., Iacob, R., Stoicescu, E.R., Borozan, F., Ghenciu, L.A. Current Trends in Diagnosis and Treatment Approach of Diabetic Retinopathy during Pregnancy: A Narrative Review, DIAGNOSTICS, Volume: 14, Issue: 4, Article Number: 369, PubMed ID: 38396408, eISSN: 2075-4418, 2024;<br>Times Cited in Web of Science Core Collection: 11 | Highly Cited Paper |
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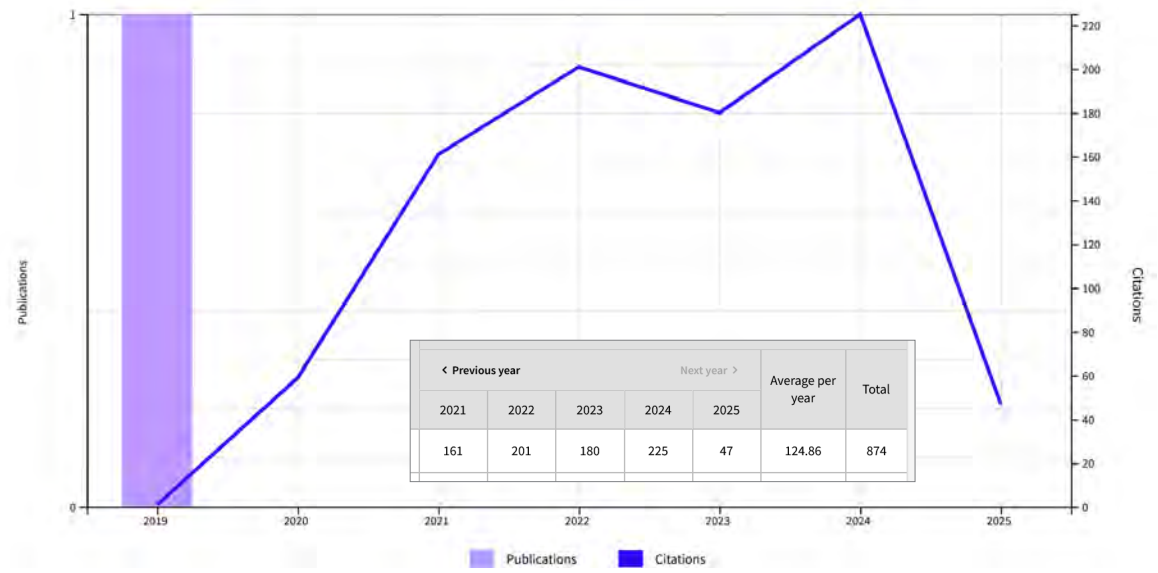
| Tanasa, C., Bosioc, A., Stuparu, A., Muntean, S., Susan-Resiga, R. A Perspective Review of Passive Techniques Applied to Control the Swirling Flow Instabilities From the Conical Diffuser of Hydraulic Turbines, APPLIED MECHANICS REVIEWS, Volume: 76, Issue: 1, Article Number: 010801, ISSN: 0003-6900, eISSN: 2379-0407, 2024.<br>Times Cited in Web of Science Core Collection: 10 | Highly Cited Paper |

Highly Cited Papers received enough citations as of January/December 2024 to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.

* The data was obtained from Web of Science - Clarivate Analytics in 20 March 2025

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Chemistry** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 161 | 201 | 180 | 225 | 47 | 124.86 | 874 |

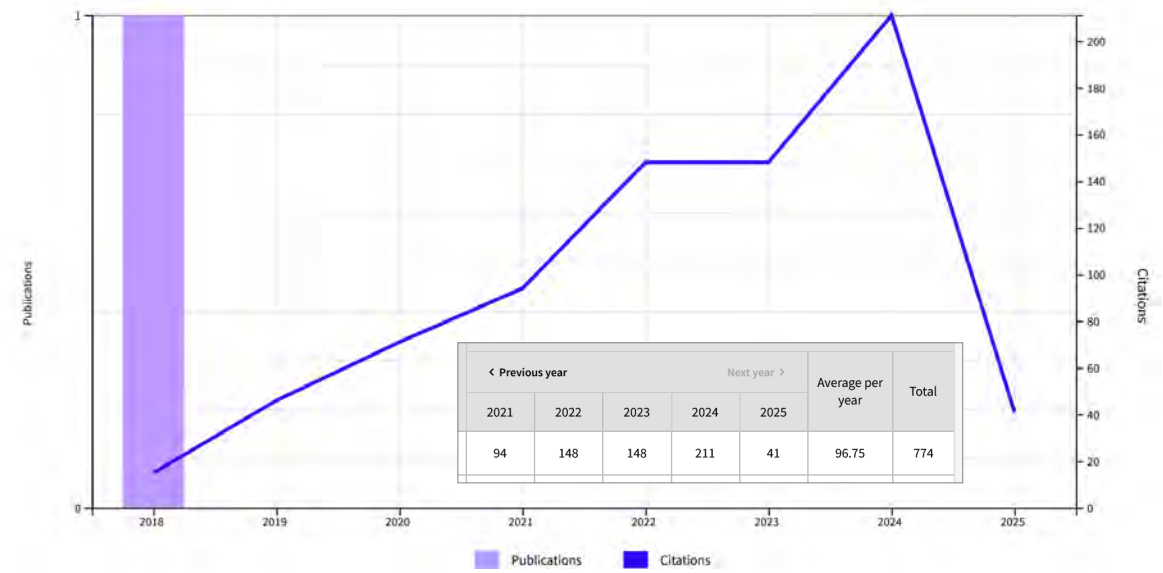
1

Rajak, D.K., Pagar, D.D., Menezes, P.L., Linul, E. Fiber-Reinforced Polymer Composites: Manufacturing, Properties, and Applications, POLYMERS, Volume: 11, Issue: 10, Article Number: 1667, PubMed ID: 31614875, eISSN: 2073-4360, 2019;
Times Cited in Web of Science Core Collection: 874

Abstract: Composites have been found to be the most promising and discerning material available in this century. Presently, composites reinforced with fibers of synthetic or natural materials are gaining more importance as demands for lightweight materials with high strength for specific applications are growing in the market. Fiber-reinforced polymer composite offers not only high strength to weight ratio, but also reveals exceptional properties such as high durability; stiffness; damping property; flexural strength; and resistance to corrosion, wear, impact, and fire. These wide ranges of diverse features have led composite materials to find applications in mechanical, construction, aerospace, automobile, biomedical, marine, and many other manufacturing industries. Performance of composite materials predominantly depends on their constituent elements and manufacturing techniques, therefore, functional properties of various fibers available worldwide, their classifications, and the manufacturing techniques used to fabricate the composite materials need to be studied in order to figure out the optimized characteristic of the material for the desired application. An overview of a diverse range of fibers, their properties, functionality, classification, and various fiber composite manufacturing techniques is presented to discover the optimized fiber-reinforced composite material for significant applications. Their exceptional performance in the numerous fields of applications have made fiber-reinforced composite materials a promising alternative over solitary metals or alloys.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 94 | 148 | 148 | 211 | 41 | 96.75 | 774 |

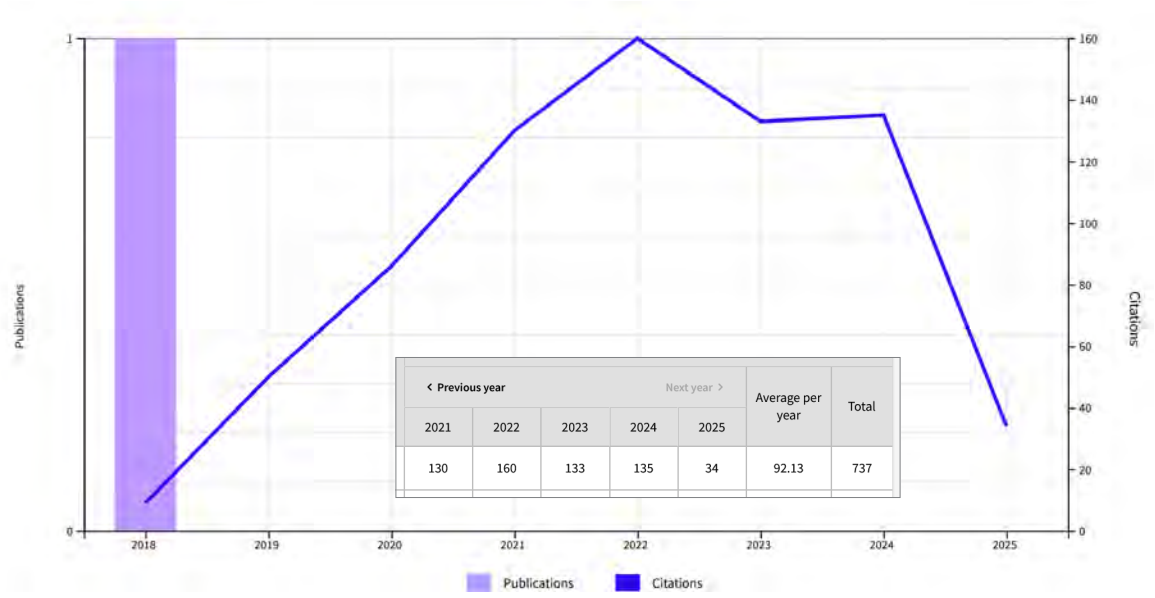
2

Ancuti, C.O., Ancuti, C., De Vleeschouwer, C., Bekaert, P. Color Balance and Fusion for Underwater Image Enhancement, IEEE TRANSACTIONS ON IMAGE PROCESSING, Volume: 27, Issue: 1, Pages: 379-393, PubMed ID: 28981416, ISSN: 1057-7149, eISSN: 1941-0042, 2018;
Times Cited in Web of Science Core Collection: 774

Abstract: We introduce an effective technique to enhance the images captured underwater and degraded due to the medium scattering and absorption. Our method is a single image approach that does not require specialized hardware or knowledge about the underwater conditions or scene structure. It builds on the blending of two images that are directly derived from a color-compensated and white-balanced version of the original degraded image. The two images to fusion, as well as their associated weight maps, are defined to promote the transfer of edges and color contrast to the output image. To avoid that the sharp weight map transitions create artifacts in the low frequency components of the reconstructed image, we also adapt a multiscale fusion strategy. Our extensive qualitative and quantitative evaluation reveals that our enhanced images and videos are characterized by better exposedness of the dark regions, improved global contrast, and edges sharpness. Our validation also proves that our algorithm is reasonably independent of the camera settings, and improves the accuracy of several image processing applications, such as image segmentation and keypoint matching.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Environment/ Ecology** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 130 | 160 | 133 | 135 | 34 | 92.13 | 737 |

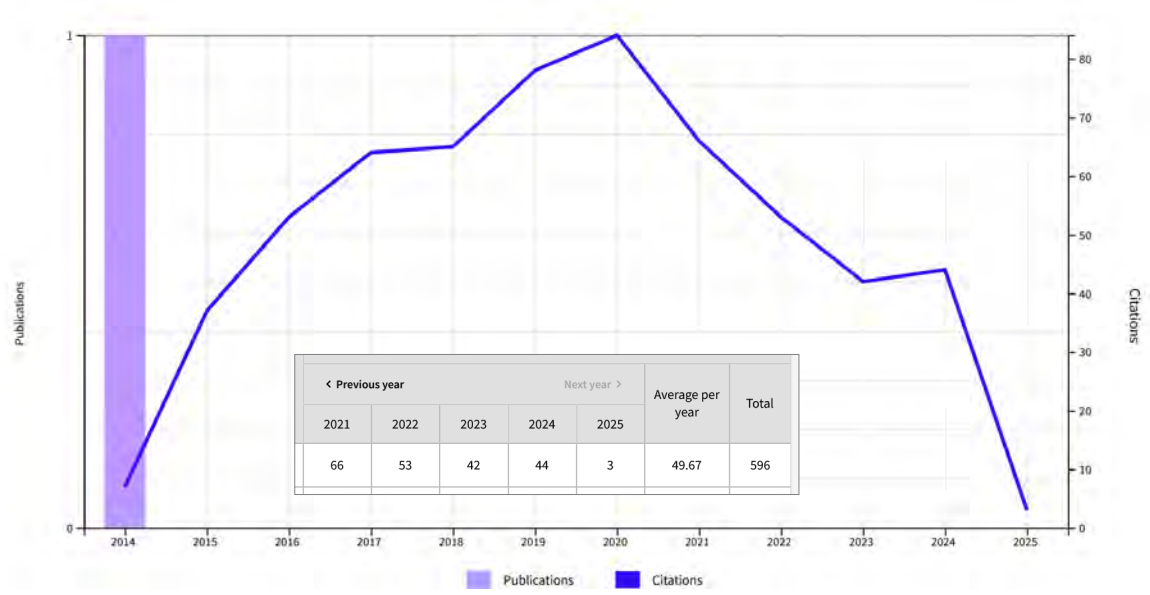
3

Sarbu, I., Sebarchievici, C. A Comprehensive Review of Thermal Energy Storage, SUSTAINABILITY, Volume: 10, Issue: 1, Article Number: 191, ISSN: 2071-1050, 2018;
Times Cited in Web of Science Core Collection: 737

Abstract: Thermal energy storage (TES) is a technology that stocks thermal energy by heating or cooling a storage medium so that the stored energy can be used at a later time for heating and cooling applications and power generation. TES systems are used particularly in buildings and in industrial processes. This paper is focused on TES technologies that provide a way of valorizing solar heat and reducing the energy demand of buildings. The principles of several energy storage methods and calculation of storage capacities are described. Sensible heat storage technologies, including water tank, underground, and packed-bed storage methods, are briefly reviewed. Additionally, latent-heat storage systems associated with phase-change materials for use in solar heating/cooling of buildings, solar water heating, heat-pump systems, and concentrating solar power plants as well as thermo-chemical storage are discussed. Finally, cool thermal energy storage is also briefly reviewed and outstanding information on the performance and costs of TES systems are included.

