Universitatea Politehnica Timișoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

Research Report 2022

Annual Research Report

Politehnica University Timisoara

2022

Research Report 2022

Research Report, 2022

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Structure of the report

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 fulfill the requirements for competences 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 2022, 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 nineteen 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 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 2022 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, fourteen, fifteen, sixteen present the most relevant scientific researches that have been published in 2022. 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 seventeen, eighteen and nineteen sections 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 Timişoara
2020
PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN 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.

CITT
POLITEHNICA 2020

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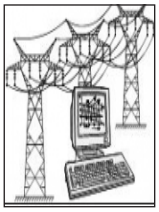
Research Center for Smart Energy Conversion and Storage
Director: Prof. Dr. Eng. Nicolae MUNTEAN
Contact: nicolae.muntean@upt.ro,
https://iee.upt.ro/web/ro/pdf/centru-de-cercetare-energy-conversion-and-storage-control-research-center

"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://eeris.eu/ERIF-2000-000P-0735

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



Research Center for Power Systems Analysis and Optimization
Director: Assoc. Prof. Dr. Eng. Constantin BARBULESCU
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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

Research Center for Organic, Macromolecular and Natural Compounds Chemistry and Engineering
Director: Prof. Dr. Eng. Corneliu DAVIDESCU
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Competence Center for Plastics Processing
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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
Director: Prof. Dr. Eng. Radu-Emil PRECUP
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Research Center for Complex Fluid Systems Engineering
Director: Prof. Dr. Eng. Romeo SUSAN-RESIGA
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Research Center for Medical Engineering
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Research Center for Integrated Engineering
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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 Inorganic Materials and Alternative Energy
Director: Prof. Dr. Eng. Robert IANOȘ
Contact: robert.ianos@upt.ro, http://www.chim.upt.ro/ro/cercetare/centre-cercetare/centru-de-cercetare-pentru-materiale-anorganice-si-energii-alternative

Research Center for Materials and Industrial Technologies
Director: Prof. Dr. Eng. Teodor HEPUȚ
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Research Center for Mechatronics and Robotics
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Research Center for Advanced Study Methods for Physical Phenomena
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Contact: nicolina.pop@upt.ro, https://iee.upt.ro/web/ro/departamente/bazele-fizice-ale-ingineriei

Research Center for Multimedia
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Research Center for Urban Planning and Architecture
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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
Director: Prof. Dr. Eng. Florica MANEA
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Smart Materials and Structures Laboratory
Director: Prof. Dr. Eng. Corneliu-Marius CRĂCIUNESCU
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Center of Advanced Research in Translation
Director: Prof. Dr. Eng. Daniel Codruț DEJICA-CARȚIȘ
Contact: daniel.dejica@upt.ro, https://eeris.eu/ERIF-2200-000S-8245

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,
http://www.mediu.ro/pdf/ANEXA_1_2021.pdf, http://mettcp.mec.upt.ro/laboratoare.html

Laboratory of Acoustic and Vibration

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

Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

SCIENTIFIC EXCELLENCE AWARDS

UPT, the best technical university in the country in the field of Engineering, according to international rankings Times Higher Education (THE) and US News

• Years ago, academician Mircea Malița said that "Timisoara has the best polytechnical university in the country". A reconfirmation of this fact is revealed by two recent international rankings, **Times Higher Education (THE)** and **US News**, which put the Politehnica University Timisoara **on the first place among technical universities**.

• Thus, according to **„Times Higher Education World University Rankings 2023 by subject: Engineering"**, the Politehnica University Timisoara is ranked first among the technical universities, being ranked among the top 1000 universities worldwide. In this ranking, the Politehnica Timisoara scores very well regarding **the number of citations (despite the small number of academic staff, compared to other universities), the income from the industry, the international reputation, the research part and the quality of education**.

• In the ranking developed by US News - Best Global Universities for Engineering in Romania – **the Politehnica University Timisoara is also on the first place among Romanian technical universities, also occupying the 640th place worldwide in Engineering**.

• In this case, too, the criteria that propelled UPT into the world elite are: **global and regional reputation, the number of publications and conferences, the number of citations, the number of papers published between the first 10% of the most cited, international collaborations, the number of scientific papers among the first 1% of the most cited.**

• The positions occupied in the international Engineering rankings are the result of the efforts made by the entire academic community of the Politehnica University Timisoara, in recent years, to ensure a quality education, through the investments that have been made in the development of the material base, through the continuous adaptation of the educational process to the requirements of the labor market, an important role in this regard being played by the UPT Steering Committee, which brings together representatives of the main companies in the area, through the projects carried out, through the research activities, both at theoretical and applied level, through the contracts concluded with the industry.

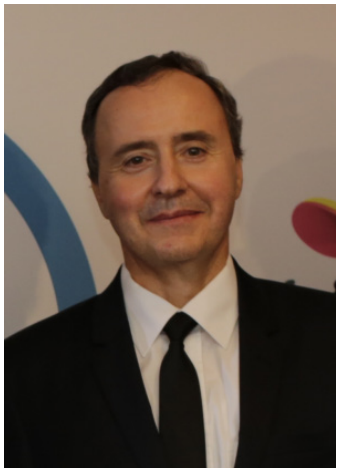
• Thus, it is no coincidence that the percentage of specialized employability among engineering graduates is over 90%, given that the statistics does not consider those who continue their studies, those who leave the country or those who open their own businesses.

Prof. Dr. Eng. Radu-Emil PRECUP among the world's authorities in the Data Science (CDO Magazine)

• CDO Magazine has announced **the 2022 List of academic leaders in Data Science**:
(https://www.cdomagazine.tech/cdo_magazine/topics/news/cdo-magazine-announces-its-2022-list-of-leading-academic-data-leaders/article_e674d960-8074-11ec-bd5a-77d2eb8cbad5.html)

• **Professor Radu-Emil PRECUP**, from the Politehnica University Timisoara, **is the only representative of a Romanian university included in this list which comprises 76 names in 2022 and is presented in alphabetical order of first names**.

• According to the organizers of the top, in the current digital age, **Data Science** has emerged as an important discipline. With the advent of the field, the number of mentors and leaders in the sector has increased. These remarkable academic leaders are paving the way with innovative data and analysis-based concepts. They use their skills to provide significant value and real-world results. These exceptional academic leaders inspire the next generation of data scientists and, more importantly, take the time to collaborate, provide guidance and pass on the information obtained and their academic experience.



• **Professor Radu Emil PRECUP**, currently the director of the **Council for University Doctoral Studies** within the Politehnica University Timisoara, is **one of the world-renowned specialists**.
In 2015, Prof. Dr. Eng. **Radu Emil PRECUP** has been named t**he best in the world in the field of Automatics**. Moreover, the results obtained by himself and his team also took the Politehnica University Timisoara to the first place in the **Scopus ranking**.

• Radu-Emil **PRECUP** deals with the study and rehabilitation of structures and equipment capable of ensuring the management of systems without human intervention. The team he leads published, between 2010 and 2014, 122 articles in the field of Automation, on the controllers, control and tuning branch, and t**heir writings have been cited in about 500 other works around the world**.

• **Prof. Dr. Eng. Radu-Emil PRECUP, was elected, in 2018, a corresponding member of the Romanian Academy, the Science and Technology of Information Section**.

• In 2020, the Politehnica University Timisoara was ranked as the best university in Romania, in the Top of the best universities with study programs in the field of **Informatics, Computers and Electronics**.

• In the ranking published by **Guide2Research**, the Politehnica University Timisoara **is represented by two prestigious researchers in the field, with a total value of the Hirsch index of 89 and a total of 254 DBLP publications, Prof. Dr. Eng. Radu-Emil PRECUP being one of them, together with Prof. Dr. Eng. Ștefan PREITL.**

Romanian Academy Awards for 2020 – "Constantin Budeanu"award and Romanian Academy of Scientists Awards for 2020-"Martin Bercovici"award for the book: "Advanced Electric Drives an UPT Selection" Authors: Sorin MUȘUROI, Cristian LASCU and Valeriu NICOLA OLARESCU

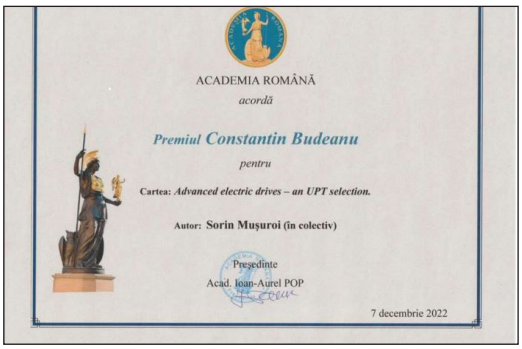
• This book written in English and coordinated by **Prof. Dr. Eng. Sorin Mușuroi** appeared in 2020 on the occasion of the **Centenary of the Politehnica University Timisoara**. The work refers to a scientific research activity over a period of over 20 years, in the field of electric drives, of a group of researchers from this university. Through its content, it is intended to be a praise brought to the School of Electric Drives of the Faculty of Electrical and Power Systems Engineering, a valuable link of Politehnica University Timisoara, through the achievements of the teaching staff and the researches that have served this field for a century.

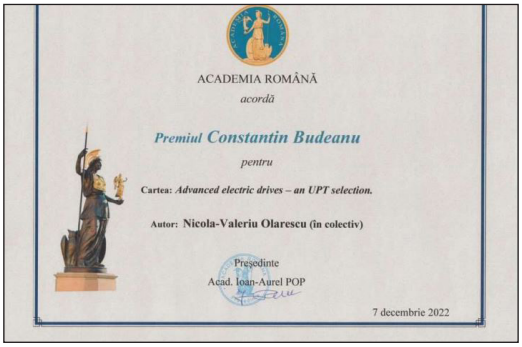
• The book is the direct effect of over ten Ph.D. theses, papers at international conferences and high impact technical journals, with a total of **2438 WoS citations** and **1933 Chapter Downloads** to date, **1 grant** and **3 international research contracts**.

The content of the paper is structured in **9 chapters** that mainly address **4 research themes**:

• **Topic 1**: Scalar and vector control of induction motor drives
• **Topic 2**: Scalar and vector control of permanent magnet synchronous motor drives
• **Topic 3**: Vector control of PM-assisted reluctance synchronous motor drives
• **Topic 4**: Power factor correction in single-phase switching power sources used in electrical drives

• The treatment of each theme is fully realized: from analytical description, control system design, numerical simulation and experimental validation, the latter linked to concrete industrial applications in the fields mentioned above.





Romanian Academy Awards for 2020 – "Henri Coandă" award
For the Group of works: "Electrical machines for variable speed applications: design and control"
Authors: Ileana TORAC, Mihaela-Codruţa PAICU (ANCUȚI), Ana-Adela POPA and Andy-Sorin ISFĂNUȚI

• The Romanian Academy offered, on the 7th of December 2022, the awards for the most valuable scientific and artistic creations achieved in 2020.
The **"Henri Coanda" Award** for Technical Sciences was awarded for the **Group of works: "Electrical machines for variable speed applications: design and control".**

• Authors are: **Ileana Torac, Mihaela-Codruţa Paicu (Ancuţi), Ana-Adela Popa and Andy-Sorin Isfănuţi**, from the Romanian Academy, Timisoara Branch, and from the **Politehnica University Timisoara**. The book was coordinated by the researcher **Ileana Torac**, who worked together with Academician Toma Dordea during his last 25 years.


ACADEMIA ROMÂNĂ
acordă
Premiul Henri Coandă
pentru
Grupul de lucrări: Maşini electrice pentru aplicaţii cu viteză variabilă: proiectare şi control.
Autor: Ana-Adela Popa (în colectiv)
Președinte
Acad. Ioan-Aurel POP
7 decembrie 2022


ACADEMIA ROMÂNĂ
acordă
Premiul Henri Coandă
pentru
Grupul de lucrări: Maşini electrice pentru aplicaţii cu viteză variabilă: proiectare şi control.
Autor: Mihaela-Codruța Paicu (Ancuți) - (în colectiv)
Președinte
Acad. Ioan-Aurel POP
7 decembrie 2022


ACADEMIA ROMÂNĂ
acordă
Premiul Henri Coandă
pentru
Grupul de lucrări: Maşini electrice pentru aplicaţii cu viteză variabilă: proiectare şi control.
Autor: Andy-Sorin Isfănuți (în colectiv)
Președinte
Acad. Ioan-Aurel POP
7 decembrie 2022

• The awarded papers present improved solutions (efficiency, cost, robustness) for a 10 MW, 10 rpm, 15 Hz directly-driven reluctance synchronous generator and for an outer Ferrite-PM-Rotor BLAC motor, apply the "active flux concept" for the control of induction and PM machines, and proposes improved strategies for motion control.

Prof. Dr. Eng. Liviu MARŞAVINA, re-elected Vice President of ESIS

• The 23rd **European Conference on Fracture** was organized in Funchal, Portugal between 27 June to 1 July 2022, by **European Structural Integrity Society (ESIS)**. On this occasion ESIS elected the new Executive Committee. The new President of ESIS was elected Professor Aleksandar Sedmak from University of Belgrade (Serbia) and the **two voted Vice – Presidents are Professor Liviu Marşavina from Politehnica University Timisoara (Romania)** and **Professor Filippo Berto** from **NTNU** Trondheim (Norway).

• **Professor Liviu Marşavina** is **Corresponding Member of Romanian Academy**. He graduated "Liceul de Matematică – Fizică from Reşiţa" (1982) and the Faculty of Mechanics (specialisation TCM) from Politehnica University Timisoara in 1988.

• In 1998 he received the PhD title in ***Strength of Materials, Elasticity and Plasticity***.

• In 2000 received a postdoctoral grant for a research stage at Loughborough University (UK) and between July 2001 to July 2002 was appointed **Research Associate at Sheffield University** (UK).

• From January 2007 to Augus 2008 was employed **More Experienced Researcher** in a **FP6 Marie Curie Transfer of Knowledge** project at Lublin University of Technology (Poland).

• His main research interests are in the field of mechanics of materials, fracture mechanics and structural integrity and durability applied to different materials and structures.

• He has a relevant experience in evaluation of integrity and durability of components from different type of materials metals, ceramics, polymers, composite and cellular materials obtained using classical technologies, or via additive manufacturing.

• **Professor Liviu Marşavina is Honorary Member of Italian Group of Fracture** (IGF) from 2020, **ESIS Fellow from 2020** and he received the **Paolo Lazzarin IGF Medal in 2021**.

Prof. Dr. Daniel DEJICA-CARȚIȘ, Secretary General of the German Society for Translation and Interpretation Studies – DGÜD

• During the annual General Assembly on 20.07.2022, **Prof. Dr. Daniel Dejica-Cartiș**, Dean of the Faculty of Communication Sciences in UPT was elected **Secretary General of the German Society for Translation and Interpretation Studies (DGÜD Deutsche Gesellschaft für Übersetzungs- und Dolmetschwissenschaft)**.

• An academic society, DGÜD aims to promote research in the fields of translation and interpretation, to strengthen the image of translators in society and to facilitate the access of young researchers to research projects in these fields.

• Within the term of office of Secretary of DGUD, Mr. **Dejica Cartiș** aims to strengthen the cooperative relations between the **Faculty of Communication Sciences** and the **German DGÜD** member universities which offer study programs in the fields of translation and interpretation, to encourage student and teacher mobility, and to facilitate access to joint publishing, editorial or research projects.

EDEN Fellow Award, Assoc. Prof. Dr. Eng. Vlad MIHAESCU

• Assoc. Prof. Dr. Eng. **Vlad Mihaescu**, director of the **Innovation and Technology Transfer Office** and member of the **eLearning Center of the Politehnica University Timisoara** received the **EDEN Fellow Award**, one of the most prestigious annual awards of the EDEN community, as **"an expression of appreciation of professional merit to EDEN Members who have demonstrated excellence in professional practice of open, distance and e-learning and provided valued support to the evolution and progress of EDEN"**.

• The award was presented on June 19, 2022, by EDEN President Josep Maria Duart at the Opening Ceremony of the **EDEN 2022 Annual Conference**, hosted by **Tallinn University, Estonia**.

• The first **Senior Fellow** and **Fellow Awards** as an idea were initiated by Professor **Alan Tait**. The introduction of the **EDEN Fellow Awards** professional recognition system took place for the first time at the **2007 Annual Conference in Naples**.

• The purpose of the **EDEN Fellow Awards** is to provide validation and support to professionals in Europe in this field and to increase their mobility in Europe through a respected recognition system.
• During the same Conference, Dr. Mihaescu was elected in the **Management Board of EDEN Digital Learning Europe**.
In the last 13 years, over 100 Fellow and Senior Fellow awards have been given by the decision of the **EDEN Management Board**.

Prof. Dr. Eng. Corina NAFORNITA – Vice-Chair of the Synthetic Aperture Radiometry Study Group – IEEE Signal Processing Society Synthetic Aperture Standards (SPS SASC) Committee

• **The Institute of Electrical and Electronics Engineers (IEEE)** is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. It is designed to serve professionals involved in all aspects of the electrical, electronic, and computing fields and related areas of science and technology that underlie modern civilization.

• IEEE is essential to the global technical community and to technical professionals everywhere, and is universally recognized for the contributions of technology and of technical professionals in improving global conditions.

• In 2022, the IEEE Signal Processing Society has begun an initiative to develop standards and recommended best practices for applying aperture synthesis to a broad range of disciplines: radar, sonar, channel sounding, optics, MRI, quantum apertures, and radiometry.
• For this purpose, the **Synthetic Aperture Standards Committee (SASC)** was created. Its purpose is development, validation, and dissemination of technical standards that describe the processes, procedures, and hardware necessary to correctly perform synthetic aperture measurements in electromagnetic environments. These measurements can be used to accurately characterize propagating and scattered electromagnetic radiation in wireless communication channels.

• In the framework of the **IEEE SPS SASC Committee**, a **Synthetic Aperture Radiometry Study Group** was formed in July 2022. The purpose was to draft a Project Authorization Request (PAR). The end goal was to form a **Working Group** in order to develop a document that describes recommended practices for exploiting aperture synthesis to construct thermometric images of scenes from which to derive useful information such as salinity of oceans and floating ice, moisture of soils and early detection of signs of conflagration.

• The **Synthetic Aperture Radiometry Study Group Officers** are: Brian Sequeira (Johns Hopkins University, USA), as Chair; **Corina Nafornita** (Politehnica University Timisoara, Romania), as **Vice-Chair**; Alexandra Artusio-Glimpse (NIST, USA), as Secretary and Jonathan Goldberg (IEEE, USA), as Program Manager.

• The webpages of the **SASC Committee and of the Radiometry Study Group** are:

• https://sagroups.ieee.org/sps-sasc/ and
• https://sagroups.ieee.org/saradiometry/.

Assist. Prof. Dr. Eng. Raul Cristian ROMAN, on the first place in the Rada Mihalcea Awards competition „Young researchers in science and engineering" from Cluj-Napoca

Assist. Prof. Dr. Eng. Raul-Cristian ROMAN, member of the academic staff within the Department of Automation and Applied Informatics of the Politehnica University Timisoara, won t**he first prize in the Rada Mihalcea Awards „Young researchers in science and engineering", 8th Edition**. During the competition there were over 40 applications of the most famous young researchers in the country and abroad.

• The competition aims to recognize young researchers in the field of science and engineering who, through their work, have demonstrated excellence and made extraordinary contributions in their field.
• The contest is organized by the City Hall of Cluj-Napoca in partnership with **Prof. Dr. Rada Mihalcea** (a honorary citizen of Cluj-Napoca since 2014 and professor at the University of Michigan).

• **Assist. Prof. Dr. Eng. Raul-Cristian ROMAN** is an assistant professor in the Department of Automation and Applied Informatics of the Politehnica University Timisoara and is part of the team coordinated by **Prof. Dr. Eng. Radu-Emil Precup**, corresponding member of the Romanian Academy.

Raul-Cristian Roman was also awarded:

• **The TUDOR TĂNĂSESCU Award** of the **Romanian Academy** in 2018 (awarded in 2020);
• **Best Paper Award** at the **7th International Conference on Information Technology and Quantitative Management ITQM 2019** (Granada, Spain);
• **Honorary Mention** within the competition **2020 IEEE Robotics & Automation Society**, **Romania Chapter**, **Best PhD Thesis Competition**;
• **Highly Cited Paper** according to **Clarivate Analytics Web of Science**, for a paper published in 2021 in the European Journal of Control;
• Top Cited Article in 2020-2021 according to the Wiley publishing house, for a paper published in 2021 in the Asian Journal of Control;
• **2021 Outstanding Accessible Title in STEM** for a book published in 2021 by **CRC Press (Taylor and Francis)**.

Romanian Academy of Technical Sciences Awards - "Stefan Grosu" award for 2022 for the book: "Hybrid DC DC Converters"
Authors: Octavian CORNEA, Dan HULEA and Nicolae MUNTEAN

• The monograph **"Hybrid DC converters"**, having as authors a group of academics from the Department of Electrical Engineering **Octavian Cornea, Dan Hulea and Nicolae Muntean** won the **"Stefan Grosu" award** offered by the **Romanian Academy of Technical Sciences**.

• We mention that **Prof. Dr. Eng. Nicolae Muntean** is an **honorary member of the Romanian Academy of Technical Sciences**.

• The paper summarizes the experience of the group of authors, carried out over 10 years of research, in the design and implementation in renewable and automotive energy applications of new configurations of equipment with power electronics.

• It is another success of the authors and of the "POLITEHNICA" Publishing House, following two other awards obtained by the same work, offered by the **Romanian Academy (2021)** and the **Academy of Scientists (2020)**.

ACADEMIA DE ȘTIINȚE TEHNICE DIN ROMÂNIA

PREMIUL ASTR 2022

SECȚIA ELECTROTEHNICĂ - ENERGETICĂ

Se acordă **Premiul Ștefan Grosu**

Prof. dr. ing. Nicolae MUNTEAN, prof. univ. dr. ing. Octavian CORNEA, prof. univ. dr. ing. Dan HULEA

Pentru lucrarea: **Convertoare de curent continuu hibride**

Editura Politehnica Timișoara, 2019

11 noiembrie 2022

Președinte, Mihai MIHĂIȚĂ

Excellence Awards 2022 Gala at the Politehnica University Timisoara Prof. Dr. Eng. Francisc PETER, the „Centenary" Award, Assist. Prof. Dr. Eng. Raul Cristian ROMAN, the „Excellence in Research" Award

Also in 2022 the **Politehnica University Timisoara** reconfirmed that it supports and recognizes true values, rewarding the efforts made, by organizing an event that pays homage to the entire academic community - the **Excellence Awards Gala of UPT for 2022**.

• The **"Ioan de Sabata" Awards** were offered to teachers who distinguished themselves through excellence in the educational process and in student tutoring, based on an open competition, on proposals from the commissions established at the level of each faculty:

• **Lecturer Dr. Arch. Diana Giurea**, (Faculty of Architecture and City Planning); **Assoc. Prof. Dr. Eng. Răzvan Virgil Bogdan** and **Assoc. Prof. Habil. Dr. Eng. Adrian Călin Popa** (Faculty of Automation and Computing); **Lecturer Dr. Eng. Ana Cristina Paul** (Faculty of Industrial Chemistry and Environmental Engineering); **Lecturer Dr. Eng. Clara-Beatrice Vîlceanu** (Faculty of Civil Engineering); **Assoc. Prof. Dr. Eng. Bogdan Marinca** and **Assoc. Prof. Dr. Eng. Ioana Monica Pop Călimanu** (Faculty of Electronics, Telecommunications and Information Technologies); **Lecturer Dr. Eng. Marcus Svoboda** (Faculty of Electrical and Power Engineering); **Lecturer Dr. Eng. Mihaela Popa** (Faculty of Engineering in Hunedoara); **Lecturer Dr. Eng. Alin Florin Totorean** and **Assist. Prof. Dr. Eng. Andrei Tiberiu Borborean** (Faculty of Mechanical Engineering); **Assoc. Prof. Dr. Eng. Adina Ramona Palea** (Faculty of Communication Sciences).

• Also for excellence in the educational process, at the proposal of the UPT Senate Education Commission, the **„Ioan de Sabata Innovation in Education" Awards** were conferred onto the following: **Lecturer Dr. Eng. Anca-Maria Moscovici** and **Assoc. Prof. Dr. Eng. Alexandru Topîrceanu**.

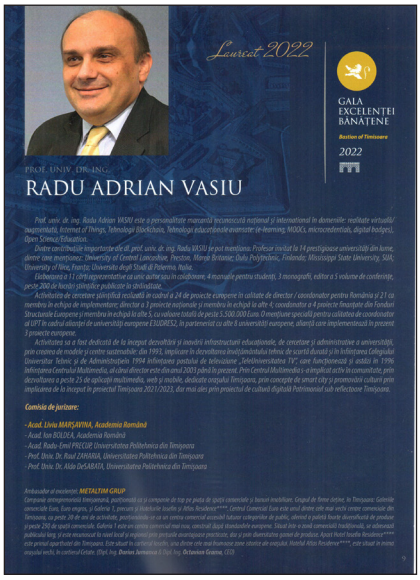
• The **„Excellence in Research" Awards** were offered to young Master students, doctoral candidates or researchers with the most articles published in internationally ranked journals: **Eng. Magdalena Patricia Marinca**, **Ph.D. Student Eng. Lucian Tudor Popa**.

• The **„Excellence in Sports" Award** was offered to the women's football team of the Politehnica Timișoara, which managed a unique performance: to score **75 goals and not receive any**.

• The efforts made throughout the year were rewarded by the prizes **„Excellence in Digitization" (Lecturer Dr. Eng. Andrei Ternauciuc)**, **„Excellence in Sustainable Development" (Prof. Dr. Eng. Ec. Marian Liviu Mocan)**, **„UPT Innovation Fellows"** (Bike UP and Clevercity).

• A number of awards of excellence have also been offered to **UPT' s educational and strategic partners**: **„UPT Economic Partner"** (ATOS, FLEX and HONEYWELL), **„Excellence in Culture"** (Hungarian State Theater „Csiky Gergely" from Timișoara), **„Excellence in ATU Partnership"** (**Prof. Dr. Cristina Adriana Dehelean**, from the University of Medicine and Pharmacy „Victor Babeș" from Timișoara, **Prof. Dr. Dana Petcu**, from the West University, and **Prof. Dr. Eng. Sorin Stanciu**, from the University of Life Sciences „King Mihai I"), **„Timisoara 2030"** (**Dr. Eng. Ovidiu Șandor**, entrepreneur), **„Alumnus UPT"** (**Prof. Dr. Eng. Alin Albu Schaffer**, DHC, Director of the Institute of Robotics and Mechatronics, German Aerospace Center), **„Centenary" (Prof. Dr. Eng. Francisc Peter, Faculty of Industrial Chemistry and Environmental Engineering**).

Banat Excellence Gala 2022 - "Traian Vuia" Award for "Engineering Sciences", Prof. Dr. Eng. Radu Adrian VASIU



• 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, is offered every year to some personalities of the Politehnica University Timisoara, in 2022 having as winner professor **Radu Adrian VASIU** from the Department of Communications.

• **Prof. Dr. Eng. Radu Adrian VASIU** is a prominent personality, recognized nationally and internationally **in the fields of virtual / augmented reality, Internet of Things, Blockchain Technologies, Advanced Educational Technologies (e-learning, MOOCs, microcredentials, digital badges), Open Science/Education**.

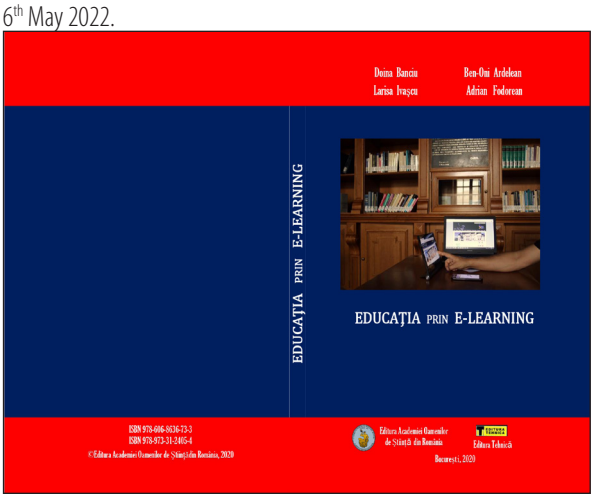
• Its activity has been dedicated to the development and innovation of the educational, research and administrative infrastructure of the university, by creating sustainable models and centers:
- 1993, development of short-term technical education, establishment of the Technical and Administrative University College
- 1994, establishment of the television station "TeleUniversitatea TV"
- 1996, establishment of the Multimedia Center
- 1994, creation of the school in Multimedia at UPT, at college level, then Bachelor level and two Master specializations
- Introduction of new courses: Development of multimedia applications, Testing of electronic and telecommunications equipment, Digital television; Audio-video compression, Advanced multimedia technologies, Internet of Things systems, Design and research management
- 1998, establishment of the Distance Education and e-Learning Center (CEL), which provides support for blended learning in the university through the **UPT Virtual Campus**.

• International recognition is highlighted by the positions of president of IAFES (International Association for e-Science) Vienna, since 2013, president of EATA (European Association for Telematics Applications) 2009-2013, Fellow member of EDEN (European Distance and E-learning Network) since 2020, member of IEEE Communications Society and IEEE Computer Society.
He was the UPT Scientific Secretary between 2004 and 2012 and is currently the **President of the UPT Senate**.

• The publishing activity includes 11 representative books, 5 volumes of edited conference proceedings, 4 textbooks for students, 3 monographs, 16 book chapters in foreign publishing houses and over 200 scientific works published in journals or at international conferences.

The „Ștefan ODOBLEJA" Prize awarded in 2022 - Prof. Habil. Dr. Eng. Larisa IVAȘCU

• The prize was officially awarded during the special session **"Romanian Academy of Scientists Awards for the year 2020"** held in Aula of the "Carol I" Central University Library of Bucharest, on 6th May 2022.



• This prize was obtained for the book titled **Education Through E-Learning** developed by: Doina BANCIU, Ben Oni ARDELEAN, **Larisa IVAȘCU**, Daniel FODOREAN.

• The book, **Education through e-learning**, is up-to-date both through the topics included, but also through the original way of solving specific problems regarding the learning-teaching processes. The harmony of the development of each chapter is logical and well argued. The general objective of this book is to present, in a systemic way, **the progress and current state of e-learning education**. The entire work is in the form of a guide intended to support the educational process in Romania.

• The theories addressed, the fundamental elements of the distance teaching-learning process, technologies, and digital libraries in support of E-learning and the current context of the online education process are indispensable elements for the development of a sustainable e-learning system.

• The chapters of the book are of great interest to trainers, teachers and researchers, students, pupils, instructors, consultants, and other categories of practitioners and in general to all those concerned with e-learning education. The way of presenting the knowledge is easy to understand, completely and correctly connected to the national economic realities, the work can contribute to the optimization of the learning systems. The paper's contribution to the way of defining the learning culture is highlighted, in a holistic, logical and motivating approach for developers.

Certificate „2019 Best Paper Awards" – Prof. Habil. Dr. Eng. Larisa IVAŞCU

• **Prof. Dr. Eng. Victoria Larisa IVAŞCU** has been awarded with **Certificate 2019 Best Paper Awards** for the paper entitled **„Occupational Accidents Assessment by Field of Activity and Investigation Model for Prevention and Control"**, **Larisa IVAŞCU**, Lucian-Ionel CIOCA, Safety 2019, 5(1), 12; doi: 10.3390/safety5010012.

• The rate of occupational accidents is increasing, leading to a number of organizational deficiencies. For European Union (EU), the non-fatal accident number in 2017 was 3,315,101. An increase in the number of accidents is recorded in many of the member states. In addition, **the increase in accidents** tends to focus on certain sectors and is due more to the increase in the incidence rate than the increase in the workforce. Companies in these industry sectors have also implemented less intensive prevention practices than firms in other sectors.

• Performing a statistical evaluation of non-fatal and fatal accidents is an important one. This assessment helps managers understand the importance of implementing prevention and control methods across organizations.

• For this research, we used **series of data obtained from the Romanian National Institute of Statistics (NIS), Labor Inspection in Romania, and Eurostat of the European Commission**. Data series evaluations were conducted for the **EU and Romania**.

• A qualitative assessment of the industry data series had been carried out. Furthermore, T-tests and analysis of variance analysis (ANOVA) were performed to identify the relationships between the frequency index of fatal and non-fatal accidents, and the categories chosen. The values obtained for men were significantly higher than those of female workers. Based on the results of the qualitative assessment and European and national strategies, an experimental model for the prevention and control of occupational accidents is proposed.