# Web of Science - Clarivate Analytics
# Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.



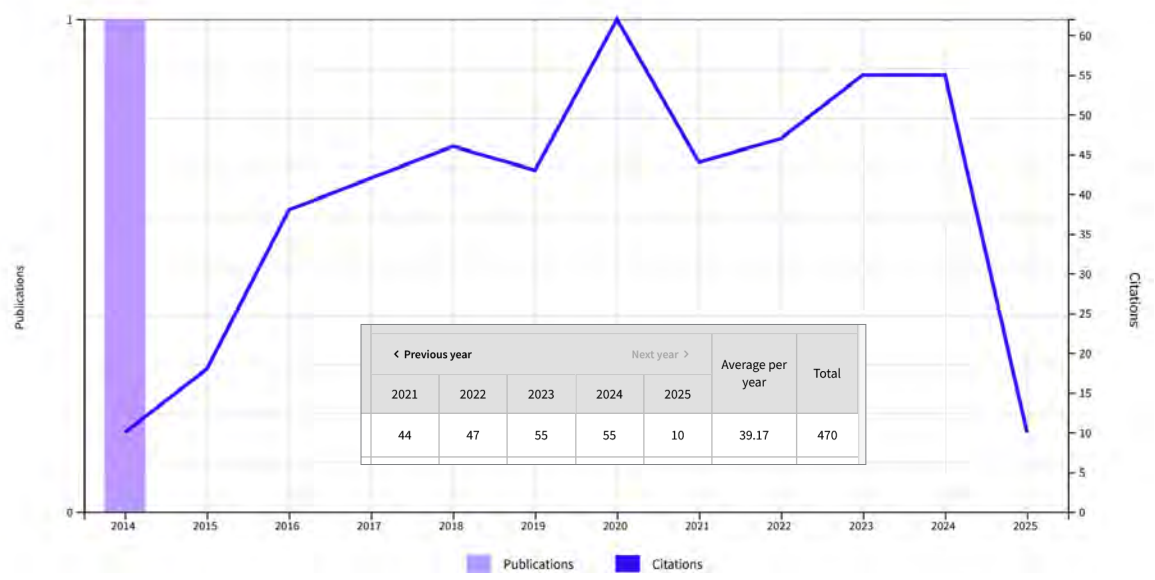

4

Boldea, I., Tutelea, L.N., Parsa, L., Dorrell, D. Automotive Electric Propulsion Systems With Reduced or No Permanent Magnets: An Overview, IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, Volume: 61, Issue: 10, Pages: 5696-5711, ISSN: 0278-0046, eISSN: 1557-9948, 2014;
Times Cited in Web of Science Core Collection: 596

Abstract: Hybrid and electric vehicle technology has seen rapid development in recent years. The motor and the generator are at the heart of the vehicle drive and energy system and often utilize expensive rare-earth permanent magnet (PM) material. This paper reviews and addresses the research work that has been carried out to reduce the amount of rare-earth material that is used while maintaining the high efficiency and performance that rare-earth PM machines offer. These new machines can use either less rare-earth PM material, weaker ferrite magnets, or no magnets; and they need to meet the high performance that the more usual interior PM synchronous motor with sintered neodymium-iron-boron magnets provides. These machines can take the form of PM-assisted synchronous reluctance machines, induction machines, switched reluctance machines, wound rotor synchronous machines (claw pole or biaxially excited), double-saliency machines with ac or dc stator current control, or brushless dc multiple-phase reluctance machines.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 44 | 47 | 55 | 55 | 10 | 39.17 | 470 |

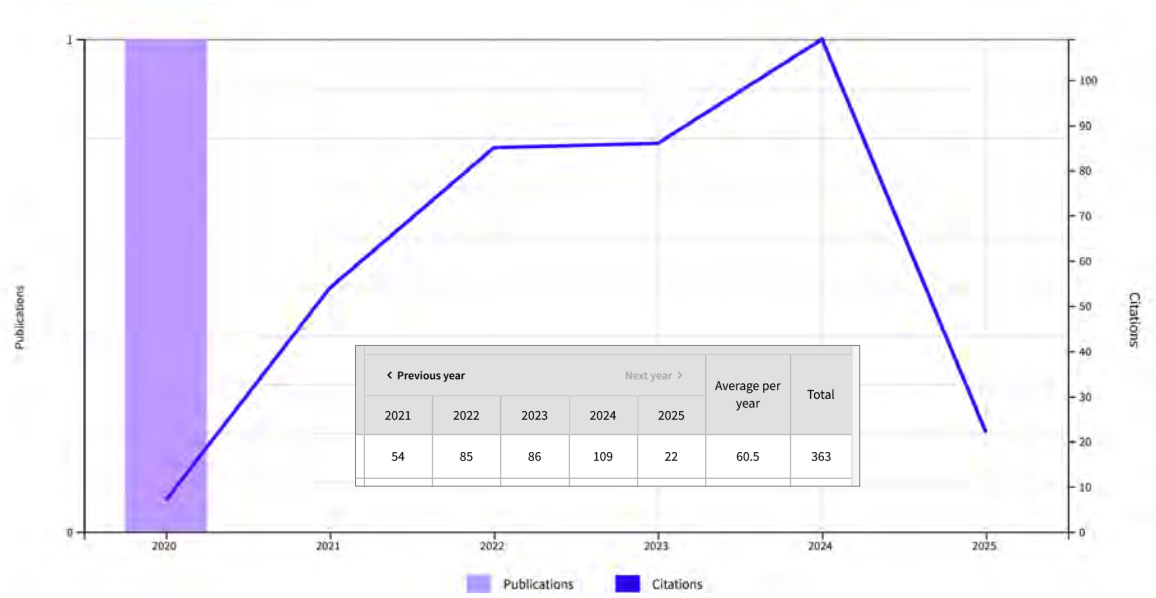
5

Sarbu, I., Sebarchievici, C. General review of ground-source heat pump systems for heating and cooling of buildings, ENERGY AND BUILDINGS, Volume: 70, Pages: 441-454, ISSN: 0378-7788, eISSN: 1872-6178, 2014;
Times Cited in Web of Science Core Collection: 470

Abstract: A large number of ground-source heat pumps (GSHP) systems have been used in residential and commercial buildings throughout the world due to the attractive advantages of high energy and environmental performances. The GSHPs are proven renewable energy technology for space heating and cooling. This paper provides a detailed literature review of the GSHP systems, and their recent advances. The operation principle and energy efficiency of a heat pump are defined first. Then, a general introduction on the GSHPs and its development, and a detailed description of the surface water (SWHP), ground-water (GWHP), and ground-couplet (GCHP) heat pumps are performed. The most typical simulation and ground thermal response test models for the vertical ground heat exchangers currently available are summarized including the heat transfer processes outside and inside the boreholes. Also, some information about a new GWHP using a heat exchanger with special construction, and the possibility to obtain the better energy efficiency with combined heating and cooling by GCHP are presented. The various hybrid GCHP systems for cooling or heating-dominated buildings are well described. Finally, the energy, economic and environmental performance of a closed-loop GCHP system is also briefly reviewed. It is found that the GSHP technology can be used both in cold and hot weather areas and the energy saving potential is significant.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Chemistry** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 54 | 85 | 86 | 109 | 22 | 60.5 | 363 |

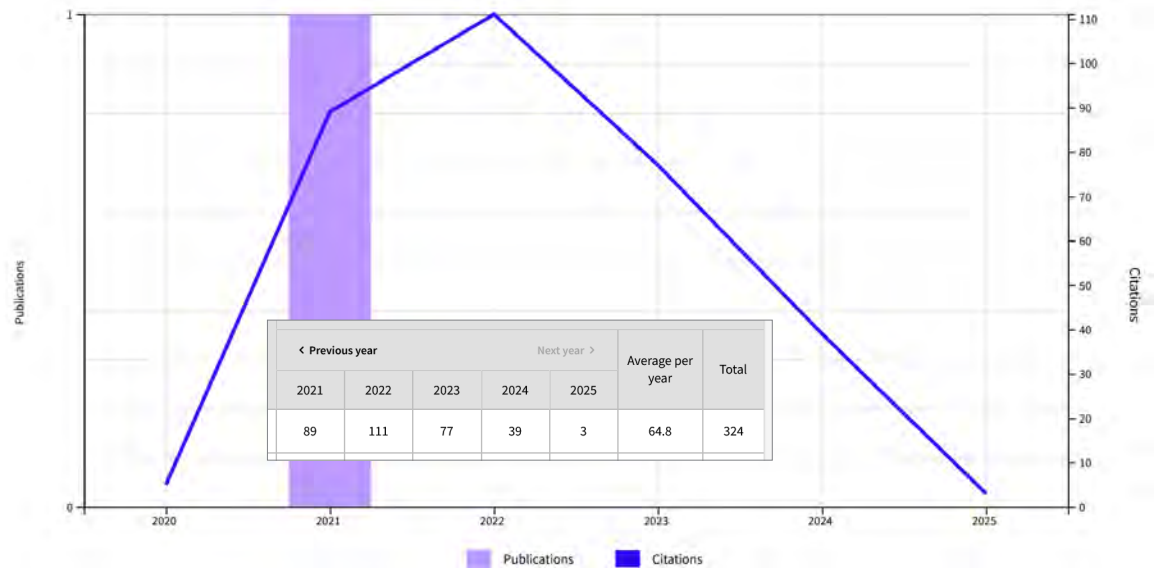
6

Covaci, C., Gontean, A. Piezoelectric Energy Harvesting Solutions: A Review, SENSORS, Volume: 20, Issue: 12, Article Number: 3512, PubMed ID: 32575888, eISSN: 1424-8220, 2020;
Times Cited in Web of Science Core Collection: 363

Abstract: The goal of this paper is to review current methods of energy harvesting, while focusing on piezoelectric energy harvesting. The piezoelectric energy harvesting technique is based on the materials' property of generating an electric field when a mechanical force is applied. This phenomenon is known as the direct piezoelectric effect. Piezoelectric transducers can be of different shapes and materials, making them suitable for a multitude of applications. To optimize the use of piezoelectric devices in applications, a model is needed to observe the behavior in the time and frequency domain. In addition to different aspects of piezoelectric modeling, this paper also presents several circuits used to maximize the energy harvested.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Economics & Business** based on a highly cited threshold for the field and publication year.




< Previous year | Next year >

| 2021 | 2022 | 2023 | 2024 | 2025 | Average per year | Total |
|---|---|---|---|---|---|---|
| 89 | 111 | 77 | 39 | 3 | 64.8 | 324 |

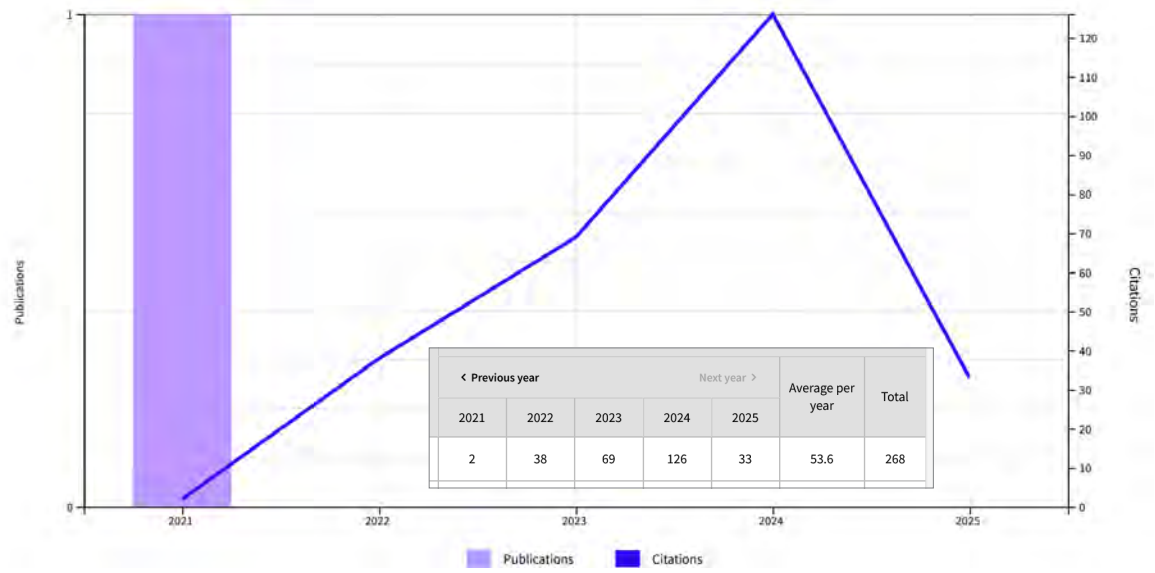
7

Albulescu, C.T. COVID-19 and the United States financial markets' volatility, FINANCE RESEARCH LETTERS, Volume: 38, Article Number: 101699, PubMed ID: 32837380, ISSN: 1544-6123, eISSN: 1544-6131, 2021;
Times Cited in Web of Science Core Collection: 324

Abstract: We empirically investigate the effect of the official announcements regarding the COVID-19 new cases of infection and fatality ratio, on the financial markets volatility in the United States (US). We consider both COVID-19 global and US figures and show that the sanitary crisis enhances the S&P 500 realized volatility. Our findings are robust to different model specifications and suggest that the prolongation of the coronavirus pandemic is an important source of financial volatility, challenging the risk management activity.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Chemistry** based on a highly cited threshold for the field and publication year.