• At the end of the paper, the situation of labor accidents in Romania and Bulgaria, two EU member states, is assessed in the agriculture, forestry and fishing, manufacturing, construction and transport, and storage sectors.

• A series of trends are presented for the period 2018–2020. The results obtained from the evaluation of the data series represent an important core of the Romanian Labor Inspectorate for the development of strategic actions.

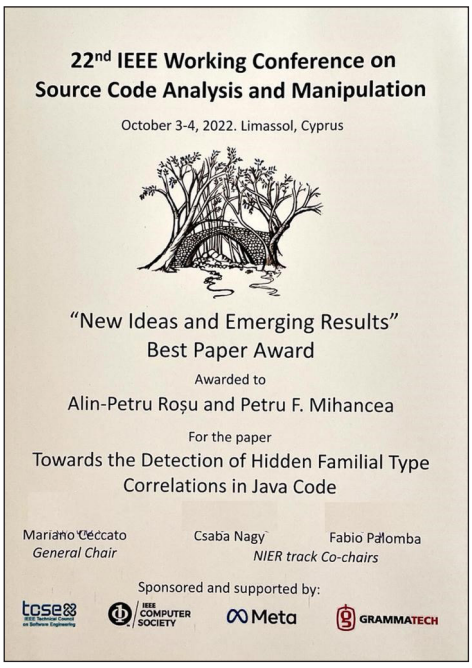
"New Ideas and Emerging Results" Best Paper Award – Alin-Petru ROȘU and Petru F. MIHANCEA
22nd IEEE Working Conference on Source Code Analysis and Manipulation, Cyprus

• The article titled "Towards the Detection of Hidden Familial Type Correlations in Java Code" has received the "Best Paper Award" distinction in the "New Ideas and Emerging Results" section of the 22nd edition of the IEEE Working Conference on Source Code Analysis and Manipulation (SCAM), held in Limassol, Cyprus. The authors of the article are **Alin Petru Roșu**, a master student from the Faculty of Automatics and Computers, and **Petru Florin Mihancea**, associate professor at the Department of Computers and Information Technology, Politehnica University Timisoara.

• The article introduces the idea of identifying and a corresponding detection method for situations within object-oriented programs, particularly in Java, where the use of a less widespread programming mechanism, known as family polymorphism, would be possible.

• The SCAM conference (https://www.ieee-scam.org/2022/) is a top conference, co-located annually with the prestigious IEEE International Conference on Software Maintenance and Evolution (ICSME).

• It focuses on theoretical aspects, techniques, and applications related to source code analysis, operating under the premise that, in practice, source code provides "the only precise description of the behavior of the system".



The excellence award "Golden Award" and "PR Innovator of the Year", received at the Gala Romanian PR Award 2022 for the project "Spotlight Heritage Timisoara"

• The project **"Patrimoniul sub reflectoare Timișoara / Spotlight Heritage Timisoara"** is a digital cultural initiative of the Politehnica University Timisoara through the **eLearning Center (Dr. Eng. Diana ANDONE) and the Multimedia Center**, achieved in partnership with the **National Museum of Banat and "Timișoara 2023 – European Capital of Culture" Association**. The award gala took place in Bucharest, on November 24, 2022, enjoying the support of a top international jury, which brought together powers in communication from 15 countries.

• The success of this project was a great joy, given that, in the competition of the **Romanian PR Award 2022 Gala**, the most important national competition for the recognition of excellence in the field of **Public Relations**, 408 applications were registered in the 33 categories of the competition.

• At the **20th edition** from 24 November 2022 of the competition **Romania PR Award**, the project won the category **"Communication in the public sector"**, with two awards: **"Golden Award for Excellence"** and **the great prize, "PR Innovator of the Year"**.

• The special distinction **„PR Innovator of the Year"** was specially awarded by **Telekom Romania Mobile**, for **innovation and transferability of the idea for other fields or cities**. The project was created with and for the community, becoming a landmark of the city on the Bega. One of the most important features of the project is its participatory nature: the involvement of students and teachers in the creation of digital artifacts, the participation of young people or seniors, the cultural and academic sectors, all having a valuable contribution to the achievement of the project.

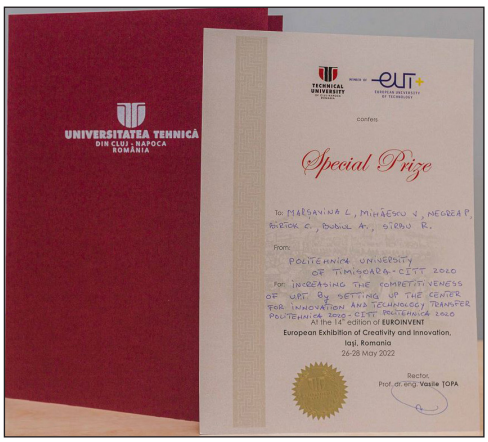
14th European Exhibition of Creativity and Innovation "EUROINVENT 2022" Iasi, 26-28 May 2022
Multiple medals for Politehnica University Timisoara

• Politehnica University Timisoara participated between May 26-28, 2022 in the **Euroinvent International Exhibition in Iași**, 14th edition with: **7 patents, 7 research projects, 9 doctoral theses, 3 student projects and 10 publications**. UPT participation in Euroinvent 2022 was carried out under the auspices of the **Center for Innovation and Technology Transfer - Politehnica 2020**.

• An international jury awarded the **Grand Scientific Prize** and the **Euroinvent Trophy 2022** to the Politehnica University Timisoara and to the team led by **Corneliu BIRTOK-BANEASA**, for the complexity and large number of inventions and research with which they participated in the event.

• Politehnica University Timisoara also obtained:
14 special awards, 7 gold medals, 12 silver medals, 3 bronze medals and 4 diplomas of excellence.

• At the same time, for the 10 publications registered, the **CITT UPT team** obtained at **EuroInvent Book Salon** the following performances: **2 gold medals, 4 silver medals, 1 bronze medal and 3 diplomas of excellence**.



• Here are some of the outstanding prizes:
• **Diploma of Gold Medal 2022** for the Research project: **Increasing the competiveness of UPT by setting up the Center for Innovation and Technology Transfer Politehnica 2020 - CITT Politehnica 2020**, authors: **Liviu MARȘAVINA, Vlad MIHAESCU, Petru NEGREA, Corneliu BIRTOK-BANEASA, Adina BUDIUL BERGHIAN, Roxana SÎRBU.**

• Virtual catalog:
https://www.euroinvent.org/Report_Euroinvent_2022.pdf

• "Special Prize", from the **Technical University of Cluj Napoca**, for "**Increasing the competitiveness of UPT by setting up the Center for Innovation and Technology Transfer Politehnica 2020-CITT Politehnica 2020**" to: **Liviu MARSAVINA, Petru NEGREA, Corneliu BIRTOK BANEASA, Adina BUDIUL BERGHIAN, Roxana SÎRBU.**

• "**Innovation Award**", from the **University of Craiova Romania**, granted as a sign of appreciation for the innovative spirit in the field of scientific research to the **Center for Innovation and Technology Transfer Politehnica 2020**.

IDEA 2022 Exhibition and Fair, 10-11 June, Szolnok, Hungary
Multiple medals for the Politehnica University Timisoara

The city of **Szolnok in Hungary** became for 2 days the pole of innovation and research in Central Europe, after hosting between June 10-11, 2022, the 13th edition of the **IDEA International Invention Exhibition 2022**.

• The **IDEA International Invention Exhibition** has been organized regularly since 1999 by the **IDEA 13 Association**, bringing together inventors and researchers from around the world. This year's edition of the exhibition was organized with the support of the **Szolnok Local Council** and the **Hungarian Office for Intellectual Property**.

• Politehnica University Timisoara participated with **31 projects registered** (patents, student and research projects, doctoral theses and publications).

• A number of **31 gold medals** and **5 special prizes** were obtained, the most prestigious being **Julianna Dij Award**, which was offered to the **Politehnica Innovation and Technology Transfer Center 2020** for its contribution to the innovation and technology transfer in the Western region.

The 26th International Exhibition of Inventics "Inventica 2022" Iasi, 22-24 June 2022 Multiple medals for Politehnica University Timisoara

The team of the Politehnica University Timisoara participated in the International Exhibition of Inventions – **INVENTICA 2022 Iasi**, 26th edition, held between 22-24 June 2022, with **29 entries (patents, student and research projects, doctoral theses and publications)**.

The event was organized by the Technical University „Gheorghe Asachi" from Iași and the National Institute of Invention from Iași, and on behalf of UPT participated the **CITT-UPT team** consisting of **Lecturer Dr. Eng. Corneliu Birtok Băneasa, Lecturer Dr. Eng. Adina Budiu Berghian and Eng. Agnes Stepanian**.

The International jury appreciated the complexity, diversity and level of work of the CITT-UPT team, which won the following awards:
3 Special Awards, 9 Diplomas of Excellence, 5 Gold Medals, 8 Silver Medals and 16 Bronze Medals.

Moreover, the **Center for Innovation and Technology Transfer - Politehnica 2020** obtained the **Award for Excellence in Innovation**, awarded by the Politehnica University of Bucharest.

7th International Invention Innovation Competition in Canada, iCAN 2022, online edition 27 August 2022
Gold medal for CITT Politehnica 2020

• The **UPT Center for Innovation and Technology Transfer team** has won a new distinction - **the gold medal** in the international competition for inventions and innovative projects in Canada, **iCAN 2022** of August 27, 2022, **Toronto**.

• The growth of innovation in the West Region of Romania (Timis County) can be achieved by establishing and operationalizing a **Center for Innovation and Technology Transfer within the Politehnica University Timisoara**.

• The purpose of establishing this CITT is to provide support to innovation and technology transfer entities in areas of intelligent specialization, namely: **Information and communication technologies, Space and security, Eco-nanotechnologies and advanced materials and Energy, environment and climate change**.

CERTIFICATE OF AWARD

THIS CERTIFICATE IS PROUDLY PRESENTED TO

MARSAVINA Liviu MIHAESCU Vlad
NEGREA Petru BIRTOK-BANEASA Corneliu
BUDIUL BERGHIAN Adina SIRBU Roxana

FOR THE ACHIEVEMENT OF

GOLD MEDAL

BY THE INVENTION · INNOVATION ENTITLED :

Increasing the competitiveness of UPT by setting up the Center for Innovation and Technology Transfer Politehnica 2020 - CITT Politehnica 2020

AT THE 7TH ANNUAL EDITION OF THE INTERNATIONAL INVENTION INNOVATION COMPETITION IN CANADA, ICAN 2022

ORGANIZED BY TORONTO INTERNATIONAL SOCIETY OF INNOVATION & ADVANCED SKILLS (TISIAS)

HELD ON AUGUST 27TH, 2022 IN TORONTO, CANADA

MOONSUK CHANG
ORGANIZING CHAIRMAN

BOB HUYBRECHTS
CO-CHAIRMAN OF THE JURY

Novelty Invention and Craft International Exhibition, 24-25 September 2022, Abony, Hungary, IDEA Gold Award for a team from Politehnica University Timisoara Dr. Eng. Stefan PAVEL

• Between September 24-25, 2022, **IDEA Novelty Invention and Craft International Exhibition** took place in **Abony, Hungary**. The IDEA International Invention Exhibition has been regularly organized since 1999 by **IDEA Club 13 Association**, bringing together inventors and researchers from around the world.

• A research team from Politehnica University Timisoara, Research Institute for Renewable Energy has been awarded the **IDEA Gold Award** for its successful presentation.
Research Team: **Pavel Stefan, Ungureanu Daniel- Viorel, Dobrin Emilia, Bînzar Alexandru**
• Name of invention: **Installation used for cleaning a segment from a section of a collector pipe of domestic wastewater**

• **Dr. Eng. Pavel Stefan** has received a **Certificate and Award** with sincere appreciation for his excellent collaboration, which broadly supports innovation and inventors.

OKLEVÉL

IDEA-2022 Abony (ötlet, újdonság, találmány és kézműves) nemzetközi kiállításon
IDEA-2022 Abony (IDEA, Novelty, Invention and craft) International Exhibition, Hungary

Pavel Ștefan, Ungureanu Daniel-Viorel, Dobrin Emilia, Bînzar Alexandru
(Polytechnic University of Timisoara, Romania)
Feltaláló(k) alkotó Inventor(s) Creative

INSTALLATION USED FOR CLEANING A SEGMENT FROM A SECTION OF A COLLECTOR PIPE OF DOMESTIC WASTEWATER

találmány-alkotása Invention-Creation

Sikeres bemutatásáért IDEA arany medál díjban részesült
has been awarded the IDEA Gold Award for its successful presentation

Abony, 2022. szeptember 25.

zsűrielnök

Nagy Zoltán
Ötlet Club 13 Egyesület elnöke

Oklevél

Az Ötlet Club 13 Egyesület vezetősége nevében,
ezt a bizonyítványt és díjat büszkén adjuk át a tisztelt –

On behalf of the management of the
Idea Club 13 Association,
we are proud to present this certificate and
Award to the Honorable

Dr.ing. Pavel Stefan

Universitatea Politehnica Timisoara Institutul de Cercetări pentru Energii Regenerabile

őszinte elismeréssel a kiváló együttműködéséért,
amely széles körben támogatja az innovációt, és
támogatja a feltalálókat. –

with sincere appreciation for its excellent
collaboration, which broadly supports innovation and
supports inventors.

Abony, September 25, 2022.

Nagy Zoltán
Elnök / President

Hungary

The 46th International Exhibition"BUDI UZOR ® INOVA" Croatia, 12-15 October 2022 Multiple medals for the Politehnica University Timisoara

• **BUDI UZOR®/INOVA 2022** is an international exhibition of innovations, prototypes and business plans designed for innovators and business idea holders who wish to test the market value of their innovations and launch businesses.

• The UPT team participated in the **international exhibition INOVA**, 46th edition, organized between October 12-15, 2022 in **Osijek, Croatia**. Organizers were the Croatia Inventors Network and the Zagreb Inventors Association.

The participation of the UPT team was carried out under the auspices of the **Center for Innovation and Technology Transfer - POLITEHNICA 2020**. The following distinctions were obtained:

- InovaCroatia Special Prize;
- WIIPA Special Prize;
- IBS Global Special Prize - Innovative Business Solutions;
- 2 gold medals;
- 1 silver medal.

The International Exhibition of Scientific Research, Innovation and Invention "Pro Invent 2022" Cluj Napoca, 20th edition, 26-28 October 2022
Multiple medals for Politehnica University Timisoara

• The UPT team participated in the International Exhibition of Scientific Research, Innovation and Inventions **PRO INVENT Cluj**, the 20th edition, organized between October 26-28, 2022 by the **Technical University of Cluj-Napoca**. The participation of the UPT team was carried out under the auspices of the **Center for Innovation and Technology Transfer - POLITEHNICA 2020**. The team had 9 patents, one research project and 13 doctoral and student projects registered in the exhibition.
Virtual catalog:
https://proinvent.utcluj.ro/img/catalogs/2022.pdf

• **The Grand Prize of the European University of Technology EUt+** was truly worthwhile, an alliance of 8 higher education institutions in the technical field that try to harmonize the pedagogical and research activity of the partner universities.
In addition to this important prize, the UPT team was also rewarded with the following distinctions:
• FIR Award Excellence in Innovation
• UPB Special Award
• ULBS Special Award
• ICECHIM Special Award
• URBAN Special Award – Excellence in Eco-Innovation
• INOE Special Award
• UTM Special Award
• Second Prize – Student category
• Justin Capra Diploma of Excellence
• USAMV Diploma of Excellence
• 13 Pro Invent Diplomas of Excellence
• 10 Golden Medals


SALONUL INTERNAȚIONAL AL CERCETĂRII ȘTIINȚIFICE, INOVĂRII ȘI INVENTICII
PRO INVENT
EDIȚIA XX, 26-28 OCTOMBRIE 2022
CLUJ-NAPOCA
DIPLOMA DE EXCELENȚĂ
ȘI MEDALIA DE AUR
Se acordă Pavel Ștefan, Ungureanu Daniel-Viorel, Dobrin Emilia, Bînzar Alexandru
De la Universitatea Politehnica Timișoara
Pentru Instalație de desfundare a unui segment dintr-o secțiune a unei conducte colectoare de ape uzate menajere


SALONUL INTERNAȚIONAL AL CERCETĂRII ȘTIINȚIFICE, INOVĂRII ȘI INVENTICII
PRO INVENT
EDIȚIA XX, 26-28 OCTOMBRIE 2022
CLUJ-NAPOCA
DIPLOMA DE EXCELENȚĂ
ȘI MEDALIA DE AUR
Se acordă Lavinia Lupa, Petru Negrea, Laura Cocheci, Anca Filimon
De la Universitatea Politehnica Timișoara
Pentru Sistem de testare a membranei funcționalizate în tratarea apei poluate


SALONUL INTERNAȚIONAL AL CERCETĂRII ȘTIINȚIFICE, INOVĂRII ȘI INVENTICII
PRO INVENT
EDIȚIA XX, 26-28 OCTOMBRIE 2022
CLUJ-NAPOCA
DIPLOMA DE EXCELENȚĂ
ȘI MEDALIA DE AUR
Se acordă Florica Manea, Katalin Bodor, Ilie Vlaicu, Nicoleta Lungar, Aniela Pop, Rodica Pode
De la Universitatea Politehnica Timișoara
Pentru Procedură pentru tratarea avansată a apei potabile


SALONUL INTERNAȚIONAL AL CERCETĂRII ȘTIINȚIFICE, INOVĂRII ȘI INVENTICII
PRO INVENT
EDIȚIA XX, 26-28 OCTOMBRIE 2022
CLUJ-NAPOCA
DIPLOMA DE EXCELENȚĂ
ȘI MEDALIA DE AUR
Se acordă MARSAVINA Liviu, MIHAESCU Vlad, NEGREA Petru, BIRTOK-BANEASA Corneliu, BUDIUL BERGHIAN Adina, SIRBU Roxana
De la Universitatea Politehnica Timișoara
Pentru Creșterea competitivității Universității Politehnice din timișoara prin înființarea și operaționalizarea unui Centru de Inovare și Transfer Tehnologic - Politehnica 2020 - CITT


SALONUL INTERNAȚIONAL AL CERCETĂRII ȘTIINȚIFICE, INOVĂRII ȘI INVENTICII
PRO INVENT
EDIȚIA XX, 26-28 OCTOMBRIE 2022
CLUJ-NAPOCA
DIPLOMA DE EXCELENȚĂ
ȘI MEDALIA DE AUR
Se acordă Andrei CRISAN
De la Universitatea Politehnica Timișoara
Pentru Metodă de utilizare a gemenilor digitali ai activelor 3D din viața reală

Third edition of International Exhibition "InventCor" Deva, online edition, 15-17 December 2022
Multiple medals for Politehnica University Timisoara

CORNELIUGROUP research-innovation Association in collaboration with Romanian Association for Alternative Technologies Sibiu - A.R.T.A. Sibiu has organized online, the **International Exhibition INVENTCOR**, third edition, 15-17 December 2022.
The main objective of the International Exhibition INVENTCOR is the importance of developing the creative – innovative spirit, through the involvement of young people. Virtual catalogue:
https://www.corneliugroup.ro/catalogic2022.pdf
Coodinator: Lecturer. Dr. Eng. Corneliu Birtok Băneasă
Here are some of the outstanding awards:

1. **Adina Budiul Berghian** from Politehnica University Timisoara, Faculty of Engineering Hunedoara has been awarded **with Excellence Innovation Award** for: **"Solutions for breed the availability of the parallel gang shears assigned for cutting the metallurgical products"**

2. **Stefan Pavel, Daniel Viorel Ungureanu, Dobrin Emilia, Alexandru Bînzar** from Politehnica University Timisoara has been awarded with **Diploma and Gold medal** for: **"Installation used for cleaning a segment from a section of a collector pipe of domestic wastewater (A/00701/19.11.2021)"**

3. **Mircea Nicolaescu, Viorel Aurel Serban, Cornelia Bandas, Corina Orha, Carmen Lazău, Simona Căprărescu** from Politehnica University Timisoara, National Institute for Research and Development in Electrochemistry and Condensed Matter Timisoara, University Politehnica of Bucharest has been awarded with **Diploma and Gold medal** for: **"Fabrication of a UV Photodetector based on n-TiO2/ p-CuMnO2 Heterostructures"**

4. **Lavinia Lupa, Petru Negrea, Laura Cocheci, Anca Filimon** from University Politehnica Timisoara, Faculty of Industrial Chemistry and Environmental Engineering Timisoara, "Petru Poni" Institute of Macromolecular Chemistry, Iasi, has been awarded with **Diploma and Gold medal** for: **"System for functionalized membranes testing for water treatment (A/00742/21.03.2022)"**

5. **Lorena-Cristina Balint, Iosif Hulka, Andrea Kellenberger** from Politehnica University Timisoara has been awarded with **Diploma and Gold medal** for: **"Pencil Graphite Electrodes Decorated with Platinum Nanoparticles as Efficient Electrocatalysts for Hydrogen Evolution Reaction"**

6. **Florica Manea, Katalin Bodor, Ilie Vlaicu, Nicoleta Lungar, Aniela Pop, Rodica Pode** from Politehnica University Timisoara, Aquatim Company has been awarded with **Diploma and Gold medal** for: **"Procedure for the drinking water treatment No. 132097/2021"**

7. **Andrei Crisan** from Politehnica University Timisoara has been awarded with **Diploma and Gold medal** for: **"Method for integrating real life assets in to the metaverse with real-time database security A/00100/25.02.2022"**

NATIONAL RESEARCH PROJECTS

NONLINEAR OBSERVERS-BASED CONTROL STRUCTURES APPLIED TO MECHATRONICS SYSTEMS (NOBSMECS)

Goal of the project

• Analysis, design and implementation of nonlinear observers-based control structures (Extended Kalman Filter, Takagi-Sugeno Fuzzy Observer and Sliding mode observer) in combination with other modern control solutions and theoretical frameworks for later multi-purpose applications related to mechatronics systems.

Short description of the project

• Mechatronics systems are successfully used in many industrial and non-industrial applications because of their initial simple and robust structure. The degree of complexity of the control subsystem of a mechatronics application differs from one application to another and may include relatively simple and advanced control structures as well. The development of advanced control solutions is a relatively difficult problem which requires a detailed preliminary study of the process, particularly the parameters variability and of its structural properties. As a continuation of previous research in this project the approach oriented on the analysis, synthesis, modeling and development of modern control solutions, such as nonlinear observers is proposed.

Project implemented by

Politehnica University Timisoara,
Faculty of Automation and Computers
Department of Automation and Applied Informatics

Implementation period

10.10.2018 – 30.11.2022

Main activities

To achieve the goals of this project, the following activities were defined:

1. Analysis, design, and implementation of modern control solutions for a class of mechatronics systems;
2. The validation of the proposed modeling and control approaches using simulations and experiments done on various laboratory equipments;
3. The dissemination of results by focusing on high visibility journals and important international academic conferences;
4. Solving the project management issues.

Results

The research team published in 2022:
- **1 journal paper** indexed in Clarivate Analytics Web of Science (WoS, with one of the previous names ISI Web of Knowledge)
ESWA 2022:
https://www.sciencedirect.com/science/article/abs/pii/S0957417422013690
- **9 conference papers** currently indexed in the international data bases Elsevier and IEEExplore
COSY 2022:
https://www.sciencedirect.com/science/article/pii/S2405896323000745
CCTA 2022:
https://ieeexplore.ieee.org/abstract document/9966012
FUZZ-IEEE 2022:
https://ieeexplore.ieee.org/abstract/document/9882748
IECON 2022:
https://ieeexplore.ieee.org/document/9968958
ICSTCC 2022:
https://ieeexplore.ieee.org/document/9931892
ICCCC 2022:
https://link.springer.com/chapter/10.1007/978-3-031-16684-6_9
ICONS 2022:
https://www.sciencedirect.com/science/article/pii/S2405896322010163
IEEE SSCI 2022:
https://ieeexplore.ieee.org/document/10022086
ITQM 2022:
https://www.sciencedirect.com/science/article/pii/S1877050922018762
The proceedings of the previous editions of these conferences are indexed in WoS.

Applicability and transferability of the results

With the support of our partner from the University of Ottawa, the nonlinear observers presented in 2022 9th International Conference on Computers Communications and Control and IEEE Symposium Series on Computational Intelligence are in the validation process at Ontario Centers of Excellence.

Financed through/by

UEFISCDI

Research Center

Research Center for Automatic Systems Engineering

Research Team

Project leader:
- Lecturer Dr. Eng. Alexandra-Iulia SZEDLAK-STÎNEAN

Researchers:
- Prof. Dr. Eng. Radu-Emil PRECUP

Contact information

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Project Website:
https://szedlak-stinean.wixsite.com/nobsmecs

INTELLIGENT CONTROL SYSTEMS WITH GENERALIZABLE BEHAVIOUR FROM LEARNED PRIMITIVES

Goal of the project

The project proposal aims at the continuous development of a hierarchical primitives-based learning concept for intelligent control systems (CSs). The idea is to induce feedback CSs with a generalization capability towards tracking tasks, inspired by intelligent living beings who can extrapolate learned optimal behaviour to new unseen tasks without learning by repetitions. The framework operates on three levels. The project's main goals are: to improve existing issues and to experimentally validate the hierarchical learning framework on different ubiquitous tracking tasks.

Short description of the project

The framework operates on three levels:
L1) low level feedback control system (CS) design in model-free style to ensure reference tracking, disturbance rejection and indirect CS linearization;
L2) learning tracking tasks (in terms of CS reference input + controlled output pairs, called primitives) by repeated executions via data-driven Iterative Learning Control (ILC), over the feedback CS, in terms of a given optimal criterion;
L3) extrapolate the learned optimal tracking behavior to new tracking tasks, without needing repetitions.

Project implemented by

Politehnica University Timisoara
Faculty of Automation and Computers
Department of Automation and Applied Informatics

Implementation period

01.09.2020 – 31.08.2022

Main activities

Main improvement activities are centered around making the above framework impactful, by:

a) ensure strong control system (CS) linearization at lower level, in an output reference model tracking problem setting, since the generalizability of the learned tracking behavior relies on the superposition principle of the linear CS;

b) ensure learning convergence at level L2 via ILC, while reducing the number of dedicated gradient experiments;

c) deal with tracking tasks of different time lengths (shorter/longer) than that of the learned primitives and with operational constraints.

Results

[1] **M.-B. Radac** and A.-B. Borlea, "Learning model-free reference tracking control with affordable systems," in Intelligent Techniques for Efficient Use of Valuable Resources: Knowledge and Cultural Resources,Springer International Publishing, pp. 147–172.

[2] **M.-B. Radac**, "Trajectory Tracking within a Hierarchical Primitive-Based Learning Approach," Entropy, vol. 24, no. 7, 889, Jun. 2022.

[3] Lala, D.-P. Chirla, and **M.-B. Radac** "Model reference tracking control solutions for a visual servo system based on a virtual state from unknown dynamics," Energies, vol. 15, no. 1, 267, Dec. 2021.

[4] A.-B. Borlea, T. Lala, **M.-B. Radac**, "A hierarchical learning approach for generalized trajectory tracking validated on a magnetic bearing system," in Proc. International Conference on Electrical, Computer and Energy Technologies (ICECET 2022), 20-22 July 2022, Prague, Czech Republic.

Applicability and transferability of the results

Validation of the proposed framework on a diversity of systems is expected to open new application areas to the next generation of autonomous, adaptive and intelligent planning and control systems (possible applications in UAVs and drones maneuvering, autonomous driving, robotic arms).

Financed through/by

UEFISCDI PN-III-P1-1.1-TE-2019-1089, 2020-2022

Research Team

- Assoc. Prof. Dr. Eng. Mircea-Bogdan RĂDAC
- M.Sc. Student Eng. Alexandra-Bianca BORLEA
- Eng. Timotei LALA

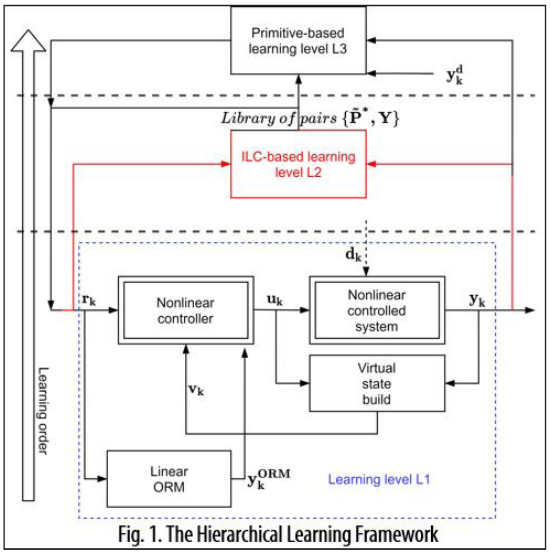

Fig. 1. The Hierarchical Learning Framework

Contact information

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Project Website: www.mbradac.info/te2019.html

FUZZY CONTROLLERS FOR SHAPE MEMORY ALLOYS SYSTEMS (FUZZYSMA)

Goal of the project

Analysis, design and implementation of adaptive fuzzy control solutions which include combination of fuzzy control, adaptive control, gain-scheduling control and sliding mode control in order to improve the Control System (CS) performance and validate the new CSs with the proposed adaptive fuzzy controllers through experiments on laboratory equipment related to Shape Memory Alloys (SMA), and other various laboratory equipment with SMA as actuators.

Short description of the project

Adaptive fuzzy control algorithms are developed and validated with experiments on laboratory equipment related to Shape Memory Alloys (SMA), and other various laboratory equipment with SMA as actuators..

Project implemented by

Assoc. Prof. Dr. Eng. Claudia-Adina Bojan-Dragoş - carries out all management activities and all activities that involve theoretical approaches.
Prof. Dr. Eng. Stefan Preitl - assists the Project leader in the management of the activities.
Lecturer Dr. Eng. Alexandra-Iulia Szedlak-Stînean - is in maternity leave in the first year of the project and she will carry out activities that involve simulation and experimental approaches on processes that include SMA actuators in the second year.
Lecturer Dr. Eng. Raul-Cristian Roman - carries out activities that involve hardware and software implementations and solve numerical problems.
Assist. Prof. Dr. Eng. Elena-Lorena Hedrea - carries out activities that involve theoretical research and experimental approaches on processes that include SMA actuators.

Implementation period

15.09.2020 – 14.09.2022

Main activities

1. The analysis of the theoretical framework with regard to the controlling of processes that include SMA actuators;

2. The development and implementation of new three new adaptive fuzzy control algorithms for nonlinear SMA processes;

3. The validation of the proposed control algorithms as controllers for real-world processes that include SMA, with the support of the external partners (Continental Automotive Timişoara, Airbus Helicopters Romania – through direct connections timely consolidated, Ontario Centres of Excellence – through our Ottawa team partner).

4. The dissemination of results focused on high visibility journals and important conferences.

5. Solving the project management issues.

Results

The research team published in 2022 **three journal papers** indexed in Clarivate Analytics Web of Science (WoS, with one of the previous names ISI Web of Knowledge)
(FUME 2022:
http://casopisi.junis.ni.ac.rs/index.php/FUMechEng/article/view/10417
IJCCC 2022:
https://univagora.ro/jour/index.php/ijccc/article/view/4623
Expert Systems with Applications 2022:
https://www.sciencedirect.com/journal/expert-systems-with-applications.
The research team published in 2022 five conference papers currently indexed in the international data bases Elsevier and IEEExplore
(COSY 2022:
https://www.sciencedirect.com/science/article/pii/S2405896323000745
CCTA 2022:
https://ieeexplore.ieee.org/abstract/document/9966012
FUZZ-IEEE 2022:
https://ieeexplore.ieee.org/abstract/document/9882748
ISIE 2022:
https://ieeexplore.ieee.org/abstract/document/9831526
ITQM 2022:
https://www.sciencedirect.com/science/article/pii/S1877050922000205).
The proceedings of the previous editions of these conferences are indexed in WoS.

Applicability and transferability of the results

With the support of our partner from the University of Ottawa, the new CSs with adaptive fuzzy controllers will be in the validation process at Ontario Centers of Excellence.