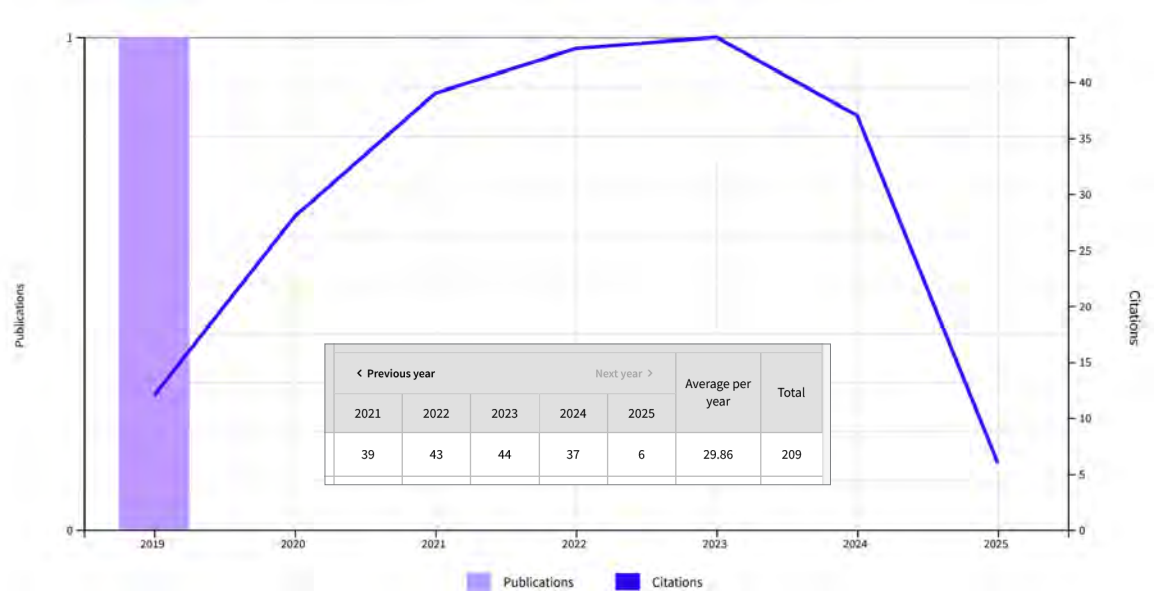

8

Ardean, C., Davidescu, C.M., Nemes, N.S., Negrea, A., Ciopec, M., Duteanu, N., Negrea, P., Duda-Seiman, D., Musta, V. Factors Influencing the Antibacterial Activity of Chitosan and Chitosan Modified by Functionalization, INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES, Volume: 22, Issue: 14, Article Number: 7449, PubMed ID: 34299068, eISSN: 1422-0067, 2021;
Times Cited in Web of Science Core Collection: 268

Abstract: The biomedical and therapeutic importance of chitosan and chitosan derivatives is the subject of interdisciplinary research. In this analysis, we intended to consolidate some of the recent discoveries regarding the potential of chitosan and its derivatives to be used for biomedical and other purposes. Why chitosan? Because chitosan is a natural biopolymer that can be obtained from one of the most abundant polysaccharides in nature, which is chitin. Compared to other biopolymers, chitosan presents some advantages, such as accessibility, biocompatibility, biodegradability, and no toxicity, expressing significant antibacterial potential. In addition, through chemical processes, a high number of chitosan derivatives can be obtained with many possibilities for use. The presence of several types of functional groups in the structure of the polymer and the fact that it has cationic properties are determinant for the increased reactive properties of chitosan. We analyzed the intrinsic properties of chitosan in relation to its source: the molecular mass, the degree of deacetylation, and polymerization. We also studied the most important extrinsic factors responsible for different properties of chitosan, such as the type of bacteria on which chitosan is active. In addition, some chitosan derivatives obtained by functionalization and some complexes formed by chitosan with various metallic ions were studied. The present research can be extended in order to analyze many other factors than those mentioned. Further in this paper were discussed the most important factors that influence the antibacterial effect of chitosan and its derivatives. The aim was to demonstrate that the bactericidal effect of chitosan depends on a number of very complex factors, their knowledge being essential to explain the role of each of them for the bactericidal activity of this biopolymer.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 39 | 43 | 44 | 37 | 6 | 29.86 | 209 |

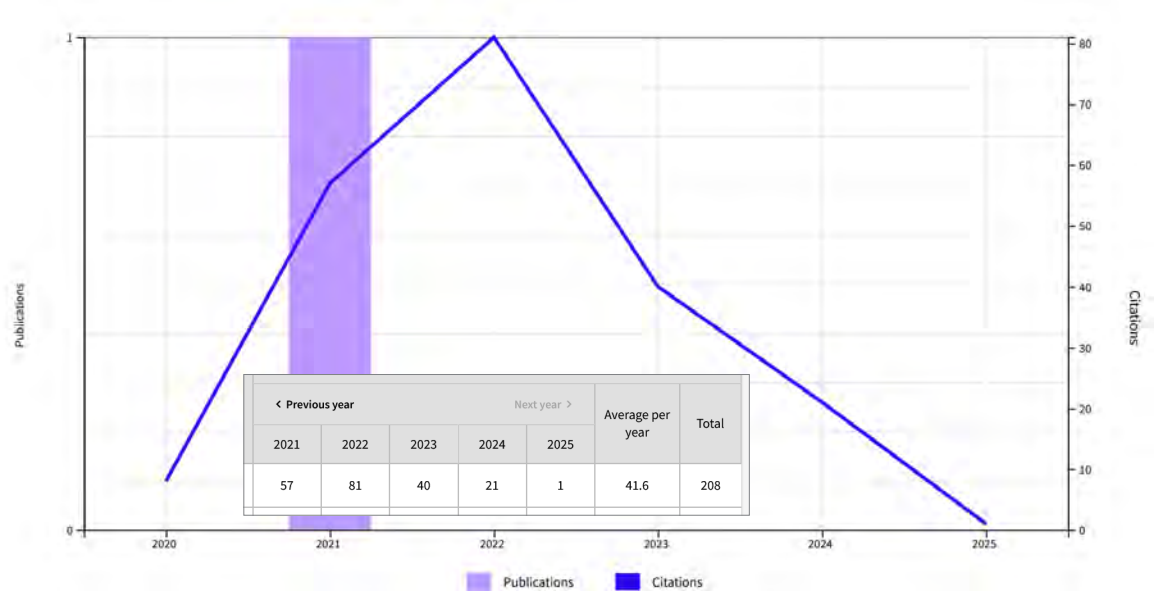
9

Sarbu, I., Dorca, A. Review on heat transfer analysis in thermal energy storage using latent heat storage systems and phase change materials, INTERNATIONAL JOURNAL OF ENERGY RESEARCH, Volume: 43, Issue: 1, Pages: 29-64, ISSN: 0363-907X, eISSN: 1099-114X, 2019;
Times Cited in Web of Science Core Collection: 209

Abstract: Thermal energy storage (TES) is a technology that stocks thermal energy by heating or cooling a storage medium so that the stored energy can be used later for heating and cooling applications and for power generation. TES has recently attracted increasing interest to thermal applications such as space and water heating, waste heat utilisation, cooling, and air conditioning. Phase change materials (PCMs) used for the storage of thermal energy as latent heat are special types of advanced materials that substantially contribute to the efficient use and conservation of waste heat and solar energy. This paper provides a comprehensive review on the development of latent heat storage (LHS) systems focused on heat transfer and enhancement techniques employed in PCMs to effectively charge and discharge latent heat energy, and the formulation of the phase change problem. The main categories of PCMs are classified and briefly described, and heat transfer enhancement technologies, namely dispersion of low-density materials, use of porous materials, metal matrices and encapsulation, incorporation of extended surfaces and fins, utilisation of heat pipes, cascaded storage, and direct heat transfer techniques, are also discussed in detail. Additionally, a two-dimensional heat transfer simulation model of an LHS system is developed using the control volume technique to solve the phase change problem. Furthermore, a three-dimensional numerical simulation model of an LHS is built to investigate the quasi-steady state and transient heat transfer in PCMs. Finally, several future research directions are provided.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
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| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 57 | 81 | 40 | 21 | 1 | 41.6 | 208 |

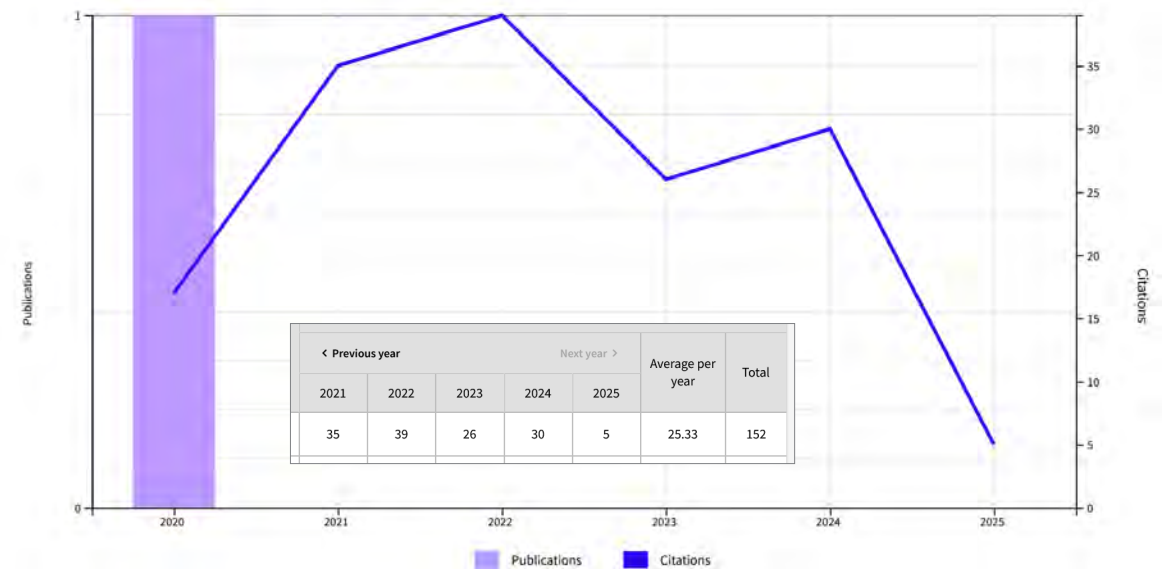
10

Roman, R.C., Precup, R.E., Petriu, E.M. Hybrid data-driven fuzzy active disturbance rejection control for tower crane systems, EUROPEAN JOURNAL OF CONTROL, Volume: 58, Pages: 373-387, ISSN: 0947-3580, eISSN: 1435-5671, 2021;
Times Cited in Web of Science Core Collection: 208

Abstract: This paper proposes the Virtual Reference Feedback Tuning (VRFT) of a combination of two control algorithms, Active Disturbance Rejection Control (ADRC) as a representative data-driven (or model-free) control algorithm and fuzzy control, in order to exploit the advantages of data-driven control and fuzzy control. The combination of Active Disturbance Rejection Control with Proportional-Derivative Takagi-Sugeno Fuzzy Control (PDTSFC) tuned by Virtual Reference Feedback Tuning results in two novel data-driven algorithms referred to as hybrid data-driven fuzzy ADRC algorithms. The main benefit of this combination is the automatic optimal tuning in a model-free manner of the parameters of the combination of Active Disturbance Rejection Control with Proportional-Derivative Takagi-Sugeno Fuzzy Control called ADRC-PDTSFC. The second benefit is that the suggested combination is time saving in finding the optimal parameters of the controllers. However, since Virtual Reference Feedback Tuning generally works with linear controllers to solve a certain optimization problem and the fuzzy controllers are essentially non-linear, this paper replaces the least-squares algorithm specific to Virtual Reference Feedback Tuning with a metaheuristic optimization algorithm, i.e. Grey Wolf Optimizer. The fuzzy control system stability is guaranteed by including a limit cycle-based stability analysis approach in Grey Wolf Optimizer algorithm to validate the next solution candidates. The hybrid data-driven fuzzy ADRC algorithms are validated as controllers in terms of real-time experiments conducted on three-degree-of-freedom tower crane system laboratory equipment. To determine the efficiency of the new hybrid data-driven fuzzy ADRC algorithms, their performance is compared experimentally with that of two control algorithms, namely Active Disturbance Rejection Control with Proportional-Derivative Takagi-Sugeno Fuzzy Control, whose parameters are optimally tuned by Grey Wolf Optimizer in a model-based manner using the nonlinear process model.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Geosciences** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 35 | 39 | 26 | 30 | 5 | 25.33 | 152 |

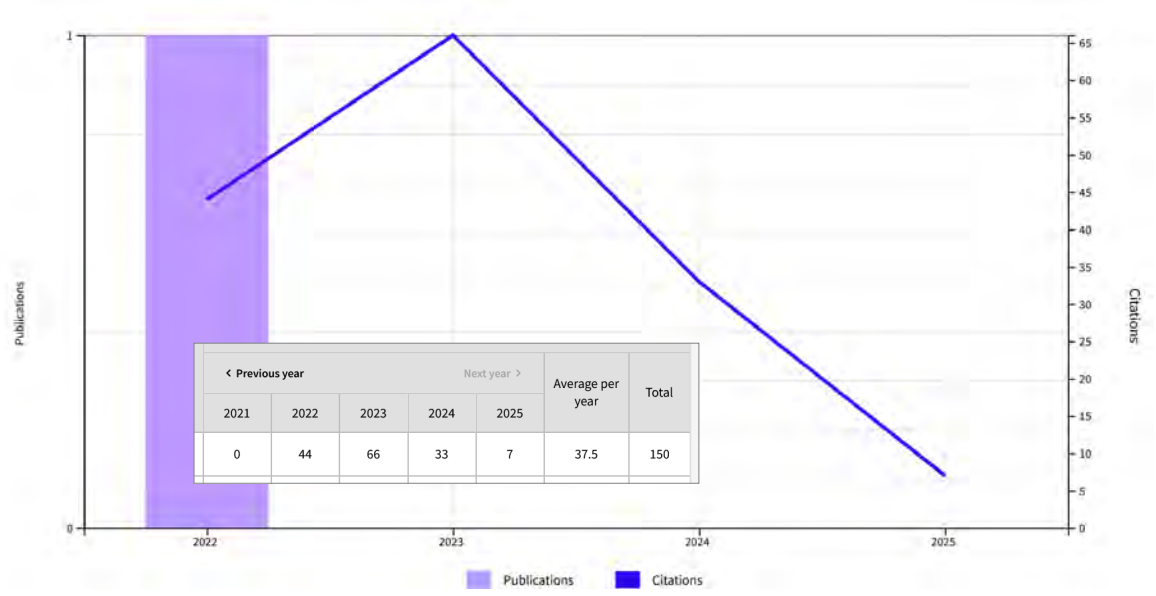
11

Tmusic, G., Manfreda, S., Aasen, H., James, M.R., Goncalves, G., Ben-Dor, E., Brook, A., Polinova, M., Arranz, J.J., Meszaros, J., Zhuang, R.D., Johansen, K., Malbeteau, Y., de Lima, I.P., Davids, C., Herban, S., McCabe, M.F. Current Practices in UAS-based Environmental Monitoring, REMOTE SENSING, Volume: 12, Issue: 6, Article Number: 1001, eISSN: 2072-4292, 2020;
Times Cited in Web of Science Core Collection: 152

Abstract: With the increasing role that unmanned aerial systems (UAS) are playing in data collection for environmental studies, two key challenges relate to harmonizing and providing standardized guidance for data collection, and also establishing protocols that are applicable across a broad range of environments and conditions. In this context, a network of scientists are cooperating within the framework of the Harmonious Project to develop and promote harmonized mapping strategies and disseminate operational guidance to ensure best practice for data collection and interpretation. The culmination of these efforts is summarized in the present manuscript. Through this synthesis study, we identify the many interdependencies of each step in the collection and processing chain, and outline approaches to formalize and ensure a successful workflow and product development. Given the number of environmental conditions, constraints, and variables that could possibly be explored from UAS platforms, it is impractical to provide protocols that can be applied universally under all scenarios. However, it is possible to collate and systematically order the fragmented knowledge on UAS collection and analysis to identify the best practices that can best ensure the streamlined and rigorous development of scientific products.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 44 | 66 | 33 | 7 | 37.5 | 150 |