Financed through/by

UEFISCDI

Research Center

Research Center for Automatic Systems Engineering

Research Team

- Assoc. Prof. Dr. Eng. Claudia-Adrina BOJAN-DRAGOȘ - Project Leader
- Prof. Dr. Eng Stefan PREITL - Member
- Lecturer Dr. Eng. Alexandra-Iulia SZEDLAK-STINEAN - Member
- Lecturer Dr. Eng. Raul-Cristian ROMAN - Member
- Assist. Prof. Dr. Eng. Elena-Lorena HEDREA - Member

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Project Website:
https://www.aut.upt.ro/~claudia.dragos/TE2019.html

DATA-DRIVEN FUZZY CONTROL WITH EXPERIMENTAL VALIDATION (DAFUCON)

Goal of the project

The main goal of this project is to develop new data-driven fuzzy controllers for nonlinear processes. The achievement of this objective requires the achievement of several particular goal during the three years of the project. Please visit: https://www.aut.upt.ro/~rprecup/grant2021.html for additional details.

Short description of the project

Fuzzy controllers are an important part of the general class of nonlinear controllers as they are relatively easily understandable and also offer very good control system performance. An alternative to the classical model-based control is represented by data-driven control (DDC), a hot topic in academia and industry as well. This project proposes the development of new data-driven fuzzy controllers for nonlinear processes with shape memory alloy actuators in order to benefit from the advantages of both fuzzy control and DDC.

Project implemented by

The Process Control Group of UPT and the Research Center for Automatic Systems Engineering

Implementation period

04.01.2021 – 31.12.2023

Main activities

1. The analysis, design and implementation of new DDC algorithms;
2. The analysis, design and implementation of new fuzzy control algorithms;
3. The analysis, design and implementation of three new data-driven fuzzy control algorithms;
4. The validation of the new control algorithms by experiments conducted on laboratory equipment that may include shape memory alloy actuators;
5. The validation of the proposed control algorithms as controllers for real-world processes;
6. The dissemination of results focusing on high visibility journals and important conferences;
7. Solving the project management issues.

Results

Overall: **7 papers** published in **Clarivate Analytics Web of Science (formerly ISI Web of Knowledge) journals with impact factor**, cumulated impact factor according to 2021 Journal Citation Reports (JCR) released by Clarivate Analytics in 2022 = 37.142,5 papers published in conference proceedings indexed in Clarivate Analytics Web of Science (formerly ISI Web of Knowledge or ISI Proceedings), **7 papers** published in conference proceedings indexed in international databases (IEEE Xplore, INSPEC, Scopus, sciencedirect, Springer Link, DBLP), 1 book published in Editura Politehnica, 2 book chapters published in Springer and World Scientific books.

Specific results:

1. One research report;

2. C. Pozna, **R. E. Precup,** E. Horvath and E. M. Petriu, Hybrid Particle Filter-Particle Swarm Optimization Algorithm and Application to Fuzzy Controlled Servo Systems, IEEE Transactions on Fuzzy Systems, vol. 30, no. 10, pp. 4286-4297, 2022, impact factor (IF) according to 2021 Journal Citation Reports (JCR) released by Clarivate Analytics in 2022 = 12.253;

3. A. I. Szedlak-Stînean, **R. E. Precup**, E. M. Petriu, R. C. Roman, E. L. Hedrea and C. A. Bojan-Dragoş, Extended Kalman filter and Takagi-Sugeno fuzzy observer for a strip winding system, Expert Systems with Applications, vol. 208, paper 118215, pp. 1-15, 2022, IF according to 2021 JCR released by Clarivate Analytics in 2022 = 8.665;

4. I. A. Zamfirache, **R. E. Precup**, R. C. Roman and E. M. Petriu, Reinforcement learning-based control using Q-learning and gravitational search algorithm with experimental validation on a nonlinear servo system, Information Sciences, vol. 583, pp. 99-120, 2022, IF according to 2021 JCR released by Clarivate Analytics in 2022 = 8.233;

5. R. E. Precup, S. Preitl, C. A. Bojan-Dragoş, E. L. Hedrea, R. C. Roman and E. M. Petriu, A low-cost approach to data-driven fuzzy control of servo systems, Facta Universitatis, Series: Mechanical Engineering, vol. 20, no. 1, pp. 21-36, 2022, IF according to 2021 JCR released by Clarivate Analytics in 2022 = 4.622;

6. R. E. Precup, R. C. Roman, E. L. Hedrea, C. A. Bojan-Dragoş, M. M. Damian and M. L. Nedelcea, Performance Improvement of Low-Cost Iterative Learning-Based Fuzzy Control Systems for Tower Crane Systems, International Journal of Computers Communications & Control, vol. 17, no. 1, 4623, pp. 1-18, 2022, IF according to 2021 JCR released by Clarivate Analytics in 2022 = 2.635;

7. R. E. Precup, G. Duca, S. Travin and I. Zinicovscaia, 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, vol. 23, no. 4, pp. 403-410, 2022, IF according to 2021 JCR released by Clarivate Analytics in 2022 = 0.734.

Applicability and transferability of the results

The controllers are ready to implement in industry.

Financed through/by

UEFISCDI

Research Center

Research Center for Automatic Systems Engineering

Research Team

- Prof. Dr. Eng. Radu-Emil PRECUP - director, principal investigator
- Lecturer Dr. Eng. Claudia-Adina BOJAN-DRAGOŞ - experienced researcher
- Lecturer Dr. Eng. Adriana ALBU - experienced researcher
- Lecturer Dr. Eng. Alexandra-Iulia SZEDLAK - STÎNEAN - experienced researcher
- Lecturer Dr. Ioan-Ciprian HEDREA - experienced researcher
- Assist. Prof. Dr. Eng. Raul-Cristian ROMAN - postdoc
- Lecturer Dr. Eng. Ion-Cornel MITULEȚU
- Ph.D. Student Eng. Elena-Lorena HEDREA

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Web: http://www.aut.upt.ro/~rprecup/
Project Website:
http://www.aut.upt.ro/~rprecup/grant2021.html

AGENT-BASED INTERACTION MODELS WITH TEMPORAL ATTENUATION FOR OPINION POLL PREDICTION

Goal of the project

Improving the accuracy of opinion poll prediction by means of agent-based complex network modelling, with the integration of temporal attenuation to model the decaying strength of agent-agent interactions. To this end, we propose the following objectives:
1) Develop a novel temporal tolerance agent-based interaction model to improve the state of the art in terms of understanding how the temporal patterns of interaction between individuals influence the distribution of opinion at macro-scale;
2) Define cost-optimal temporal spreading strategies for improving diffusion coverage in social networks;
3) Enhance opinion poll prediction using temporal attenuation through votes injected in the social network by selected seeders, active for a predefined time frame;
4) Implement a mobile simulation application for opinion injection and poll estimation. We corroborate all expected research results, with direct applicative socio-economic impact, by developing a simulation application for further validation via crowdsourcing.

Short description of the project

• This project comes to push the boundaries of scientific understanding forward, on several levels, in terms of better predicting the spread of opinion over large social temporal networks, with applicability in opinion poll prediction.

Project implemented by

Assoc. Prof. Dr. Eng. Alexandru TOPÎRCEANU – project director. Roles of: outlining the research goals, modeling of experiments, simulation, and data validation, writing scientific manuscripts, overall project management.
Prof. Dr. Eng. Mihai UDRESCU – mentor for the project director, research goals, revising scientific manuscripts.
Ph. D. Student Eng. Mihai ARDELEAN – mobile application development, under director's supervision.
M. Sc. Student Eng. Adrian MILITARU – data acquisition and processing, under director's supervision.

Implementation period

August 2020 – July 2022 (24 months)

Main activities

• In order to reach the final research objective – that of improving the accuracy of opinion poll prediction – a number of activities are planned. We start from developing a novel temporal tolerance agent-based interaction model to understand how the patterns of interaction between individuals influence the distribution of opinion at macro-scale.

• We build upon our previously introduced tolerance model (Topirceanu et al., PeerJ Comp Sci, 2016), corroborated with state of the art, and augment it by adopting an original perspective on temporal dynamics.
• Next, we consider that opinion should not be considered fixed in time and space, but rather opinion should be injected at specific locations in the topology, for limited amounts of time, and that each spreader agent implies a cost of operation (Figure 1 a, b).
• Consequently, we enhance opinion dynamics prediction using temporal attenuation (TA) previously introduced in (Topirceanu et al., Social Netw. Analys. Mining, 2020) (see Figure 1 c-e).

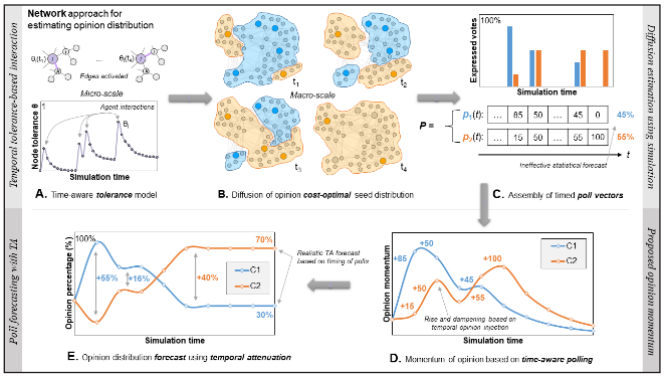
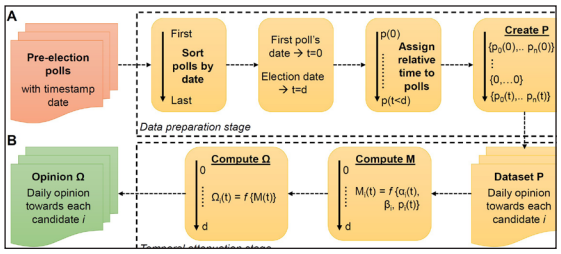


Fig. 1 - Overview of the main objectives for creating a dynamic agent-based opinion injection simulation model which can better forecast opinion distribution in a large social network.

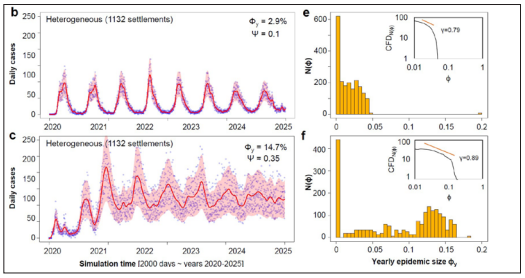
Agents react to individual interactions in their vicinity by increasing their immediate tolerance threshold; poll vectors are further processed using temporal attenuation, and opinion momentum is computed based on the timing of polls in the network.

Results

We aggregated the concepts of micro-scale opinion dynamics and temporal epidemics to develop a novel macro-scale temporal attenuation (TA) model, which uses pre-election poll data to improve electoral forecasting accuracy. See Figure below.



Furthermore, motivated by the reduced tractability of studies employing homogeneous mixing, we propose a new, very fine-grained population model incorporating the spatial distribution of individuals into geographical settlements, with a hierarchical organization down to the level of households. Our results pinpoint that epidemic size is more sensitive to the increase in distance of travel, rather that the frequency of travel. See Figure below.



One journal/WoS Q1 paper:

• **Topîrceanu, A.** (2022). Benchmarking Cost-Effective Opinion Injection Strategies in Complex Networks. Mathematics, 10(12), 2067, IF=2.59;

One conference proceeding:

• **Topirceanu, A.**, & Udrescu, M. (2022, May). On cost-effective strategies for opinion diffusion in complex networks. In 2022 IEEE 16th International Symposium on Applied Computational Intelligence and Informatics (SACI) (pp. 000179-000184), IEEE.

And one mobile application simulator for the real-time injection of opinion in complex networks.

• **SocialSim published on Google Play**, June 2022:

https://play.google.com/store/apps/details?id=com.topindustries.processing

Applicability and transferability of the results

Current state of the art in forecasting employs multilevel regression and post-stratification (MRP). However, the MRP method is often cumbersome to apply, requiring economic indices and detailed demographics to be accurate. Alternatively, we propose to elaborate on the concept of temporal attenuation (TA), which models the timed oscillation of poll data as opinion momentum. For this, we propose a research methodology based on computer simulation of information diffusion, on large datasets, using novel agent-based models.

The expected results of this project are directly applicable in the industry context, like political and marketing research. For example, web marketing and recommender systems are increasingly popular for disseminating influence, as there is a need of scientific support for strategies to maximize revenue, applicable on social networking platform like Facebook or Twitter. Altogether, the project outputs can minimize marketing investment, and maximize the impact of a campaign.

Financed through/by

Romanian National Authority for Scientific Research and Innovation (UEFISCDI), project number PN-III-P1-1.1-PD-2019-0379

Research Center

- CCCTI: Research Center for Computers and Information Technology (UPT)
- ACSA: Advanced computing systems and architectures research group

Research Team

- Director: Assoc. Prof. Dr. Eng. Alexandru TOPÎRCEANU
- Mentor: Prof. Dr. Eng. Mihai UDRESCU

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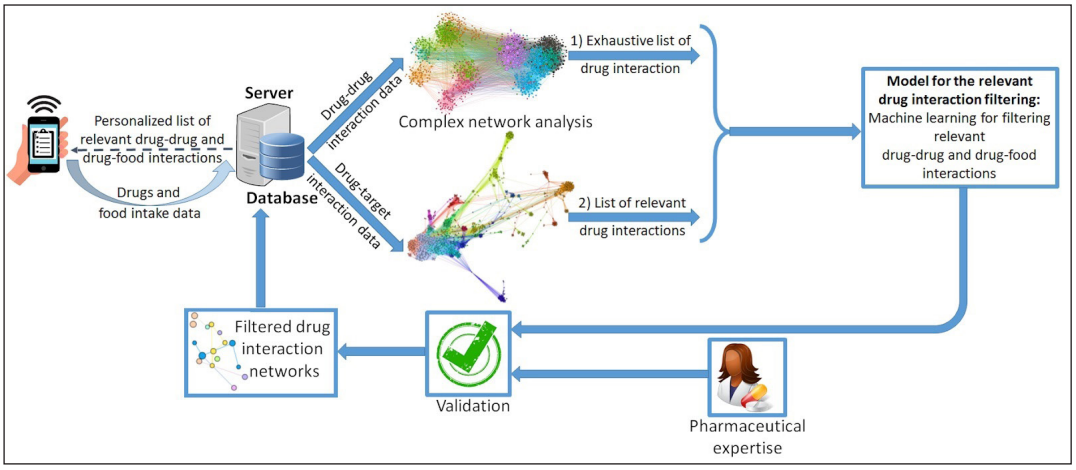
COMPLEXITY SCIENCE FOR PRECISION PHARMACY: PREDICTING RELEVANT DRUG INTERACTIONS USING COMPLEX NETWORK ANALYSIS (HYPERION)

Goal of the project

A drug-drug interactome (DDI) is a complex graph, where the node is a drug, and an edge represents a drug-drug interaction. DDIs are analyzed with algorithmic and statistical methods to predict previously unaccounted interactions. Our objective is to build a network-based model that selects only the individually-relevant drug interactions and then issues corresponding alerts. Our personalized drug interaction prediction model will mitigate alert fatigue. The end product will be a prototype of the smartphone-based personalized alert system, for relevant drug interactions.



Short description of the project

Drug-drug interactions (DDI) may cause therapeutic failure. Avoiding harmful DDI is crucial in medical practice.

Project implemented by

- "Victor Babes" University of Medicine and Pharmacy Timisoara (coordinator),
- Politehnica University Timisoara (partner)

Implementation period

02.11.2020-31.10.2022

Main activities

1. Building the initial drug-drug interaction network and the drug-drug similarity network;
2. Performing the complex network analysis and processing on Politehnica University Timisoara and University of Medicine and Pharmacy Timisoara servers;
3. Pharmacological validation of network modeling;
4. Building a supervised machine learning model for selecting the relevant drug-drug and drug-food interactions;
5. Adjusting the filtered drug interaction network according to the validated machine learning model;
6. Mobile application development.

Results

Our project's expected results are:

(i) the validated drug-drug interaction and drug-drug similarity networks, in Gephi and Python/NetworkX, using data from the DrugBank database;

(ii) the validated machine learning model for predicting the relevance (i.e., strength) of drug interactions at server-level, and

(iii) the prototype smartphone software for personalized drug interaction alert.

All the results of the project - server software and mobile application are published here:
https://github.com/hyperion-research

Applicability and transferability of the results

• The starting point of our project covers the TRL2-specific requests, as all project's objectives consists of theoretical models.
• Both drug-drug interaction and drug-drug similarity networks with data from DrugBank, built in Gephi and NetworkX correspond to TRL3, as they represent analytical and experimental critical function.
• The mobile application prototype for personalized drug interaction alert represents a laboratory-validated system (TRL4).
• We will experimentally demonstrate the integration of our system by testing it with data gathered from the medical prescriptions database.
• We will identify potential customers (patients with chronic diseases, pharmacists, and doctors).

Financed through/by

UEFISCDI

Research Center

Research Center for Computers and Information Technology (CCCTI)

Research Team

- Prof. Dr. Eng. Mihai UDRESCU
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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 is 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:
01: AI-based Environment Perception and Terrain Estimation;
02: 4-legged robot motion control;
03: Connectivity, mapping, and data collection;
04: 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

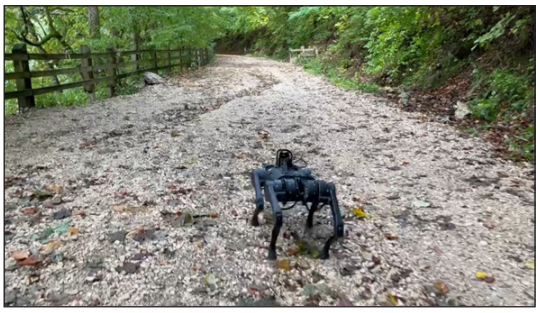
• In the first six months of the project's implementation, the consortium concentrated on developing the necessary infrastructure. The main hardware device used in the AI LegRob project is the **Unitree A1 4-legged robot**.
The definition of the training database was made according to the sensorial systems of the robot, creating several data acquisition libraries.

• A first training database was generated through manual control of the robot into an unstructured environment on a forest road near Brașov. Figure 1 is an image taken during the experiments. The data acquisition system of the robot was activated, therefore, the information read from different sensors was stored.

• A perception neural network was implemented to label the images as: accessible area, person, obstacle, vegetation, sky. The semantic information obtained from the convolutional neural network is used to control the motion trajectory of the robot.
The first step was to define a low-level control based on the cinematic model.

Applicability and transferability of the results

From a technological perspective, AI-LegRob aims to enhance the autonomy of legged robotic systems designed to navigate unstructured terrain. AI-LegRob will deliver 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 AI-based data-driven automated controlled technology for 4-legged robots used to navigate and monitor unstructured environments such as forest roads.



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
Researchers (UTBv):
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- Prof. Dr. Eng. Claudiu POZNA
- Ph.D. Student Eng. Mihai-Valentin ZAHA
- Assoc. Prof. Dr. Eng. Lucian-Mirea SASU
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- Alexandra ENACHE
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Researchers (UPT):
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3D POROUS DIMENSIONALLY STABLE ANODE - INTEGRATED PARTICULATE ELECTRODE ELECTROCHEMICAL FILTERING SYSTEM FOR ADVANCED TREATMENT OF CYTOSTATICS-CONTAINING WATER

Goal of the project

The **goal** of the present project is to develop an innovative **three-dimensional (3D) Porous Dimensionally Stable Anode – integrated Particulate Electrode -Electrochemical Filtering System** for advanced water treatment, which will be validated at the lab-scale for advanced treatment of cytostatics-containing water. The system **will be flexible and enable for an advanced treatment of water/wastewater characterized by a wide range of contaminants (organics and inorganics)** by combination of advanced electrooxidation with adsorption/ catalysis processes within one reactor.

Short description of the project

This project falls within the targeted area of **Environment and Climate Change and Depollution Technologies** according with the goals of Romanian National Plan for RDI 2015-2020.

Project implemented by

The project is implemented by one university, one research institute and one private company.
Coordinator: Politehnica University Timisoara
Partners: National Institute for R&D in Electrochemistry and Condensed Matter Timisoara; BeeSpeed Automatizari SRL

Implementation period

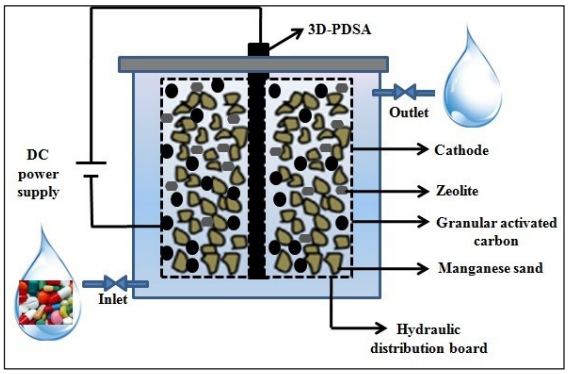
2020-2022

Main activities

I. Synthesis and characterization of new porous dimensionally stable anodes. Design of an innovative three-dimensional (3D) porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system
II. Synthesis and characterization of new porous dimensionally stable anodes. Optimization of particulate electrode composition. Design and fabrication of an innovative three-dimensional (3D) porous dimensionally stable anode – integrated particulate electrode - electrochemical filtering system
III. Testing electrochemical filtering system in removal and degradation and mineralization of cytostatics from water.

Results

- Lots of porous DSA type electrode materials;
- Morpho-structural and electrochemical characteristics of the electrode materials;
- Various compositions of the particulate electrode;
- Design of innovative three-dimensional (3D) porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system;
- Innovative three-dimensional (3D) porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system;
- Functional and operational characteristics of innovative three-dimensional (3D) porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system;
- Scientific-technical report for each stage;
- 1 patent request;
- 4 ISI-ranked scientific articles;
- 6 oral presentations and 8 poster presentations at national and international conferences.



Applicability and transferability of the results

- Transferability of research results between consortium partners;
- Technological transfer of advanced water/wastewater treatment technologies/procedures to public and private economic environment (regional water operators, environmental companies, private companies in the water/waste field etc.)

Financed through/by

Executive Agency for Higher Education, Development and Innovation Funding (UEFISCDI)

Research Center

Research Center for Environmental Science and Engineering

Research Team

Politehnica University Timisoara- Coordinator
- Prof. Dr. Eng. Florica MANEA-**project director**
- Lecturer Dr. Eng. Aniela POP
- Assoc. Prof. Dr. Eng. Raluca VODA
- Ph.D. Student Eng. Claudia DELCIOIU
- Ph.D. Student Eng. Sergiu VASILIE
- Eng. Lacrima-Crysty IGHIAN

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- Dr. Eng. Corina ORHA-**P1 responsible**
- Dr. Carmen LAZAU
- Dr. Eng. Cornelia BANDAS
- Ph.D. Student Eng. Mina Ionela POPESCU
- Ph.D. Student Eng. Mircea Daniel NICOLAESCU

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- Assoc. Prof. Dr. Eng. Alexandru HEDES
- Assoc. Prof. Dr. Eng. Valentin CIUPE
- Ph.D. Student Eng. Liviu-Danut VITAN

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https://www.chim.upt.ro/ro/cercetare/proiecte-de-cercetare/290-pn-iii-p2-2-1-ped-2019-4492

SMART PHOSPHORESCENT PIGMENTS FOR PERSISTENT GLOW-IN-THE-DARK SAFETY MARKINGS

Goal of the project

The goal of the research project is to obtain smart phosphorescent pigments via an energy-efficient method and test them in making persistent glow-in-the-dark safety markings.
To achieve this goal, the project involves active research and development of efficient SrAl2O4: Eu^{2+}, Dy^{3+} phosphorescent pigments and adequate organic matrixes to incorporate the obtained pigments (TRL3). In a second phase, both components (pigment and organic matrix) will be integrated in the form of a glow-in-the-dark coating and tested for compatibility (TRL4).

Short description of the project

An energy-efficient method is used to make phosphorescent pigments designed for glow-in-the-dark safety markings.

Project implemented by

Politehnica University Timisoara, Faculty of Industrial Chemistry and Environmental Engineering, department CAICAM

Implementation period

August 2020 – June 2022

Main activities

The following activities are involved to achieve the project goals:
- Recipes design and combustion synthesis of $SrAl_2O_4$: Eu^{2+}, Dy^{3+} phosphor pigments;
- Pigments characterization, results interpretation and recipes optimization;
- Choosing a compatible organic matrix for pigments incorporation;
- Preparation of organic matrix – pigment disperse systems with various pigment content, to establish the optimal proportions;
- Coatings application and characterization. Results interpretation and parameters optimization;
- Testing in laboratory conditions of the pigment-matrix system functionality;
- Results dissemination and project management.

Results

The results will include, but are not limited to:
- Sets of investigation reports, optimized pigments recipes and synthesis protocols;
- Sets of investigation reports and selected organic matrix specimens.
- Manuscript submitted for publication in an ISI-ranked journal, paper presentation within an international conference, diploma paper, project website, periodic research report for UEFISCDI;
- Preparation recipes, working procedures, two components (pigment-matrix) specimens;
- Coatings specimens, set of investigation reports, optimized coating application protocol;
- Manuscript accepted for publication in an ISI-ranked journal, paper presentation within an international conference, "Inorganic Pigments Technology" special course topic, project website update, periodic research report for UEFISCDI, OSIM patent request.

Applicability and transferability of the results

• The resulted pigment-matrix systems can be used as persistent glow-in-the-dark safety marking systems in the transportation (automotive and aircraft or railway industry), public spaces and buildings, road signage, etc. Different pigment-matrix systems may be used for different application supports.
• The research results will also be disseminated as conference presentations and articles in ISI publications to increase project visibility. The know-how achieved within the project development will also be used to coordinate a diploma paper. The implementation team will apply for a patent request to protect the results obtained within the project for future transfer to the industry.

Financed through/by

The project is financed by the The Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI), P2 Program - Increasing the competitiveness of the Romanian economy through RDI/ Demonstration experimental project (PED)

Research Center

Research Center for Inorganic Materials and Alternative Energies

Research Team

The research team is composed by:

- The principal investigator
  - Radu LAZĂU
- Two experienced researchers
  - Cornelia PĂCURARIU and Robert IANOȘ
- and a technician
  - Aylin CĂPRARU

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NEW "GREEN" TECHNOLOGY FOR ADVANCED WATER TREATMENT BASED ON FUNCTIONALIZED POLYSULFONES/IONIC LIQUIDS MEMBRANES (GREENTECHMEMBR)

Goal of the project

The goal of this project is to develop new supported liquid membranes (SLMs) and polymer inclusion membranes (PIMs), which will be used as medium separations in an innovative membrane treatment unit (MTU), which will be tested and validated for the advanced treatment of aqueous solutions, containing both organic and inorganic pollutants. Our approach involves the development of membranes based on quaternized polysulfones (PSFQs) and various ionic liquids (ILs), with improved features and performances, so that by integrating those into MTU, the functionality and expected performance of the entire assembly can be fulfilled.

Short description of the project

We aim to develop new functionalized polysulfones/ionic liquids membranes, for testing, and validation in a water treatment unit.

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

03.08.2020-29.07.2022

Main activities

- Optimization of properties in solution in order to obtain ionic liquids-based polysulfone membranes;

- Formulation and design of ionic liquids-based polysulfone membranes (SLMs, PIMs);

- Optimization of properties in solid state in order to obtain ionic liquids-based polysulfone membranes applicable in microfiltration process;

- Design and development of the membrane treatment unit (MTU) by integrating the optimized experimental demonstrator (SLM, PIM) into a final product;

- Validation of the laboratory technology through specific tests;

- Dissemination of the results.

Results

• The modeling of new membrane materials with increased efficiency in microfiltration processes was performed by the optimal combination of PSFQ functionalized with various ionic liquids. Thus, by the method of solution pouring, polysulfonic membranes with controlled thickness were obtained. By mixing/including polysulfonic solutions (PSFQ) with selected ionic liquids in different ratios the PIM membranes were obtained, and the SLM membranes were made by depositing/immersing the PSFQ membranes already obtained in the selected ionic liquids.

• The membrane treatment unit (MTU) was designed / built for a variable flow of raw water, and the configuration of the unit by integrating the experimental demonstrator (SLM, PIM membranes) in the proposed technological installation was made to operate in optimal conditions for their application. in microfiltration processes, aiming to determine the efficiency of the membranes obtained in water treatment processes.

Applicability and transferability of the results

- A solid transfer of knowledge occurred during the collaboration between the partners involved in the research.
- Application of the developed membranes in the advanced treatment of waters and waste waters.
- Transfer of the membrane treatment unit from the lab-scale application to large-scale advanced treatment.

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-2019-3013, within PNCDI III.

Research Center

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

Research Team

(ICMPP) – project coordinator:

- Dr. Anca FILIMON – project director
- Dr. Adina Maria DOBOS
- Dr. Alexandra BARGAN
- Dr. Mihaela Dorina ONOFREI
- Ph. D. Student Alexandru ANISIEI
- Ph.D. Student Oana DUMBRAVA

(UPT) – project partner:

- Assoc. Prof. Dr. Eng. Lavinia LUPA - UPT – **project responsible**
- Prof. Dr. Eng. Petru NEGREA
- Lecturer Dr. Eng. Laura COCHECI
- Ph.D. Student Eng. Samuel Nick ȚOLEA

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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@UPT100

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 **"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 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-TECH-UTP** 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
- Selection of postdoctoral researchers in the field of the project
- Integration and testing of purchased equipment within research centers / laboratories
- Creating the site : https://perform-cdi100.upt.ro/

Results

- Efficient management of the project – preparation of a scientific and technical report on the implementation of the project, as well as of the specific financial documents;
- **Improving RDI infrastructure** by purchasing fixed assets
- Funding was provided for the publication in **Open Access** regime of scientific papers in WoS - Clarivate indexed journals, located in the first 2 quartiles;
- There were supported financially: participation in 2 prestigious international conferences abroad, at 2 international conferences organized in the country, at an international inventions exhibition as well as participation in the **European Researchers' Night** event;
- Participations were supported financially in prestigious international conferences abroad, international conferences organized in the country, and in national and international invention exhibitions;
- A meeting was organized with two experts from **National Contact Point**, an entity from **UEFISCDI**. The ways in which the university scientific community will be able to access information on European funding instruments available in 2023 have been addressed and it was established for the end of November 2022 a direct on-site meeting at the university, with NCP experts that were to convey to the academic staff within UPT the particularities of open programs / calls, but also examples of good practice.

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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INTEGRATED CONCEPT FOR PLATINUM GROUP METALS RECOVERY BY ADSORPTION ONTO IONIC LIQUID-IMPREGNATED LAYERED DOUBLE HYDROXIDES AND FURTHER REUSE AS PHOTOCATALYST FOR WATER TREATMENT

Goal of the project

The **goal** of the **RE-ADPHOTOCAT** project is to **RE**cover the platinum group metals (PGMs) by **AD**sorption onto ionic liquid (ILs)-impregnated layered double hydroxides (LDHs) and further **RE**use as **PHOTOCAT**alyst in the degradation process of undesirable compounds from wastewaters. The project is in line with the European Union vision for sustainable development, since a green solution is proposed for the recover of useful elements from aqueous solutions and the resulted spent adsorbent is further applied as photocatalyst in the degradation process of undesirable compounds from wastewaters, thus engaging both environmental and economic benefit.

Short description of the project

The proposed project represents a promising route of PGMs recover followed by a perspective application as photocatalyst.

Project implemented by

Politehnica University Timisoara
Faculty of Industrial Chemistry and Environmental Engineering
Department CAICAM

Implementation period

March 2021 – February 2023

Main activities

A1. Obtaining and characterization of ILs impregnated LDHs. Various ILs will be used (imidazolium, ammonium and phosphonium based ILs) which will be impregnated on various LDHs (M^{II}/M^{III} systems: Mg/Al; Zn/Al; Mg/Fe; Cu/Fe), using two methods of impregnations: ultrasonication followed by the drying under vacuum and co-synthesis. The structural and morphological characterization of the ILs impregnated LDH will be realized to decide the efficiency of the studied impregnation methods.

A2. Adsorption of PGMs from aqueous solutions onto ILs impregnated LDHs. The adsorption performance of the obtained adsorbent material will be optimized by studying the dependence of its adsorption capacity and PGMs elimination degree versus various parameters (i.e. nature of the used ILs and LDHs, aqueous solutions pH, solid:liquid ratio, etc.).

A3. Converting the spent adsorbents into photocatalysts for elimination of undesirable compounds from water. An optimal catalytic material will be elaborated, by correlations between the obtaining routes of ILs impregnated LDHs, adsorptive performance of the obtained material and photocatalytic activity of the spent adsorbent: choosing the life cycle for the most favorable material, from point of view of the synthesis economics and efficiency of PGMs, as well as unwanted compounds removal from water.