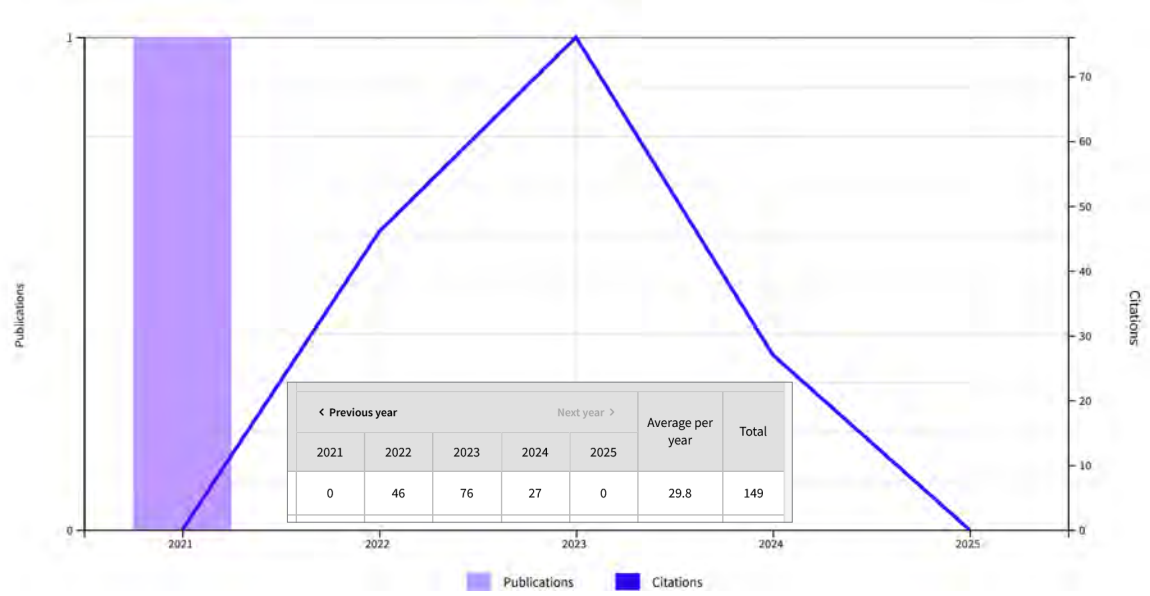
12

Pozna, C., Precup, R.E., Horvath, E., Petriu, E.M. Hybrid Particle Filter-Particle Swarm Optimization Algorithm and Application to Fuzzy Controlled Servo Systems, IEEE TRANSACTIONS ON FUZZY SYSTEMS, Volume: 30, Issue: 10, Pages: 4286-4297, ISSN: 1063-6706, eISSN: 1941-0034, 2022; Times Cited in Web of Science Core Collection: 150

Abstract: This article presents a hybrid metaheuristic optimization algorithm that combines particle filter (PF) and particle swarm optimization (PSO) algorithms. The new PF-PSO algorithm consists of two steps: the first generates randomly the particle population;and the second zooms the search domain. An application of this algorithm to the optimal tuning of proportional-integral-fuzzy controllers for the position control of a family of integral-type servo systems is then presented as a second contribution. The reduction in PF-PSO algorithm's cost function allows for reduced energy consumption of the fuzzy control system. A comparison with other metaheuristic algorithms on canonical test functions and experimental results are presented at the end of this article.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Computer Science** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 46 | 76 | 27 | 0 | 29.8 | 149 |

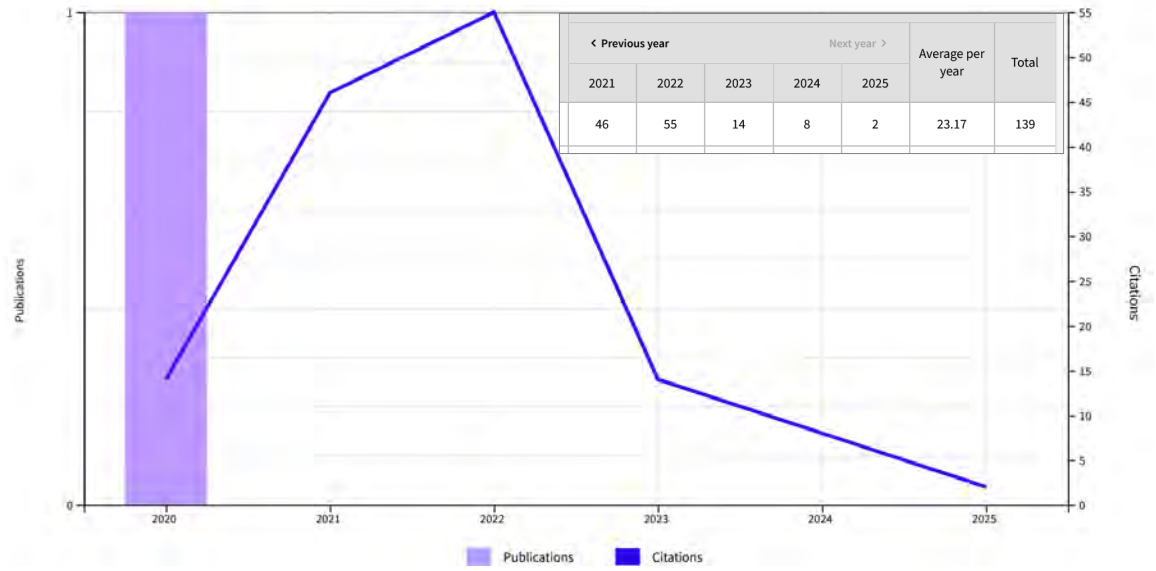
13

Zamfirache, I.A., Precup, R.E., Roman, R.C., Petriu, E.M. Policy Iteration Reinforcement Learning-based control using a Grey Wolf Optimizer algorithm, INFORMATION SCIENCES, Volume: 585, Pages: 162-175, ISSN: 0020-0255, eISSN: 1872-6291, 2021;
Times Cited in Web of Science Core Collection: 149

Abstract: This paper presents a new Reinforcement Learning (RL)-based control approach that uses the Policy Iteration (PI) and a metaheuristic Grey Wolf Optimizer (GWO) algorithm to train the Neural Networks (NNs). Due to an efficient tradeoff to exploration and exploitation, the GWO algorithm shows good results in NN training and solving complex optimization problems. The proposed approach is compared to the classical PI RL-based control approach using the Gradient Descent (GD) algorithm, and with the RL-based control approach which uses the metaheuristic Particle Swarm Optimization (PSO) algorithm. The experiments are conducted using a nonlinear servo system laboratory equipment. Each approach evaluated on how well it solves the optimal reference tracking control for an experimental servo system position control system. The policy NNs specific to all three approaches are implemented as state feedback with integrator controllers to remove the steady-state control errors and thus ensure the convergence of the objective function. Because of the random nature of metaheuristic algorithms, the experiments for GWO and PSO algorithms are run multiple times and the results are averaged before the conclusions are presented. The experimental results shows that for the control objective considered in this paper, the GWO algorithm represents a better solution compared to GD and PSO algorithms.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/June 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.



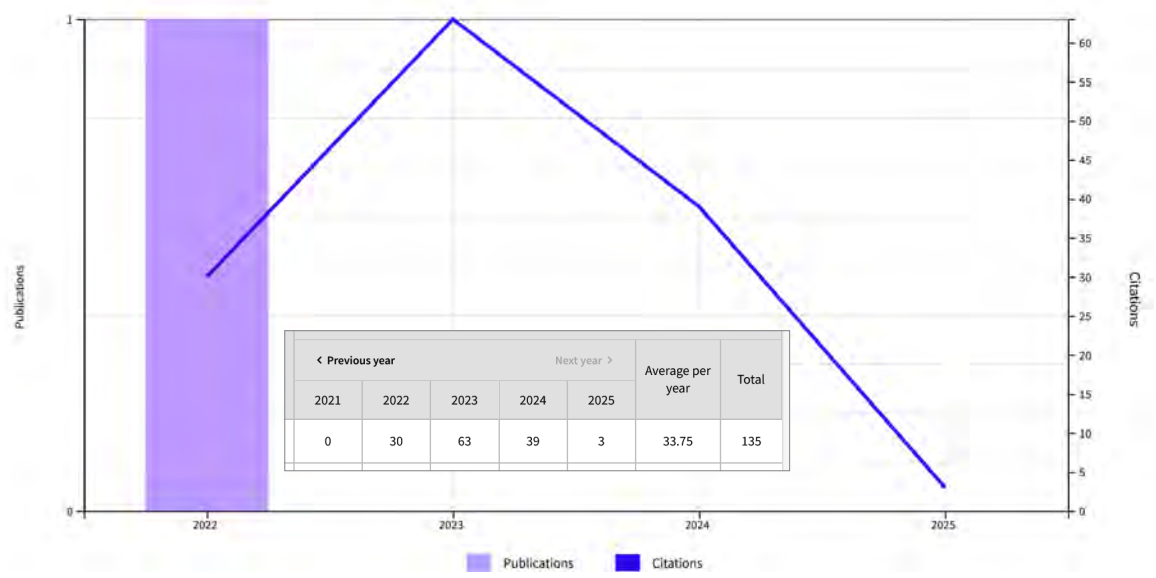

14

Precup, R.E., Teban, T.A., Albu, A., Borlea, A.B., Zamfirache, I.A., Petriu, E.M. Evolving Fuzzy Models for Prosthetic Hand Myoelectric-Based Control, IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, Volume: 69, Issue: 7, Pages: 4625-4636, ISSN: 0018-9456, eISSN: 1557-9662, 2020;
Times Cited in Web of Science Core Collection: 139

Abstract: This article applies an incremental online identification algorithm to develop a set of evolving fuzzy models (FMs) that characterize the nonlinear finger dynamics of the human hand for the myoelectric (ME)-based control of a prosthetic hand. The FM inputs are the ME signals obtained from eight ME sensors and past inputs and/or outputs. The FM outputs are the finger angles, considered here as the midcarpal joint angles, to ensure their control. The best evolving FMs that characterize each of the five fingers are described with the results validated on real data. Simple second-order linear models are next given to enable the cost-effective controller design. Five separate control loops are proposed, with proportional-integral (PI) controllers separately tuned by a frequency-domain approach. Simple PI-fuzzy controllers are designed starting with the linear PI controllers to ensure the control system performance improvement. The evolving FMs are used to simulate accurately the behavior of the human hand. Digital simulation results are included to show the effectiveness of the PI-fuzzy controllers and the performance improvement in comparison to the initial PI ones.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Psychiatry/ Psychology** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 30 | 63 | 39 | 3 | 33.75 | 135 |

15

Yu, S.B., Abbas, J., Draghici, A., Negulescu, O.H., Ain, N.U. Social Media Application as a New Paradigm for Business Communication: The Role of COVID-19 Knowledge, Social Distancing, and Preventive Attitudes, FRONTIERS IN PSYCHOLOGY, Volume: 13, Article Number: 903082, PubMed ID: 35664180, ISSN: 1664-1078, 2022;
Times Cited in Web of Science Core Collection: 135

Abstract: Business firms and the public have encountered massive consequences of the COVID-19 pandemic. This pandemic has become the most significant challenge and influenced all communities. This research study focuses on exploring the relationship between COVID-19 knowledge, social distancing, individuals' attitudes toward social media use, and practices of using social media amid the COVID-19 crisis. This study examines how attitudes toward social media use mediate the linkage between COVID-19 knowledge, social distancing, and practices for social media use. This survey uses a non-probability convenience sampling approach to collect samples and recruit willing respondents with their consent for data collection. This study recorded the feedback from 348 participants who encountered the indirect/direct effects of nationwide lockdowns, restrictions on social gatherings, and COVID-19 infection. The findings validate the proposed hypotheses for their direct effects and indicate significant beta-values, t-statistics, and the p-values at $p < 0.001$. The results validate a relationship between the COVID-19 knowledge of and social distancing practices. Similarly, the results approved a positive link between social distancing and attitudes toward social media use amid COVID-19. The findings validate the relation between social distancing and attitudes toward social media use during COVID-19 challenges (beta-value = 0.22 and t-statistics = 3.078). The results show the linkage between attitudes toward social media use and practices of using social media (beta-value = 0.41, and t-statistics = 7.175). Individuals' attitude toward social media use during COVID-19 mediates the connection between COVID-19 knowledge and COVID-19 practices of using social media use. The results validate the first mediation at beta-value = 0.21 and t-statistic = 5.327.