Results

The results will include, but are not limited to:
- Protocols for obtaining ILs-impregnated LDHs;
- Method for removal of PGMs from water by adsorption onto ILs impregnated LDHs;
- Protocol for water treatment containing undesirable compounds via reclaiming of spent adsorbent;
- 3 ISI papers published;
- Oral and poster presentation at scientific conferences;
- A book chapter published;
- 1 patent demand.

Applicability and transferability of the results

• Good practice guide for a closed cycle technology regarding the PGMs recover and reuse.
• The research results will also be disseminated as conference presentations and articles in ISI publications to increase project visibility. The know-how achieved within the project development will also be used to coordinate a diploma paper, and a PhD thesis.
The implementation team will apply for a patent request to protect the results obtained within the project for future transfer to the industry.

Financed through/by

This work was supported by a grant of the Romanian Ministry of Education and Research,
CNCS - UEFISCDI, project number PN-III-P1-1.1-TE-2019-1555, within PNCDI III

Research Center

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

Research Team

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http://www.upt.ro/Informatii_UPT_1874_ro.html

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, will be obtained.

Will be 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.

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

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- Dr. Irina ROSCA
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- Dr. Alexandra BARGAN
- Dr. Mihaela Dorina ONOFREI
- Ph.D. Student Oana DUMBRAVA

- (UPT) – project partner:
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- Prof. Dr. Eng. Petru NEGREA
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BIOCATALYTIC SYNTHESIS OF NEW POLYESTERAMIDES AS NANOCARRIERS FOR BIOACTIVE COMPOUNDS

Goal of the project

The main goal of the project is to develop a demonstration model of a new biocatalytic approach to synthesize polyesteramides, based on renewable sources and suitable as nanosized carriers for bioactive compounds. Therefore, the project is focused on two main directions:
(i) biocatalytic polymerization and
(ii) particle technology.
The validation of the model will be accomplished through the effectiveness of the polymeric material in specific encapsulation of a bioactive product, together with the demonstration of its biodegradability.

Short description of the project

A biobased synthetic route was developed for biocatalytic synthesis of new polyesteramides, from hydroxy acids and ε-caprolactam. Substrate-directed immobilization was used for the stabilization of the employed lipase, including covalent binding and magnetic sol-gel entrapment.
The selectivity of different hydrolases has been evaluated in terms of catalytic efficiency, to increase the productivity of the process. Several hydroxy acids were tested as co-monomers, using experimental design to assess the optimal reactions conditions.
The reaction engineering targeted the effect of different process parameters on the structure and properties of the synthesized polyesteramides.
Structural analysis and assessment of the physico-chemical properties of the reaction products were accomplished. The synthesized oligoesters can be used as starting materials for novel nanoparticles, effective as carriers for bioactive compounds.

Project implemented by

Politehnica University Timisoara
Faculty of Industrial Chemistry and Environmental Engineering
Department of Applied Chemistry and Engineering of Organic and Natural Compounds

Implementation period

03.08.2020-31.07.2022

Main activities

Stage 3 (2022) - Biodegradation study and utilization of polyesteramide-based nanoparticles.

Activity 3.1. Evaluation of biodegradability of polyesteramides by lipases;

Activity 3.2. Evaluation of biodegradability of polyesteramides by microorganisms form natural sources;

Activity 3.3. Nanoparticles obtained from polyesteramides;

Activity 3.4. Characterization of the obtained nanoparticles;

Activity 3.5. Controlled release of a selected bioactive compound.

Results

Main scientific achievements of **Stage 3**:
- The new polyesteramides were characterized by MALDI-TOF mass spectrometry, gel permeation chromatography and NMR, having average molecular wights around 3000 Da;
- Particles with sizes between 200-250 nm based on these new polymers were obtained using the solvent evaporation method;
-Then nanoparticles were effective for the encapsulation of the drug Sorafenib and the possibility of controlled release of this compound has been demonstrated.

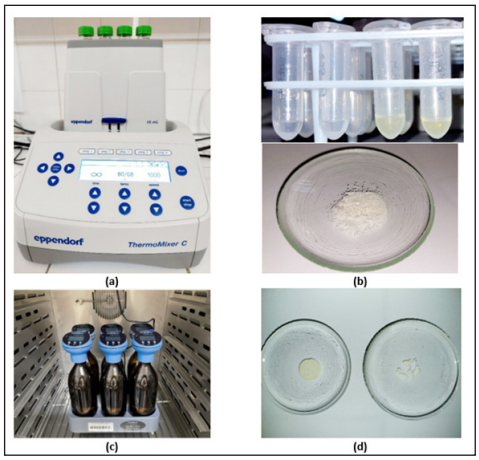

Fig. 1. The experimental setup for the enzymatic synthesis of polyesteramides (a); The product obtained after separation of the enzyme (b, top) and after purification (b, bottom); the OxiTop system used for biodegradation (c); The polyesteramide product before (d, left) and after microbial degradation (d, right)

Selected publications and presentations:

1. Kántor, D. Dreavă, A. Todea, **F. Péter**, Z. May, E. Biró, G. Babos, T. Feczkó, Co-entrapment of Sorafenib and Cisplatin drugs and iRGD tumour homing peptide by poly[ε-caprolactone-co-(12-hydroxy-stearate)] copolymer, **Biomedicines** 2022, 10, 43.
2. I.C. Benea, D. M. Dreavă, I. Bîtcan, C. Paul, A. Todea, L. Nagy, S. Kéki, I. Kántor, T. Feczkó, **F. Péter**, Biocatalytic synthesis of novel polyesteramide nanoparticles derived from ε-caprolactam and hydroxy acids, **The 5th Edition of Biotech France 2022 International Conference and Exhibition**, June 15-17, 2022, Paris, France.

Applicability and transferability of the results

The results demonstrate the suitability of this green biocatalytic approach for **in vitro** synthesis of new biopolymers.
In the next step, a laboratory-scale technology can be developed and validated, based on these results.

Financed through/by

Romanian Ministry of Education and Research, CCCDI - UEFISCDI, project code PN-III-P2-2.1-PED-2019-2638, within PNCDI III

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

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  - Lecturer Dr. Eng. Diana Maria DREAVĂ
  - Lecturer Dr. Eng. Iulia Maria PĂUȘESCU
  - Lecturer Dr. Eng. Valentin BADEA
  - Dr. Eng. Emese BIRÓ
  - Ph.D. Student Eng. Ioana Cristina BENEA

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INTELLIGENT AND ACTIVE SYSTEMS IN FOOD PACKAGING BASED ON BIOPOLYMERS AND NOVEL FLAVYLIUM DYES

Goal of the project

The main scope of the project is developing a model for production of new materials used in food packaging systems which must include compounds that through their properties can emphasize different possible transformations of the packaged food. The packaging systems must fulfill mandatory conditions that should highlight possible food transformations in time under different conditions. This would be accomplished by inserting in the package material compounds with photochromic properties whose colour is changing with pH value and temperature variation.

Short description of the project

The project will address the development of new packaging materials starting with computational methods and synthesis of new dyes and polymers.

Project implemented by

Coordinator: Politehnica University Timisoara

Implementation period

01.11.2020 – 31.10.2022

Main activities

Stage 3– Preparation and characterization of films based on biopolymers and synthesized dyes for food packaging applications and their properties evaluation.

Activity 3.1 – Part 2. Evaluation of antioxidant properties of synthesized dyes

Activity 3.2 – Part 2. Evaluation of toxicity of synthesized dyes

Activity 3.3 – Part 2. Preparation and characterization of unblended biopolymer (single biopolymer: chitosan, polyvinyl alcohol, polylactic acid, cellulose, starch) pH indicator films and the synthesized dyes.

Activity 3.4 – Part 2. Preparation and characterization of blended biopolymer (single biopolymer: chitosan, polyvinyl alcohol, polylactic acid, cellulose, starch) pH indicator films and the synthesized dyes

Activity 3.5 – Part 2. Material properties evaluation of the indicator films

Activity 3.6 – Colorimetric response evaluation of films at pH changes in aqueous solutions

Activity 3.7 – Sensitivity evaluation of films in quality food monitoring processes

Activity 3.8 – Results dissemination

Results

The results of the third stage:

In the third stage, the main activities were: antioxidant properties and toxicity evaluation of dyes; the preparation of films (Single and mixed biopolymers) with selected dyes and their properties evaluation; monitoring the quality of food (meat) packed in obtained films.

Table 1. Antioxidant activity of synthesized dyes

Compound	IC_{50}
Curcumin	66.74
Ascorbic acid	33.31
S1_2	27.40
S1_4	22.13

Toxicity evaluation of synthesized dyes on cancer cells HepG2 and HCT116

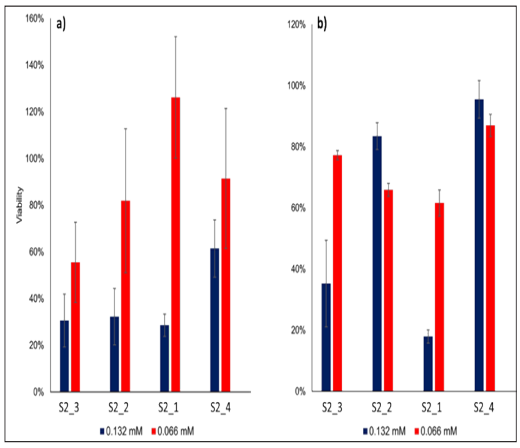

Fig. 1 Viability of the cells

Film characterization

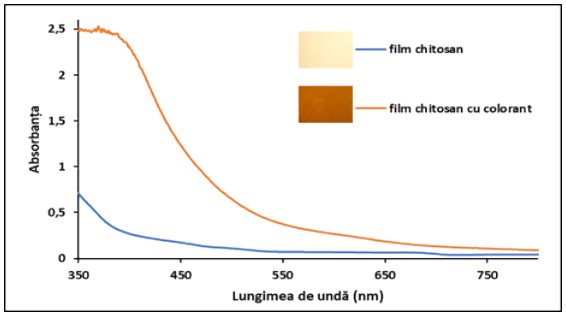

Fig. 2 UV-VIS spectra of chitosan_S1_2 dye

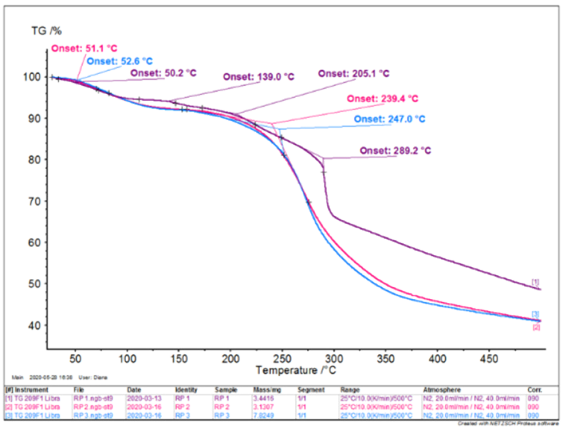

Fig. 3 Thermogravimetric analysis chitosan film, dye, chitosan+dye

Table 2. Material properties

Film	Water content %	Solubility %	Swelling %
CHIT-CEL-S1_10	12,31	18,77	1264,84
CHIT-PVA-S1_10	5,81	6,76	344,35
CHIT-PVA-S1_2	7,59	5,32	213,09
CHIT-S2_2	15,08	3,54	128,48
CHIT-S2_3	12,34	3,42	107,60

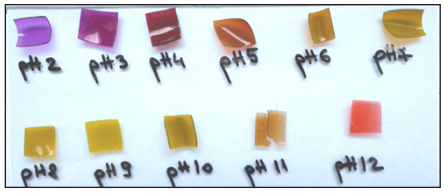

Fig. 4 Chitosan – PVA (S1_10 dye) film color dependency on pH variation

Fig. 5 Sensitivity evaluation procedure of films in quality food monitoring processes

- Three scientific papers were published. (WOS Q1, Total IF 14.93)
- Two international conferences

Applicability and transferability of the results

• The main objective of this project was to obtain new materials useful in food quality monitoring, based on biopolymer films with new synthetic photochromic flavylium dyes inspired from natural compounds.

• The results proved the possibility to obtain and use the proposed materials. However more tests should be done to evaluate other possible toxic properties and more material properties tests in various environment and stress conditions.

• The analysis of dyes properties obtained by computational methods proved to be an efficient method to select dyes with better properties to be synthesized. During the research process some syntheses and analytical procedures were developed.

• The research could be continued with other types of dyes and materials for film preparations and for other types of food.

Financed through/by

Romanian Ministry of Education and Research, CCCDI – UEFISCDI, project number PN-III-P2-2.1-PED-2019-3037

Research Center

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

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CONTINUOUS-FLOW SYSTEM BIOREACTOR FOR THE ENZYMATIC KINETIC RESOLUTION OF NOVEL CHIRAL SECONDARY HETEROCYCLIC ALCOHOLS- PN-III-P2-2.1-PED-2019-3414

Goal of the project

The goal of the project is to develop a demonstration model for quantitative resolution of racemic mixture of novel secondary alcohols with biologic potential activity. The validation of the experimental system will be accomplished through the effective obtaining of the enantiomers in quantities of the order of grams whose biological activity will be evaluated and compared with that of the racemic mixture..

Short description of the project

• The aim of this project is to develop, at laboratory scale, a continuous-flow system bioreactor for quantitative kinetic enzymatic resolution of racemic mixtures of novel chiral secondary heterocyclic alcohols, with potential biological activity, which will be synthesized within this project.

• After the synthesis of the new secondary heterocyclic alcohols (R,S)-1-(aryl/methyl)-2-[(4,5-diaryl-4H-1,2,4-triazol-3-yl)thio] ethan-1-ols as racemate, optimal conditions of enzymatic kinetic resolution will be established for each substrate, using selected microbial lipases and various reaction media.

• The realization of the enzymatic kinetic resolution will be done using a continuous flow bioreactor followed by the isolation and purification of the products with high enantiomeric purity.

The realization of the enzymatic kinetic resolution will be done using a continuous flow bioreactor followed by the isolation and purification of the products with high enantiomeric purity.

• The validation of the experimental system will be accomplished through the effective obtaining of the enantiomers, whose biological activity, after assigning their absolute configuration, will be evaluated and compared with that of the racemic mixture where they come from.

Project implemented by

Politehnica University Timisoara

Implementation period

01.11.2020-31.10.2022

Main activities

Stage 1- Synthesis, purification and spectroscopic characterization of intermediates used to obtain new chiral heterocyclic secondary alcohols.

Activity 1.1. Synthesis, purification and spectroscopic characterization of the corresponding N-(aryl) hydrazine carbothioamides - Part 1.

Activity 1.2. Synthesis, purification and spectroscopic characterization of the corresponding 2-benzoyl-N-arylhydrazine -1-carbothioamides - Part 1.

Activity 1.3. Synthesis, purification and spectroscopic characterization of the corresponding 4-aryl-5-phenyl-4H-1,2,4-triazole-3-thiols - Part 1.

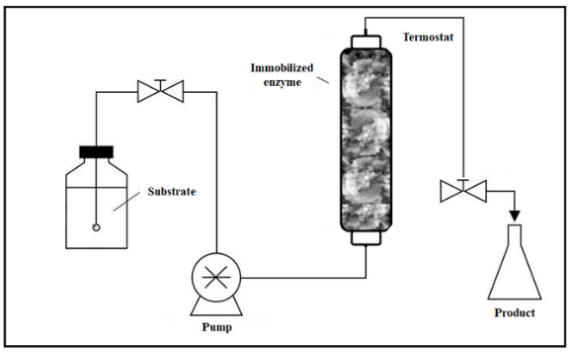

Fig. 1. The proposed continuous flow system using packed-bed column bioreactor

Results

The results of the first stage were:
- Development of an experimental synthesis protocol for N-(aryl) hydrazinecarbothioamide in gram amounts and spectroscopic characterization;
- Development of an experimental synthesis protocol for benzoyl(acyl)-N-arylhydrazine-1-carbothioamide in gram amounts and spectroscopic characterization;
- Development of an experimental synthesis protocol for 4-aryl-5-phenyl(alkyl)-4H-1,2,4-triazol-3-thiol in gram amounts and spectroscopic characterization;
- Development of an experimental synthesis protocol for 1-(aryl)-2-[(4-aryl-5-aryl(alkyl)-4H-1,2,4-triazol-3-yl)thio]ethan-1-one in gram amounts and spectroscopic characterization.