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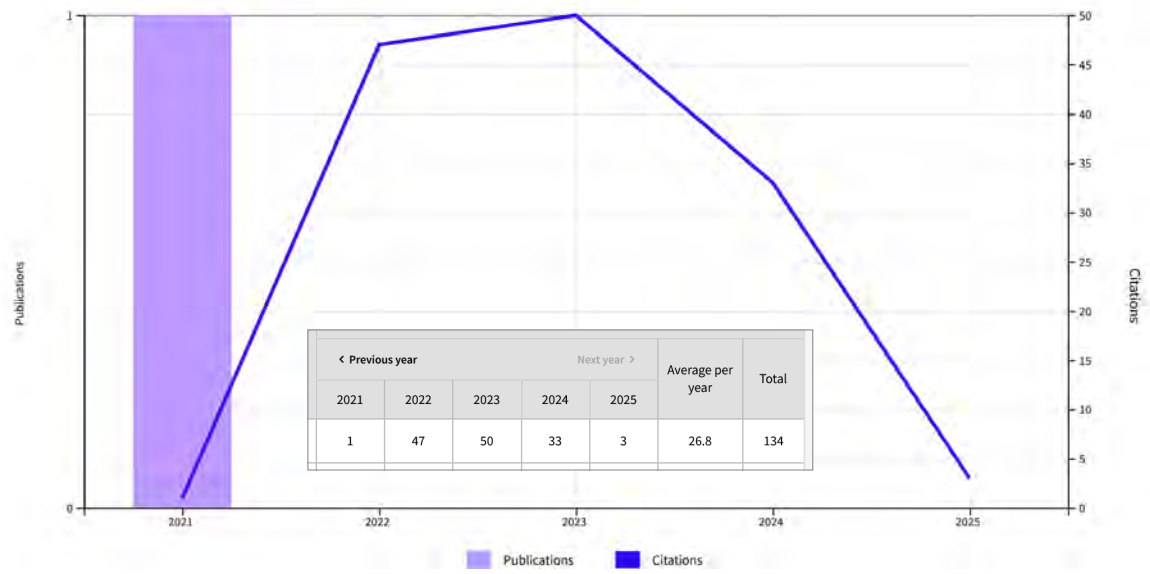
# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Computer Science** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 1 | 47 | 50 | 33 | 3 | 26.8 | 134 |

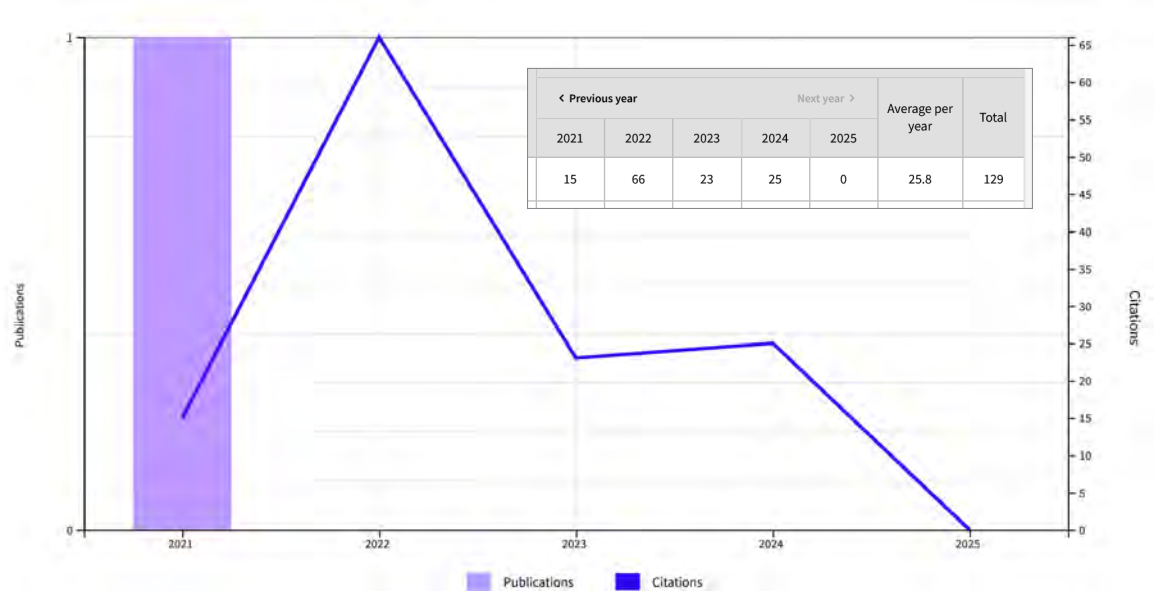
16

Zamfirache, I.A., Precup, R.E., Roman, R.C., Petriu, E.M. Reinforcement Learning-based control using Q-learning and gravitational search algorithm with experimental validation on a nonlinear servo system, INFORMATION SCIENCES, Volume: 583, Pages: 99-120, ISSN: 0020-0255, eISSN: 1872-6291, 2021;
Times Cited in Web of Science Core Collection: 134

Abstract: This paper presents a novel Reinforcement Learning (RL)-based control approach that uses a combination of a Deep Q-Learning (DQL) algorithm and a metaheuristic Gravitational Search Algorithm (GSA). The GSA is employed to initialize the weights and the biases of the Neural Network (NN) involved in DQL in order to avoid the instability, which is the main drawback of the traditional randomly initialized NNs. The quality of a particular set of weights and biases is measured at each iteration of the GSA-based initialization using a fitness function aiming to achieve the predefined optimal control or learning objective. The data generated during the RL process is used in training a NN-based controller that will be able to autonomously achieve the optimal reference tracking control objective. The proposed approach is compared with other similar techniques which use different algorithms in the initialization step, namely the traditional random algorithm, the Grey Wolf Optimizer algorithm, and the Particle Swarm Optimization algorithm. The NN-based controllers based on each of these techniques are compared using performance indices specific to optimal control as settling time, rise time, peak time, overshoot, and minimum cost function value. Real-time experiments are conducted in order to validate and test the proposed new approach in the framework of the optimal reference tracking control of a nonlinear position servo system. The experimental results show the superiority of this approach versus the other three competing approaches.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/August 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Computer Science** based on a highly cited threshold for the field and publication year.



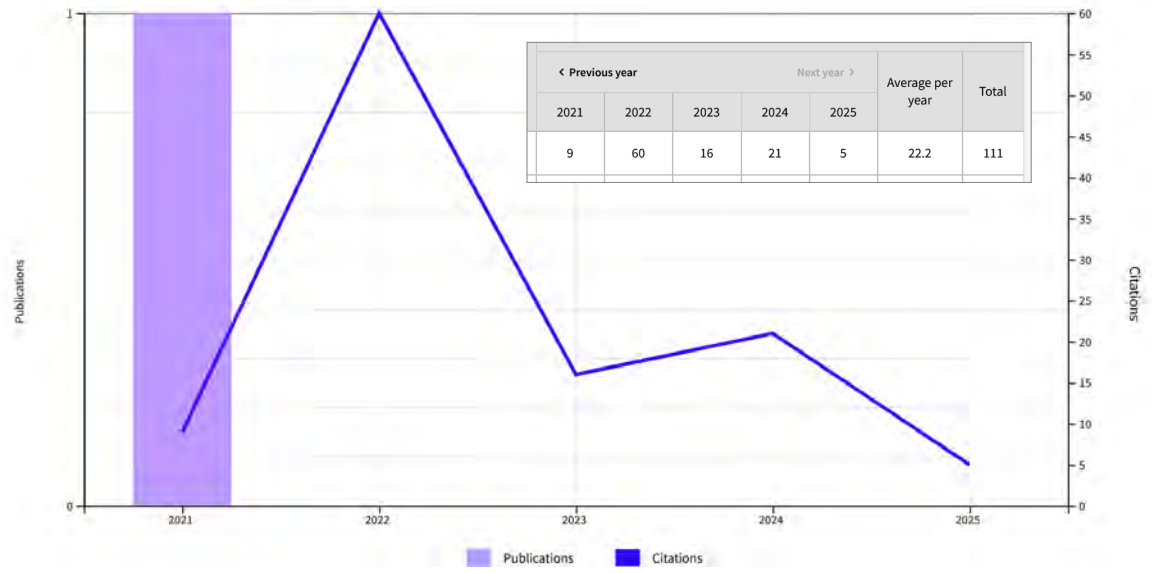

17

Borlea, I.D., Precup, R.E., Borlea, A.B., Iercan, D. A Unified Form of Fuzzy C-Means and K-Means algorithms and its Partitional Implementation, KNOWLEDGE-BASED SYSTEMS, Volume: 214, Article Number: 106731, ISSN: 0950-7051, eISSN: 1872-7409, 2021;
Times Cited in Web of Science Core Collection: 129

Abstract: This paper proposes as an element of novelty the Unified Form (UF) clustering algorithm, which treats Fuzzy C-Means (FCM) and K-Means (KM) algorithms as a single configurable algorithm. UF algorithm was designed to facilitate the FCM and KM algorithms software implementation by offering a solution to implement a single algorithm, which can be configured to work as FCM or KM. The second element of novelty of this paper is the Partitional Implementation of Unified Form (PIUF) algorithm, which is built upon the UF algorithm and designed to solve in an elegant manner the challenges of processing large datasets in a sequential manner and the scalability of the UF algorithm for processing datasets of any size. PIUF algorithm has the advantage of overcoming any possible hardware limitations that can occur if large volumes of data are processed (required to be stored, loaded in memory and processed by a certain specified computational system). PIUF algorithm is designed and formulated to be used on a single machine if the processed dataset is very big and it cannot be entirely loaded in the memory; at the same time it can be scaled to multiple processing nodes for reducing the processing time required to find the optimal solution. UF and PIUF algorithms are implemented and validated in BigTim platform, which is a distributed platform developed by the authors, and offers support for processing various datasets in a parallel manner but they can be implemented in any other data processing platforms. The Iris dataset is considered and next modified to obtain different datasets of different sizes in order to test the algorithms implementations in BigTim platform in different configurations. The analysis of PIUF algorithm and the comparison with FCM, KM and DBSCAN clustering algorithms are carried out using two performance indices; three performance indices are employed to evaluate the quality of the obtained clusters.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/April 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.



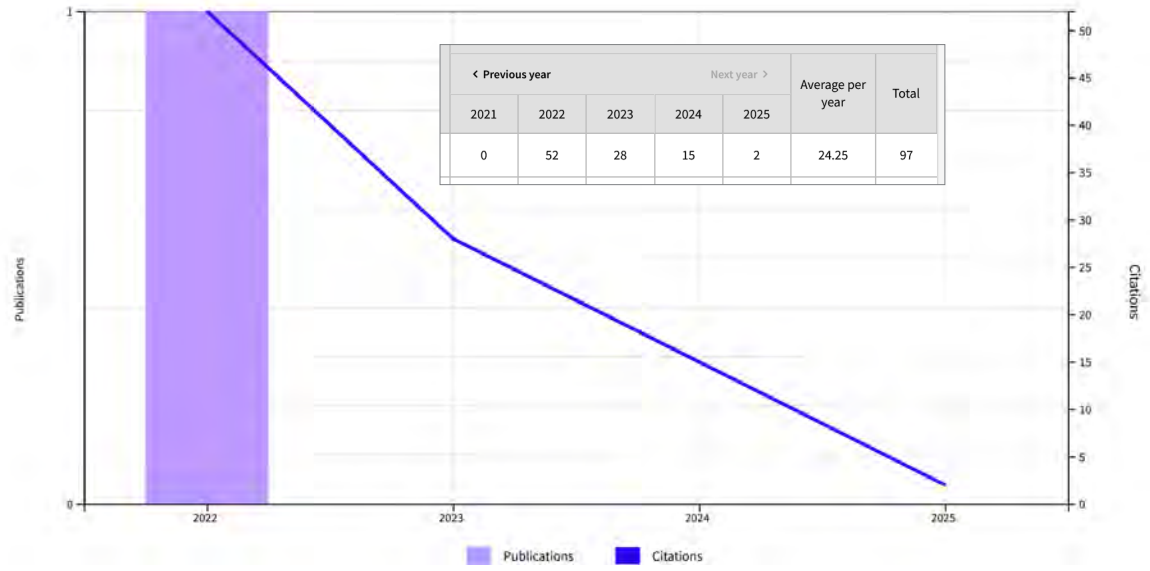

18

Precup, R.E., David, R.C., Roman, R.C., Szedlak-Stinean, A.I., Petriu, E.M. Optimal tuning of interval type-2 fuzzy controllers for nonlinear servo systems using Slime Mould Algorithm, INTERNATIONAL JOURNAL OF SYSTEMS SCIENCE, ISSN: 0020-7721, eISSN: 1464-5319, 2021;
Times Cited in Web of Science Core Collection: 111

Abstract: This paper presents a novel application of the metaheuristic Slime Mould Algorithm (SMA) to the optimal tuning of interval type-2 fuzzy controllers. Inserting the information feedback model F1 in SMA leads to a new version of the metaheuristic algorithm, further referred to as SMAF1. The paper discusses implementation details specific to interval type-2 fuzzy controllers for the position control of processes modelled by nonlinear servo systems with an integral component and dead zone plus saturation nonlinearity. The linear PI controllers are tuned on the basis of the Extended Symmetrical Optimum method using only one tuning parameter and next fuzzified to result in interval type-2 fuzzy controllers. The optimisation requires the minimisation of a discrete-time objective function expressed as the sum of time multiplied by squared control errors, and the vector variable is the parameter vector of the Mamdani PI fuzzy controller. Experimental results conclusively illustrate the superiority of SMAF1 and SMA in comparison with other metaheuristic algorithms.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Psychiatry/ Psychology** based on a highly cited threshold for the field and publication year.




19

Zhou, Y.Y., Draghici, A., Abbas, J., Mubeen, R., Boatca, M.E., Salam, M.A. Social Media Efficacy in Crisis Management: Effectiveness of Non-pharmaceutical Interventions to Manage COVID-19 Challenges, FRONTIERS IN PSYCHIATRY, Volume: 12, Article Number: 626134, PubMed ID: 35197870, ISSN: 1664-0640, 2022;
Times Cited in Web of Science Core Collection: 97

Abstract: The new identified virus COVID-19 has become one of the most contagious diseases in human history. The ongoing coronavirus has created severe threats to global mental health, which have resulted in crisis management challenges and international concerns related to health issues. As of September 9, 2021, there were over 223.4 million patients with COVID-19, including 4.6 million deaths and over 200 million recovered patients reported worldwide, which has made the COVID-19 outbreak one of the deadliest pandemics in human history. The aggressive public health implementations endorsed various precautionary safety and preventive strategies to suppress and minimize COVID-19 disease transmission. The second, third, and fourth waves of COVID-19 continue to pose global challenges to crisis management, as its evolution and implications are still unfolding. This study posits that examining the strategic ripostes and pandemic experiences sheds light on combatting this global emergency. This study recommends two model strategies that help reduce the adverse effects of the pandemic on the immune systems of the general population. This present paper recommends NPI interventions (non-pharmaceutical intervention) to combine various measures, such as the suppression strategy (lockdown and restrictions) and mitigation model to decrease the burden on health systems. The current COVID-19 health crisis has influenced all vital economic sectors and developed crisis management problems. The global supply of vaccines is still not sufficient to manage this global health emergency. In this crisis, NPIs are helpful to manage the spillover impacts of the pandemic. It articulates the prominence of resilience and economic and strategic agility to resume economic activities and resolve healthcare issues.
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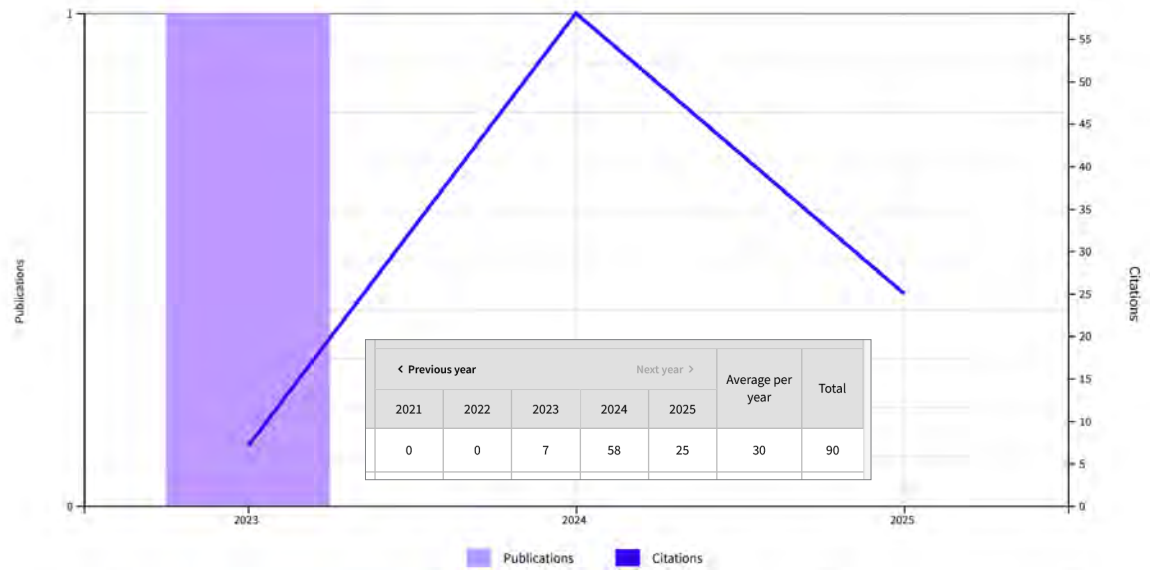
# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Plant & Animal Science** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 0 | 7 | 58 | 25 | 30 | 90 |

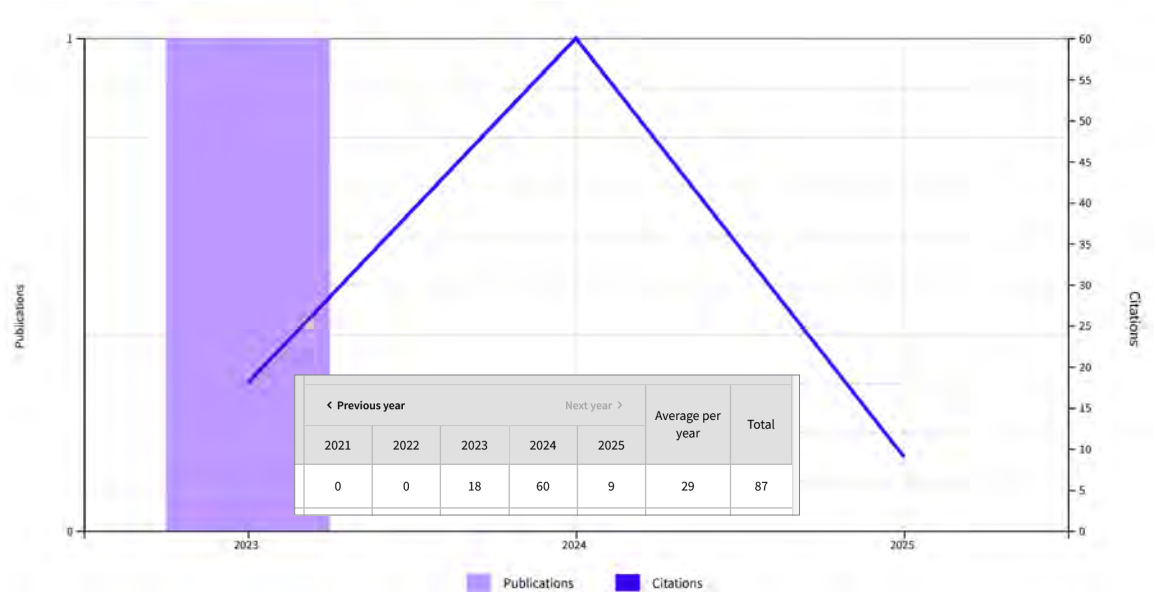
20

Liga, S., Paul, C., Péter, F. Flavonoids: Overview of Biosynthesis, Biological Activity, and Current Extraction Techniques, PLANTS-BASEL, Volume: 12, Issue: 14, Article Number: 2732, PubMed ID: 37514347, ISSN: 2223-7747, 2023;
Times Cited in Web of Science Core Collection: 90

Abstract: Recently, increased attention has been paid to natural sources as raw materials for the development of new added-value products. Flavonoids are a large family of polyphenols which include several classes based on their basic structure: flavanones, flavones, isoflavones, flavonols, flavanols, and anthocyanins. They have a multitude of biological properties, such as anti-inflammatory, antioxidant, antiviral, antimicrobial, anticancer, cardioprotective, and neuroprotective effects. Current trends of research and development on flavonoids relate to identification, extraction, isolation, physico-chemical characterization, and their applications to health benefits. This review presents an up-to-date survey of the most recent developments in the natural flavonoid classes, the biological activity of representative flavonoids, current extraction techniques, and perspectives.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 0 | 18 | 60 | 9 | 29 | 87 |

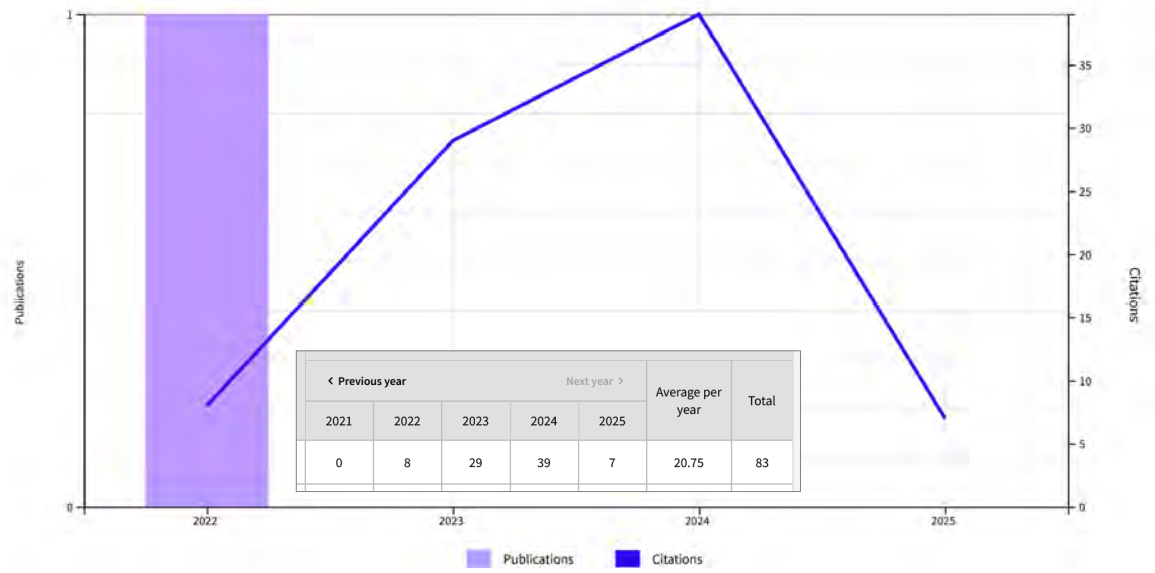
21

Zamfirache, I.A., Precup, R.E., Roman, R.C., Petriu, E.M. Neural Network-based control using Actor-Critic Reinforcement Learning and Grey Wolf Optimizer with experimental servo system validation, EXPERT SYSTEMS WITH APPLICATIONS, Volume: 225, Article Number: 120112, ISSN: 0957-4174, eISSN: 1873-6793, 2023;
Times Cited in Web of Science Core Collection: 87

Abstract: This paper introduces a novel reference tracking control approach implemented using a combination of the Actor-Critic Reinforcement Learning (RL) framework and the Grey Wolf Optimizer (GWO) algorithm. The classical neural network (NN)-based implementation of the Critic, optimized with the Gradient Descent (GD) algorithm, is replaced with the GWO algorithm, aiming to eliminate the main drawbacks of the GD algorithm, i. e., slow convergence and the tendency to get stuck in local optimal values. The combined effort from multiple search agents and the random values involved in the search process make the GWO algorithm very efficient in exploring the solution space and finding global optimal solutions. The main objective of the proposed approach is to build a NN-based controller capable of solving an optimal reference tracking control problem on nonlinear servo system laboratory equipment. The training data needed to build the controller is collected while the actor learns how to control the servo system, using the GWO-based critic to monitor the process and step in to correct the actor when needed. A comparison study is performed across three online RL-based control approaches, namely the novel approach using GWO to implement the Critic in the Actor-Critic RL framework, the traditional approach using NNs with GD for optimization and another approach using a metaheuristic algorithm called Particle Swarm Optimization (PSO). The experimental results illustrate the superiority of the proposed approach over the competing ones.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of September/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Physics** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 8 | 29 | 39 | 7 | 20.75 | 83 |

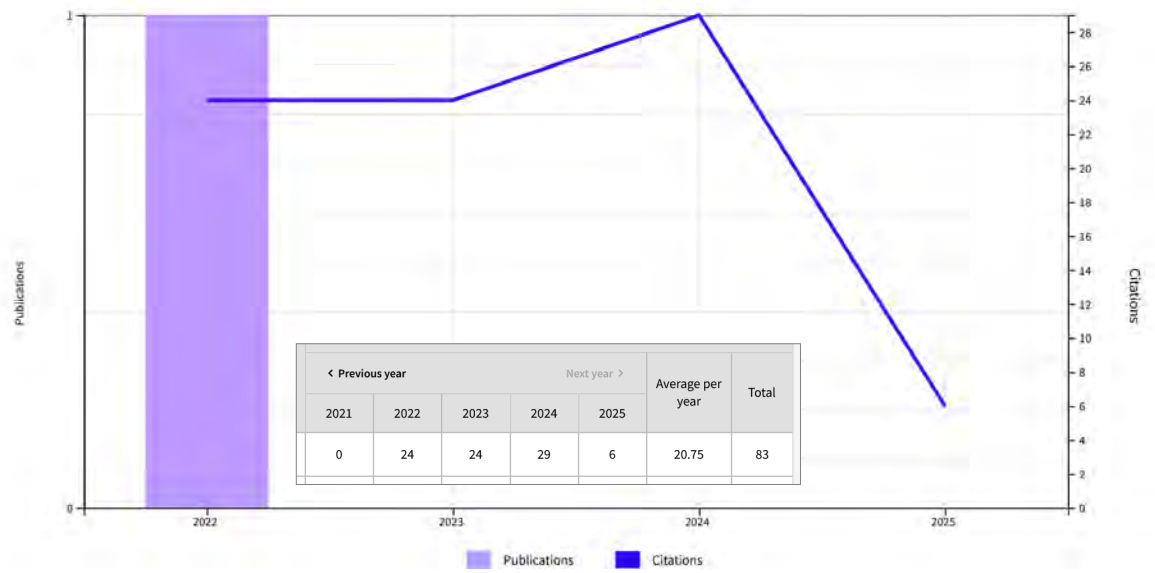
22

Socoliuc, V., Avdeev, M., Kuncser, V., Turcu, R., Tombácz, E., Vékás, L. Ferrofluids and bio-ferrofluids: looking back and stepping forward, NANOSCALE, Volume: 14, Issue: 13, Pages: 4786-4886, PubMed ID: 35297919, ISSN: 2040-3364, eISSN: 2040-3372, 2022;
Times Cited in Web of Science Core Collection: 83

Abstract: Ferrofluids investigated along for about five decades are ultrastable colloidal suspensions of magnetic nanoparticles, which manifest simultaneously fluid and magnetic properties. Their magnetically controllable and tunable feature proved to be from the beginning an extremely fertile ground for a wide range of engineering applications. More recently, biocompatible ferrofluids attracted huge interest and produced a considerable increase of the applicative potential in nanomedicine, biotechnology and environmental protection. This paper offers a brief overview of the most relevant early results and a comprehensive description of recent achievements in ferrofluid synthesis, advanced characterization, as well as the governing equations of ferrohydrodynamics, the most important interfacial phenomena and the flow properties. Finally, it provides an overview of recent advances in tunable and adaptive multifunctional materials derived from ferrofluids and a detailed presentation of the recent progress of applications in the field of sensors and actuators, ferrofluid-driven assembly and manipulation, droplet technology, including droplet generation and control, mechanical actuation, liquid computing and robotics.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
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| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 24 | 24 | 29 | 6 | 20.75 | 83 |

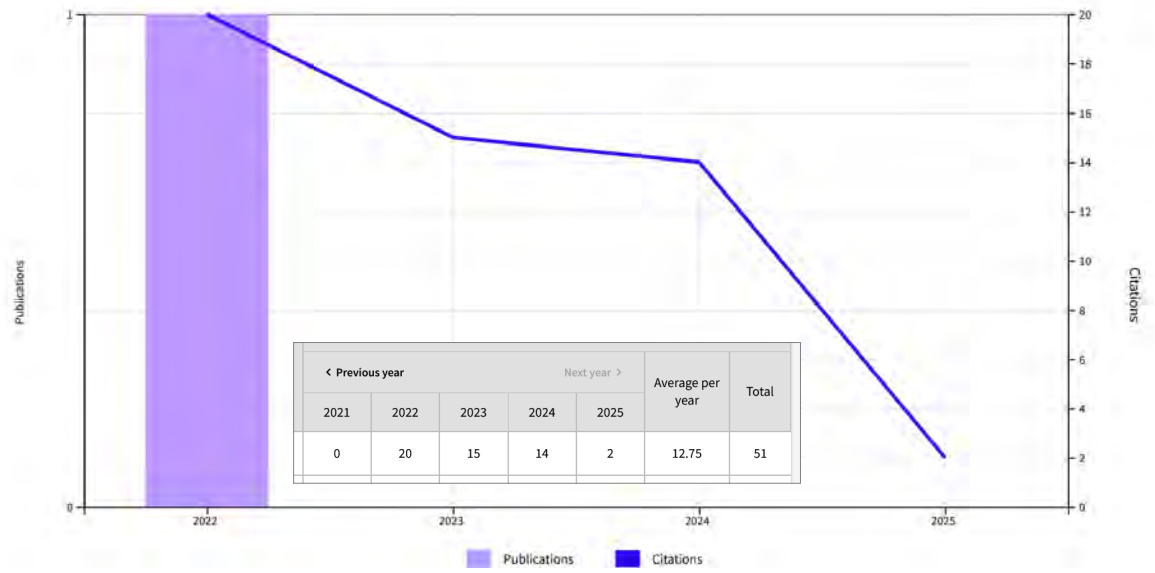
23

Dar, A.A., Hameed, J., Huo, C.H., Sarfraz, M., Albasher, G., Wang, C.Y., Nawaz, A. Recent optimization and panelizing measures for green energy projects; insights into CO2 emission influencing to circular economy, FUEL, Volume: 314, Article Number: 123094, ISSN: 0016-2361, eISSN: 1873-7153, 2022;
Times Cited in Web of Science Core Collection: 83

Abstract: Green energy projects (including wind, solar, biomass, hydro projects) are the major constituents of biofuel projects and primary need of global world which are directly concerned with economic growth and gross domestic products (GDP) development. In last few decades, fossil fuel consumption and carbon dioxide (CO2) emission have been increased due to more economic growth and growing population. Moreover, the objective of this research is to assess the consequence of biofuel including natural gas, environmentally friendly power projects (renewable-energy), and thermal power utilization on financial turn of events including GDP and CO2 in ten top countries. Multivariate climate countries with ubiquitous CO2 emission during the period of 1990-2018 were selected to examine the long-run flexibility as well as the path of causality between different variables, the panel co-integration test, panel heterogonous Dumitrescu and Hurlin causality evaluation and panel completely modified ordinary least squares were employed. The panel co-reconciliation test verify that variables have a long-run equilibrium correlation in their relationships. Long haul versatility and causality tests show that natural gas doesn't add to financial development or CO2 decreases. According to this present study, results can help to develop conservative policies regarding long-run and sustainable energy and design in energy development.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of January/October 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Psychiatry/Psychology** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 20 | 15 | 14 | 2 | 12.75 | 51 |

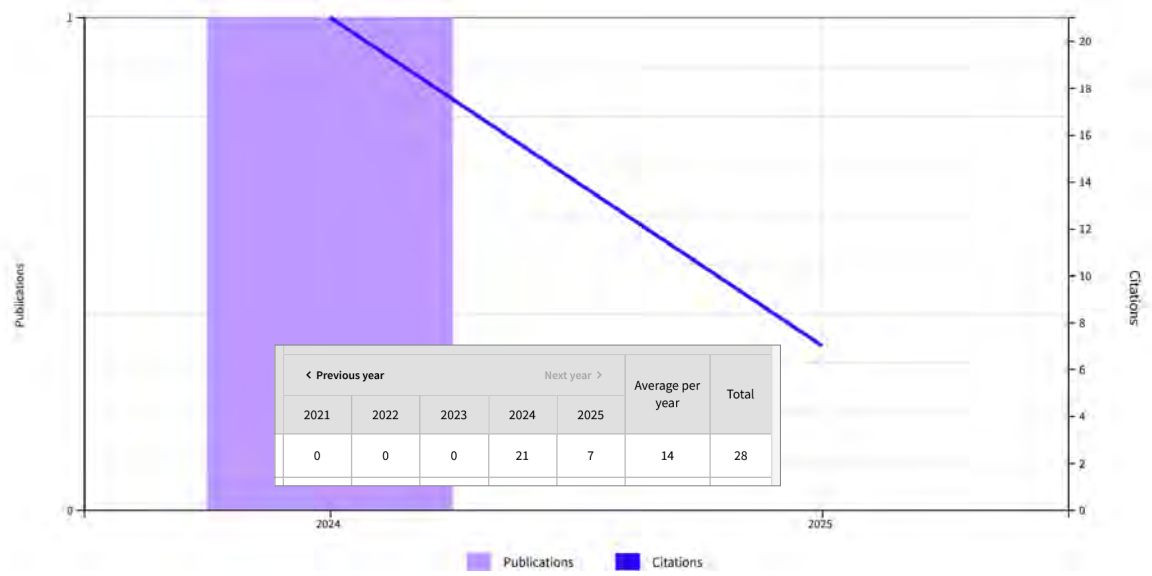
24

Mohsin, M., Jamil, K., Naseem, S., Sarfraz, M., Ivascu, L. Elongating Nexus Between Workplace Factors and Knowledge Hiding Behavior: Mediating Role of Job Anxiety, PSYCHOLOGY RESEARCH AND BEHAVIOR MANAGEMENT, Volume: 15, Pages: 441-457, PubMed ID: 35250318, ISSN: 1179-1578, 2022;
Times Cited in Web of Science Core Collection: 51

Abstract: Purpose: The study objective is to investigate the relationship between workplace ostracism, workplace incivility, and knowledge hiding behavior (evasive hiding, playing dumb, rationalized hiding) while considering the mediating role of job anxiety.
Methods: The study collected data through structured questionnaires from 275 participants (ie, employees) working in the small to medium-sized enterprise of five big cities of Pakistan. The study adopted a structured equation modeling technique for data analysis.
Results: Significantly, the study results suggest a positive effect of workplace ostracism and workplace incivility on employees' knowledge hiding behavior, and job anxiety significantly mediates the relationship between workplace ostracism, workplace incivility, and knowledge hiding behavior of employees.
Conclusion: The present study highlights the need to examine the personality disposition for understanding the relationship between the variables (eg, workplace ostracism, workplace incivility, knowledge hiding behavior). Employees' inappropriate behavior had suppressed by initiating a campaign for a realistic job preview, setting an exceptional example. The study significantly contributes to the current literature on knowledge hiding behavior by presenting valuable insight into organizational and individual variables, subsequently influencing the knowledge hiding behavior of individuals. Indeed, this study is the first to investigate the predictive effect of the proposed variables.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of July/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Computer Science** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
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| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 0 | 0 | 21 | 7 | 14 | 28 |

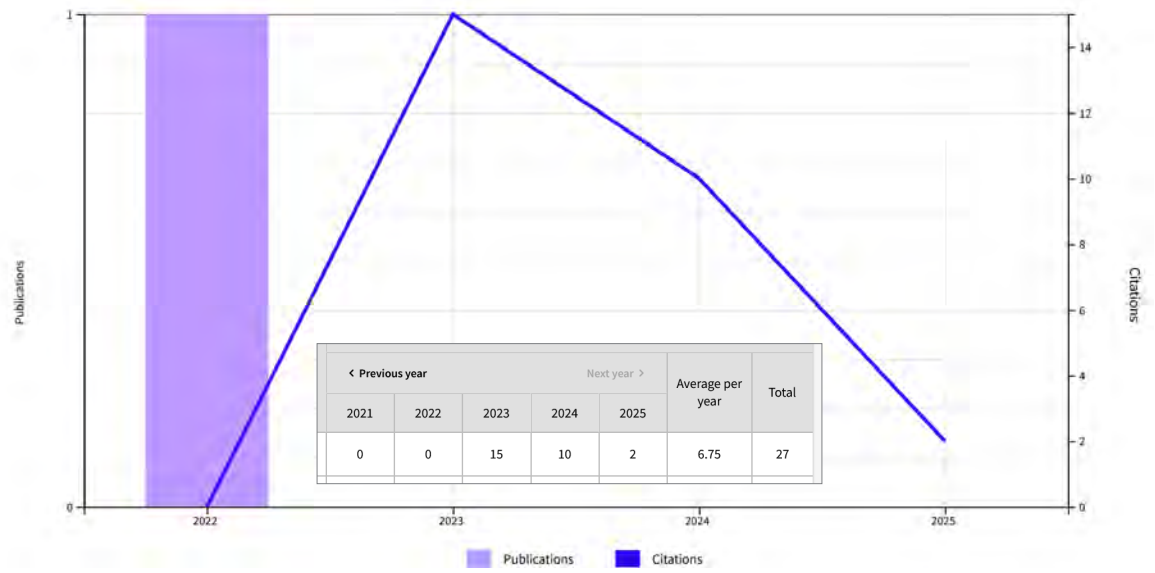
25

Roman, R.C., Precup, R.E., Petriu, E.M., Borlea, A.I. Hybrid Data-Driven Active Disturbance Rejection Sliding Mode Control with Tower Crane Systems Validation, ROMANIAN JOURNAL OF INFORMATION SCIENCE AND TECHNOLOGY, Volume: 27, Issue: 1, Pages: 50-64, ISSN: 1453-8245, 2024;
Times Cited in Web of Science Core Collection: 28

Abstract: This paper proposes a combination of a data-driven algorithm represented by continuous-time Active Disturbance Rejection Control (ADRC) and a Sliding Mode Control (SMC) algorithm. The purpose of this hybrid controller referred to as ADRC-SMC is to improve the overall control-loop system performance while guaranteeing its stability. This will be done through clear, simple, and transparent steps of controller design in a novel real formulation focused on practical implementation. The parameters of the novel second-order continuous-time ADRC-SMC algorithm are optimally tuned using a metaheuristic slime mould algorithm. The purpose of obtaining the parameters of the ADRC-SMC algorithms in this model-based manner is to reduce the heuristics and further ensure a fair performance comparison of the ADRC-SMC algorithm with that of the popular ADRC algorithm. The data-driven second-order continuous-time ADRC and ADRC-SMC algorithms are validated experimentally validated on tower crane laboratory equipment.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of July/October 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Mathematics** based on a highly cited threshold for the field and publication year.

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| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 0 | 15 | 10 | 2 | 6.75 | 27 |

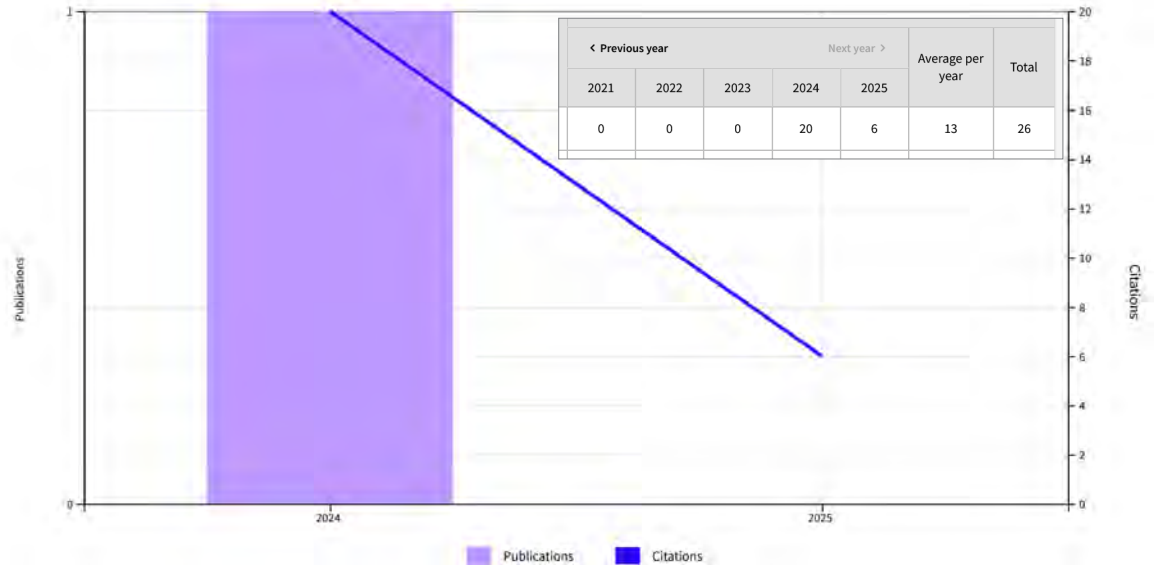
26

Precup, R.E., Duca, G., Travin, S., Zinicovscaia, I. PROCESSING, NEURAL NETWORK-BASED MODELING OF BIOMONITORING STUDIES DATA AND VALIDATION ON REPUBLIC OF MOLDOVA DATA, PROCEEDINGS OF THE ROMANIAN ACADEMY SERIES A-MATHEMATICS PHYSICS TECHNICAL SCIENCES INFORMATION SCIENCE, Volume: 23, Issue: 4, Pages: 403-410, ISSN: 1454-9069, 2022;
Times Cited in Web of Science Core Collection: 27

Abstract: This paper suggests an approach to process and model the data obtained in biomonitoring studies. The approach is validated on data obtained from biomonitoring studies performed in the Republic of Moldova in 2015. Using the preliminary data, the decomposition on the basis of the pollution spectrum for the most polluted and cleanest sites is first carried out. The deviations of model predictions from the actual measurements are considered. A correlation analysis is next performed to evidence the correlation of two geographical coordinates with chemical elements. Factor analysis and regression analysis are applied to highlight the nonlinear mechanisms specific to the obtained data. A multilayer neural network-based model is derived to describe the relationship of the pollution rank to the geographic coordinates. The predictive capabilities of the model are represented graphically.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of July/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Pharmacology & Toxicology** based on a highly cited threshold for the field and publication year.



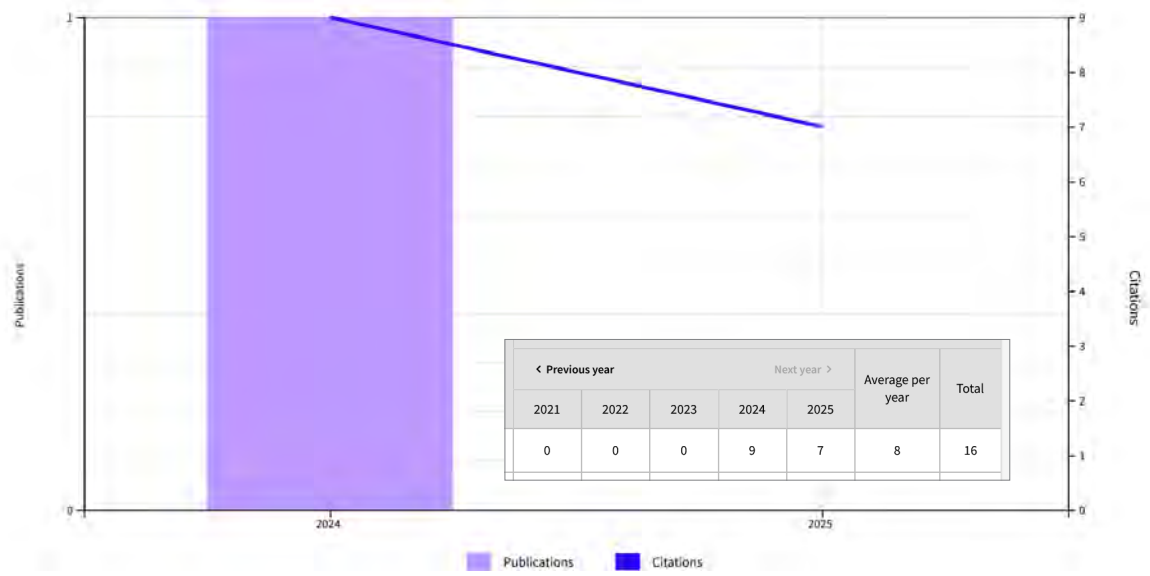

27

Liga, S., Paul, C., Moaca, E.A., Péter, F. Niosomes: Composition, Formulation Techniques, and Recent Progress as Delivery Systems in Cancer Therapy, PHARMACEUTICS, Volume: 16, Issue: 2, Article Number: 223, PubMed ID: 38399277, eISSN: 1999-4923, 2024;
Times Cited in Web of Science Core Collection: 26

Abstract: Niosomes are vesicular nanocarriers, biodegradable, relatively non-toxic, stable, and inexpensive, that provide an alternative for lipid-solid carriers (e.g., liposomes). Niosomes may resolve issues related to the instability, fast degradation, bioavailability, and insolubility of different drugs or natural compounds. Niosomes can be very efficient potential systems for the specific delivery of anticancer, antioxidant, anti-inflammatory, antimicrobial, and antibacterial molecules. This review aims to present an overview of their composition, the most common formulation techniques, as well as of recent utilizations as delivery systems in cancer therapy.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of September/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Pharmacology & Toxicology** based on a highly cited threshold for the field and publication year.




| < Previous year | | | | Next year > | Average per year | Total |
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| 0 | 0 | 0 | 9 | 7 | 8 | 16 |

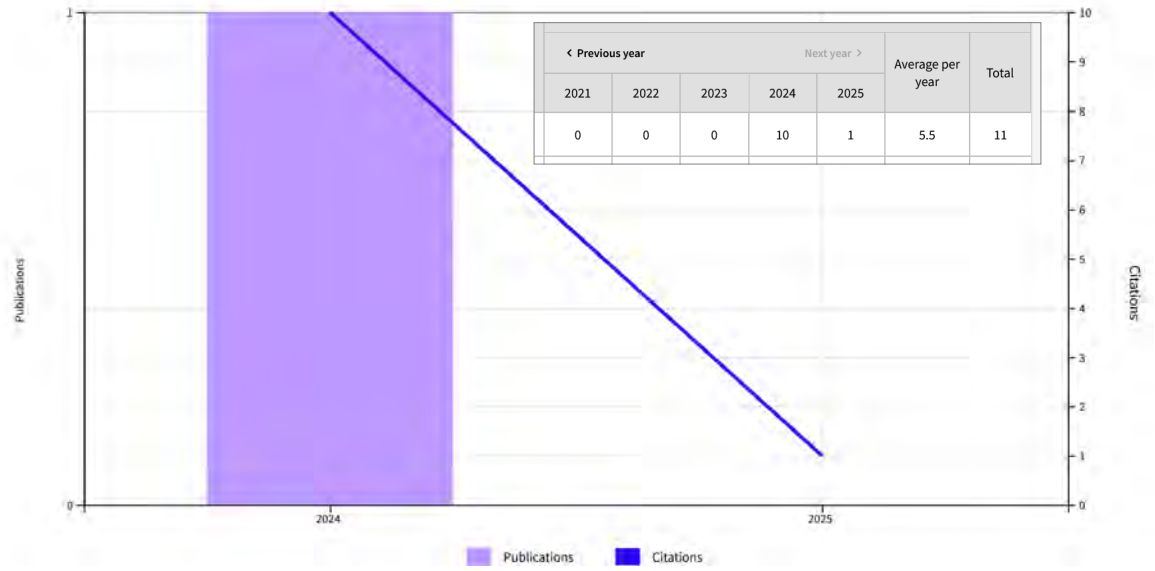
28

Danila, A.I., Ghenciu, L.A., Stoicescu, E.R., Bolintineanu, S.L., Iacob, R., Sandesc, M.A., Faur, A.C. Aldose Reductase as a Key Target in the Prevention and Treatment of Diabetic Retinopathy: A Comprehensive Review, BIOMEDICINES, Volume: 12, Issue: 4, Article Number: 747, PubMed ID: 38672103, eISSN: 2227-9059, 2024;
Times Cited in Web of Science Core Collection: 16

Abstract: The escalating global prevalence of diabetes mellitus (DM) over the past two decades has led to a persistent high incidence of diabetic retinopathy (DR), necessitating screening for early symptoms and proper treatment. Effective management of DR aims to decrease vision impairment by controlling modifiable risk factors including hypertension, obesity, and dyslipidemia. Moreover, systemic medications and plant-based therapy show promise in advancing DR treatment. One of the key mechanisms related to DR pathogenesis is the polyol pathway, through which aldose reductase (AR) catalyzes the conversion of glucose to sorbitol within various tissues, including the retina, lens, ciliary body and iris. Elevated glucose levels activate AR, leading to osmotic stress, advanced glycation end-product formation, and oxidative damage. This further implies chronic inflammation, vascular permeability, and angiogenesis. Our comprehensive narrative review describes the therapeutic potential of aldose reductase inhibitors in treating DR, where both synthetic and natural inhibitors have been studied in recent decades. Our synthesis aims to guide future research and clinical interventions in DR management.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of September/December 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Clinical Medicine** based on a highly cited threshold for the field and publication year.



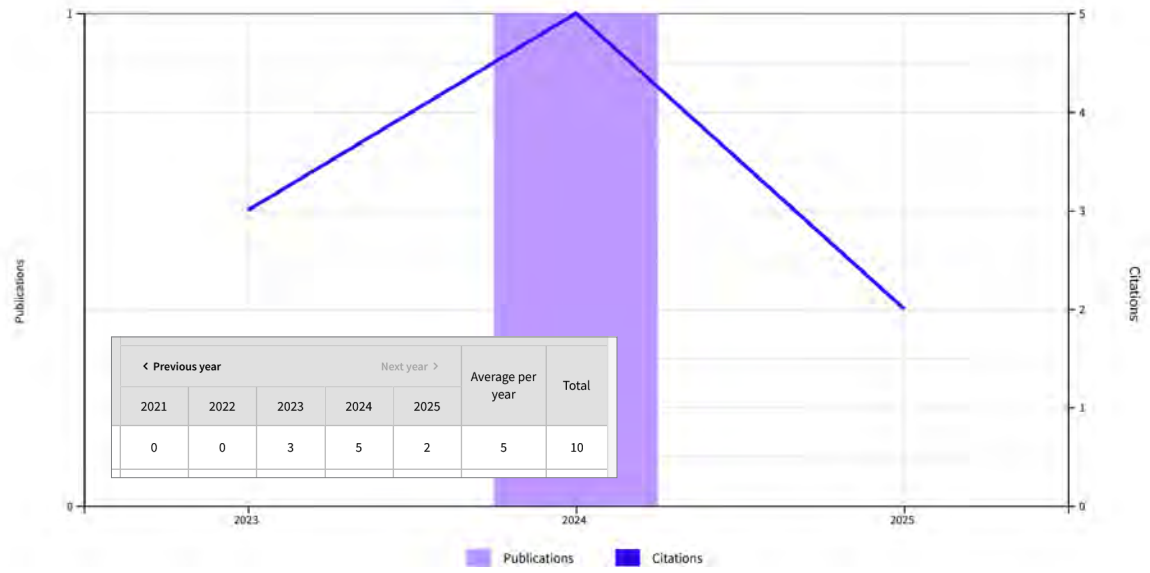

29

Rosu, L.M., Prodan-Barbulescu, C., Maghiari, A.L., Bernad, E.S., Bernad, R.L., Iacob, R., Stoicescu, E.R., Borozan, F., Ghenciu, L.A. Current Trends in Diagnosis and Treatment Approach of Diabetic Retinopathy during Pregnancy: A Narrative Review, DIAGNOSTICS, Volume: 14, Issue: 4, Article Number: 369, PubMed ID: 38396408, eISSN: 2075-4418, 2024;
Times Cited in Web of Science Core Collection: 11

Abstract: Diabetes mellitus during pregnancy and gestational diabetes are major concerns worldwide. These conditions may lead to the development of severe diabetic retinopathy during pregnancy or worsen pre-existing cases. Gestational diabetes also increases the risk of diabetes for both the mother and the fetus in the future. Understanding the prevalence, evaluating risk factors contributing to pathogenesis, and identifying treatment challenges related to diabetic retinopathy in expectant mothers are all of utmost importance. Pregnancy-related physiological changes, including those in metabolism, blood flow, immunity, and hormones, can contribute to the development or worsening of diabetic retinopathy. If left untreated, this condition may eventually result in irreversible vision loss. Treatment options such as laser therapy, intravitreal anti-vascular endothelial growth factor drugs, and intravitreal steroids pose challenges in managing these patients without endangering the developing baby and mother. This narrative review describes the management of diabetic retinopathy during pregnancy, highlights its risk factors, pathophysiology, and diagnostic methods, and offers recommendations based on findings from previous literature.

# Web of Science - Clarivate Analytics Highly Cited Paper

As of March/April 2024, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.

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|---|---|---|---|---|---|---|
| 2021 | 2022 | 2023 | 2024 | 2025 | | |
| 0 | 0 | 3 | 5 | 2 | 5 | 10 |

30

Tanasa, C., Bosioc, A., Stuparu, A., Muntean, S., Susan-Resiga, R. A Perspective Review of Passive Techniques Applied to Control the Swirling Flow Instabilities From the Conical Diffuser of Hydraulic Turbines, APPLIED MECHANICS REVIEWS, Volume: 76, Issue: 1, Article Number: 010801, ISSN: 0003-6900, eISSN: 2379-0407, 2024.
Times Cited in Web of Science Core Collection: 10

Abstract: This paper represents a welcome synthesis of the results obtained by the authors over more than a decade. The reason why such an approach is perfectly justified is found in the novelty of the control techniques of decelerated swirling flows from the conical diffuser of hydraulic turbines. The results presented in this paper refer strictly to the new passive control techniques of the swirling flows instabilities from the conical diffuser of hydraulic turbines. Although the results of these new techniques have been disseminated in various papers, it is difficult to outline an overview from a collection of articles. In addition, a lot of valuable information about modern experimental and numerical investigations is not found in articles that usually distill only the most significant results. Therefore, the present paper achieves a welcome unitary synthesis, useful to specialists in the field of turbomachine hydrodynamics. The reluctance of the turbine manufacturers on active control techniques that use external/additional energy sources led us to the choice of passive control techniques review, especially the ones developed in the last years. The first part of the paper analyzes the specialized literature that includes a variety of passive solutions for mitigating self-induced instabilities of decelerated swirling flow downstream of hydraulic turbines. Such inherent instabilities manifest intensely at far from optimal operating regimes and represent one of the challenges of modern hydraulic turbines. The mitigation of these instabilities is an open problem, so far there are no unanimously accepted technical solutions implemented on prototype turbines. The second part of the paper includes detailed investigations on axial water injection with flow-feedback, but also more recent approaches using adjustable diaphragm in the conical diffuser.

Universitatea Politehnica Timișoara

# BOOKS IN HIGHLIGHT

# 4TH INTERNATIONAL CONFERENCE "COORDINATING ENGINEERING FOR SUSTAINABILITY AND RESILIENCE" & MIDTERM CONFERENCE OF CIRCULARB "IMPLEMENTATION OF CIRCULAR ECONOMY IN THE BUILT ENVIRONMENT"

V. UNGUREANU (Editor), L. BRAGANÇA (Editor),
C. BANIOTOPOULOS (Editor), K.M. ABDALLA (Editor)
Published by: Springer Cham
Pages: 713
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DOI: https://doi.org/10.1007/978-3-031-57800-7


## Short description of the context

The volume represents the state of the art of sustainability and resilience in modern and future built environment, constructions, and infrastructure, and includes topics such as structural materials and robustness, fire engineering, risk assessment, impact of climate change on the built environment, sustainable resilience of systems in the built environment, smart cities, circular economy, design strategies for product design, integration of renewable energy at building and small urban area scales, restoration & rehabilitation of historical buildings, sustainable infrastructures, wind energy structures, façade engineering, green buildings, and waste management.

## Purpose and Motivation of the book

This open access book gathers the proceedings of the **4th International Conference "Coordinating Engineering for Sustainability and Resilience" (CESARE) & Midterm Conference of CircularB "Implementation of Circular Economy in the Built Environment"**, held in Timișoara, Romania, on May 29-31, 2024, as part of the **COST Action CA21103**.

## Summary

169 authors from 31 countries on five continents are contributing with 63 scientific papers and two Keynote Lectures, covering **ten topics**:

- Sustainable Infrastructures
- Structural Engineering
- Energy Systems and Structures
- Innovation in Materials, Products, and Systems
- Circular Value Chains and Stakeholders Engagement
- Circularity KPIs and Criteria for Material, Flow and Design Assessment
- Circular BusinessModels and Economic Viability of Circularity Solutions
- Environmental Impact of Circularity Strategies and Solutions
- Standards and Regulations
- Digitalisation and BIM for Circular Design and Evaluation in Construction

# MECHANISM DESIGN FOR ROBOTICS MEDER 2024

**Erwin-Christian LOVASZ (Editor), Marco CECCARELLI (Editor), Valentin CIUPE (Editor)**
Published by: Springer Cham
Pages: 445
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DOI: https://doi.org/10.1007/978-3-031-67383-2


## Short description of the context

The aim of the Symposium on Mechanism Design for Robotics (MEDER 2024) is to bring together researchers, industry professionals and students from a broad range of disciplines related to mechanisms and robotics, to share the latest developments and discuss the directions for the future of mechanism and robotics research. MEDER 2024 continues a successful series of Symposiums that has been started in Mexico 2010, continued in China 2012, in Denmark 2015, in Italy 2018 and in France 2021.

## Purpose and Motivation of the book

This book presents the proceedings of the 6th IFToMM Symposium on Mechanism Design for Robotics **(MEDER)**, held in Timişoara, Romania, 27–29 June 2024. The book offers a source of information and inspiration for researchers seeking to improve their work and gather new ideas for future developments.

## Summary

The book contains the following chapters:
- Mechanism Education and History of MMS (Mechansim and Machine Science)
- Mechanism Design
- Mechanics of Robots
- Experimental Mechanics
- Biomechanics and Rehabilitation
- Linkages and Manipulators
- Innovative Mechanisms/Robots and Their Applications

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Timișoara

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1. Alic, D.D. Vibrații mecanice. Teorie și aplicații, Editura Politehnica, Timișoara, 2024, ISBN 978-606-35-0597-3;
2. Ancuți, M.C., Butaru, F., Deacu, A. MATLAB & SIMULINK în inginerie electrică. Fundamente, Editura Politehnica, Timișoara, 2024, ISBN 978-606-35-0621-5;
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