Financed through/by

Romanian Ministry of Education and Research, CCCDI - UEFISCDI, project number PN-III-P2-2.1-PED-2019-3414, within PNCDI III

Research Center

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

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NEW SOL-GEL-MAGNETIC BIOCATALYSTS USED FOR THE ENZIMATIC HYDROLYSIS OF LIGNOCELLULOSIC BIOMASS

Goal of the project

The main goal of the project is the obtaining of new immobilized enzymatic biocatalysts, customized by new sol-gel entrapment techniques, used for the hydrolysis of certain types of lignocellulosic biomass.

Short description of the project

• The major cause of environmental pollution is due to emissions generated by burning of fossil fuels. The known crude oil reserves are going to disappear in short time and the oil crisis in recent years, together with the rising of air pollution levels has shown the need for the replacement of fossil fuels with cleaner biofuels, obtained from a range of organic renewable raw materials.

• The first step in conversion of lignocellulosic biomass is the pretreatment for the release of cellulose from the network formed with lignin and to increase the yield of fermentable sugars. There are many methods of pretreatment, but they are energy consumable and pollute the environment.

• In this sense, the project proposes an innovative approach on studies regarding biomass pretreatment and enzymatic hydrolysis of cellulose in an integrated system that can improve the exploitation of biomass components and the reuse of the biocatalyst. It is desired to provide novel biocatalysts, immobilized cellulases customized by new sol-gel entrapment techniques, used in the hydrolysis of certain types of lignocellulosic biomass.

• By immobilization, the stability and reusability of cellulases are significantly improved, a key issue for increasing the amount of fermentable sugars and to reduce process costs.

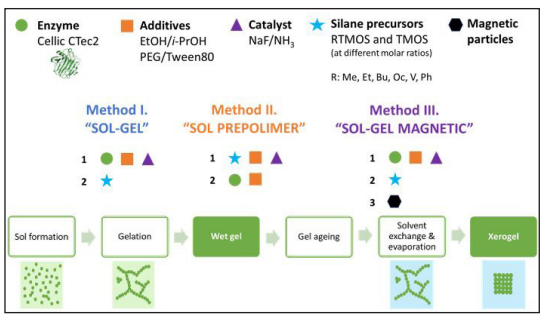

Fig. 1. Cellulase immobilization by sol-gel entrapment methods

Project implemented by

Politehnica University Timisoara

Implementation period

15.09.2020-14.09.2022

Main activities

Stage 3 (2022): Enzymatic hydrolysis of the cellulose from biomass and biocatalyst reuse.

Activity 3.1. Determination of optimal conditions for enzymatic hydrolysis of lignocellulosic material.

Activity 3.2. Increasing the efficiency of enzymatic hydrolysis by reusing immobilized cellulases.

Results

In this stage, research on the establishment of optimal conditions for the enzymatic hydrolysis of cellulose and wheat straw biomass involved:

– The study of the influence of the nature of the biocatalyst,

- The study of the time evolution of the enzymatic hydrolysis of microcrystalline cellulose,

- The study of the influence of thermal and pH on the enzymatic hydrolysis of cellulose by immobilized Cellic CTec2 biocatalysts by entrapment in sol-gel and magnetic sol-gel.

• Studies on the reuse of the new magnetic sol-gel biocatalysts in the enzymatic hydrolysis reaction of carboxymethylcellulose, microcrystalline cellulose, and pretreated lignocellulosic biomass from wheat straw have also been carried out.

• The new sol-gel magnetic biocatalysts were reused in seven successive batch hydrolysis cycles of pretreated wheat straw biomass with good values of remanent activity and sugar productivity, thus obtaining promising results for scaling up the process.

The dissemination of the results was achieved by two research papers published in journals with impact factor:

1. C. Vasilescu, **C. Paul**, S. Marc, I. Hulka, F. Péter, Development of a tailored sol-gel immobilized biocatalyst for sustainable synthesis of the food aroma ester n-amyl caproate in continuous solventless system, Foods, 2022, 11(16), 2485, https://doi.org/10.3390/foods11162485, WOS:000846142000001, eISSN 2304-8158, Impact factor 5.561 (2021), JCR - Q1.

2. C. Vasilescu, S. Marc, I. Hulka, **C. Paul**, Enhancement of the catalytic performance and operational stability of sol-gel entrapped cellulase by tailoring the matrix structure and properties, Gels, 2022, 8(10), 626, https://doi.org/10.3390/gels8100626, WOS:000875190400001, eISSN 2310-2861 Impact factor 4.432 (2021), JCR - Q1.

Scientific presentations published in abstracts at international conferences:

1. **C. Paul,** S. Marc, C. Vasilescu, Structural characterization and catalytic activity of sol-gel entrapped cellulase Cellic CTec2, 18th International Conference on Renewable Resources & Biorefineries (RRB-18), June 1-3, 2022 Bruge, Belgium.

2. C. Vasilescu, R. Subulescu, S. Marc, F. Péter, **C. Paul**, High stability sol-gel entrapped enzymes for biocatalysis, Sol-Gel Conference, July 24-29, 2022, Lyon, France.

3. C. Vasilescu, S. Marc, F. Péter, **C. Paul**, Optimized continuous-flow aroma ester synthesis by entrapped Candida antarctica lipase B in novel sol-gels with epoxy functional groups, 12th Edition of Global Conference on Catalysis, Chemical Engineering & Technology (CAT 2022 – Online Event), September 5-7, 2022, Paris, France.

Applicability and transferability of the results

• The BIOCATLIGNOCELL project proposed an efficient strategy for the production of fermentable sugars using new enzymatic biocatalysts in the process of enzymatic hydrolysis of lignocellulosic biomass pretreated by non-conventional methods. New biocatalysts with immobilized cellulases have been obtained, showing improved stability and the ability to be reused in many stages of biomass hydrolysis, an important aspect for reducing process costs and increasing the production of fermentable sugars.

• Thus, an original **Laboratory Technological Process** was developed for the enzymatic hydrolysis of cellulose from pretreated wheat straw biomass by ultrasound, which may have an impact on the development of the respective fields in Romania and the EU.

Financed through/by

Romanian Ministry of Education and Research, CNCS - UEFISCDI, project code PN-III-P1-1.1-TE-2019-1179, project number TE 94 / 2020 within PNCDI III

Research Center

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

Research Team

Project leader:

- Lecturer Dr. Eng. Ana Cristina PAUL

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- Lecturer DVM Simona MARC
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GREEN CHEMISTRY ROUTE FOR THE ENZYMATIC CASCADE SYNTHESIS OF BIODEGRADABLE OLIGOESTERS- PN-III-P1-1.1-TE-2019-1573

Goal of the project

The main goal of the project is to demonstrate a new concept for valorization of vegetable oils, mainly of castor oil by developing new oligo-esters containing -OH functions or aromatic rings, in a system of three cascade enzymatic reactions. The proposed reaction system involves an innovative three cascade reaction system catalyzed by two enzymes of different classes: (i) hydrolysis of triglycerides,
(ii) glycerol oxidation and
(iii) synthesis of oligoesters.
The enzyme stabilization will be performed by covalent binding and the selectivity will be evaluated in terms of maximal catalytic efficiency, to increase the productivity of the process. The reaction products will be characterized in detail by several analytical techniques for structure confirmation and assessment of the physico-chemical properties and their biodegradability rate will be evaluated by two methods. The synthesized monomers and oligoesters will be used as starting materials for novel organogels preparation.

Short description of the project

The main objective of the project is to obtain new oligoesters in one-pot system starting from castor oil and bio-based furan monomers by a complete green route, using a combination of two enzymes. All the purposed reactions will be mediated by tailor-made immobilized enzymes that are non-toxic, recyclable and eco-friendly biocatalysts, by using green solvents or solventless systems. The resulted biodegradable oligoesters will present new functionalities and properties.

Project implemented by

Politehnica University Timisoara

Implementation period

15.09.2020-14.09.2022

Main activities

Stage 3 (2022): Enzymatic and microbial degradation a new oligoesters. Preparation and characterization of some organogels with two or three components.
Activity 3.1. Study of the biodegradability of oligoesters using lipases-Part II
Activity 3.2. Study of the biodegradability of oligoesters using microorganisms
Activity 3.3. Organogels preparation using organic solvents Part II
Activity 3.4. Characterization of organogels. Testing of mechanical, thermal, rheological properties

Results

The results of the third stage:
- A series of studies on the immobilization of lipase from ***Ps. stutzeri*** by adsorption and covalent binding and its testing in the one-pot reaction system were performed.
- The enzymatic synthesis of new oligomeric compounds using castor oil and 5-hydroxymethyl-2-furancarboxylic acid was studied. Structural analysis, demonstration of copolymer formation and its composition were performed using sophisticated instrumental techniques, such as 2D-NMR and MALDI-TOF MS.
- Biodegradation studies of the resulted product from the "one-pot system" were performed in liquid culture media, both in the presence of a native lipase or a consortium of microorganisms collected from Bega river and sea water.
- Promising results were obtained with in both cases, showing high biodegradation degrees after 21 days of incubation with a consortium of microorganisms taken from a natural environment.
- Mono and bi- component organogels were prepared and morphologically characterized.

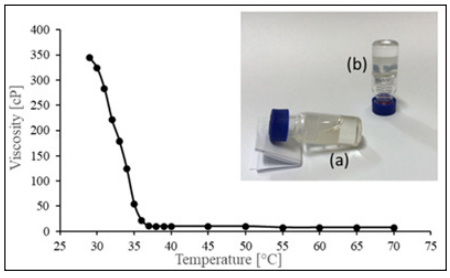

Fig.1. An example of an organogel obtained within the Green_Polygel Project

Publication:

- **I Păușescu,** DM Dreavă, I Bîtcan, R Argetoianu, D. Dăescu, M. Medeleanu, Bio-Based pH Indicator Films for Intelligent Food Packaging Applications, Polymers, 2022, 14(17), 3622.

Conferences:

- **I. Bîtcan,** A.Todea, D. Dreavă, I. Păușescu, F. Peter, L. Nagy, S. Kéki Green synthesis and characterization of novel furan-based oligoesters for organogel applications, 9th IUPAC International Conference on Green Chemistry (ICGC 2022), 5 - 9 September 2022, Athens, Greece.
- D. Dreavă, I. Bîtcan, A. Petrovici, **I. Păușescu,** F. Peter, A. Todea, Optimization of furan-based oligoester enzymatic synthesis by design of experiments, 9th IUPAC International Conference on Green Chemistry (ICGC 2022), 5 - 9 September 2022, Athens, Greece.

Visit also:
http://chim.upt.ro/ro/cercetare/proiecte-de-cercetare/285-pn-iii-p1-1-1-te-2019-1573

Financed through/by

Romanian Ministry of Education and Research, CNCS - UEFISCDI, project code PN-III-P1-1.1-TE-2019-1573, project No. TE 101/2020, within PNCDI III

Research Center

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

Research Team

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- Assist. Dr. Chem. Diana Maria DREAVĂ
- Lecturer Dr. Eng. Ana Maria PANĂ

Ph.D. Students:
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- Eng. Ioana Cristina BENEA
- Eng. Ionuț Mihai TĂNASE

Student:
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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 for the production of 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 (Fig.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.

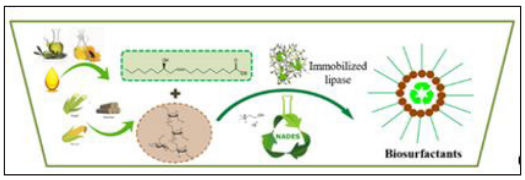

Fig. 1. Enzymatic biotransformations of fatty acids and sugars into biosurfactants

Project implemented by

Politehnica University Timisoara

Implementation period

15.02.2021 – 14.02.2024

Main activities

Phase 2/2022: Synthesis of fatty acid esters of carbohydrate oligomers and reaction engineering

Activity 2.1. Stability of native and immobilized lipases in deep eutectic solvents

Activity 2.2. Investigation of the reactivity of selected carbohydrate oligomers in esterification reactions with fatty acids and fatty acid derivatives.

Activity 2.3. Determining optimal conditions for the enzymatic esterification of carbohydrates with fatty acids.

Activity 2.4. Dissemination of results.

Results

Main scientific achievements of Phase 2:

- Binary and ternary natural deep eutectic solvents (NADES) with carbohydrates and polyols were obtained and characterized.
- Binary and ternary natural deep eutectic solvents (NADES) with carbohydrates and polyols were obtained and characterized.
- Native and immobilized lipases are compatible with NADES and show high catalytic activity and thermal stability.
- Native and immobilized lipases catalyze the synthesis of esters of lauric acid with monosaccharides, disaccharides, and carbohydrate polyols.
- Reaction engineering with design of experiments (DOE) identified optimal conditions for esterification.
- Results were presented at international conferences and one paper was published in an ISI journal.

Dissemination:

D1. Bîtcan I., Petrovici A., Pellis A., Klébert S., Károly Z., L. Bereczki L., Peter F., Todea A. Enzymatic route for selective glycerol oxidation using covalently immobilized laccases, Enzyme and Microbial Technology, 2022, 163.

D2. Boeriu C.G. A short history of biocatalysis: from dreams to industrial reality. The 13th International Symposium of the Romanian Catalysis Society, June 20-21, 2022, Băile Govora, Romania, Invited lecture.

D3. Buzatu A. R., Bîtcan I., Dreavă D. M., Todea A., Peter F., **Boeriu C.G.** Sustainable synthesis of carbohydrate-based surfactants in reactive NADES. 5th International Conference on Green Chemistry and Sustainable Engineering, 20– 22 July 2022, Rome, Italy.

D4. Buzatu A. R., Bîtcan, I., Dreavă, D. M., Todea A., Peter F., Boeriu C.G., Enzymatic esterification of carbohydrates in reactive natural deep eutectic solvents. 10th International Congress on Biocatalysis, 28.08–1.09.2022, Hamburg, Germany.

D5. Boeriu C.G., Buzatu A. R., Bîtcan I., Dreavă D. M., Todea A., Peter F. Reactive natural deep eutectic solvents as essential reaction media for lipase catalyzed carbohydrate esterification, 9th IUPAC International Congress on Green Chemistry, 5–9 September 2022, Athens, Greece.

Financed through/by

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

Research Centre

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

Research Team

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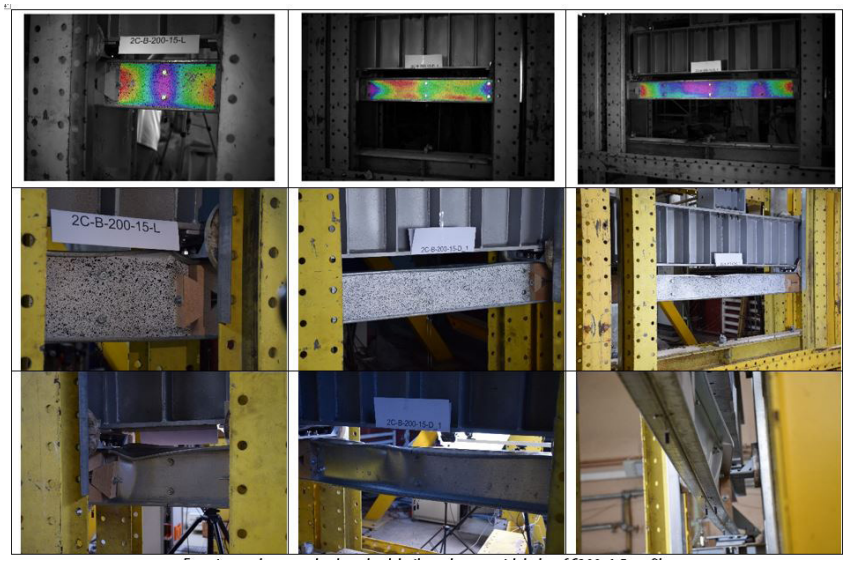
STRUCTURAL DESIGN TOOL FOR COLD-FORMED STEEL STRUCTURES (CFSEXPERT)

Goal of the project

The project will develop innovative design software tools for cold-formed steel members and structures. The calculation processes are prepared for practising engineers and integrated with easy-to-use modelling and analysis tools to provide complete design solutions.



Experimental tests on back-to-back built-up beams with bolts of C200x1.5 profiles

Short description of the project

The project aims to develop a calculation core for the design of structures composed of cold-formed steel (CFS) members, which will be implemented in three different structural softwares: CFSExpert Structure, CFSExpert Member and CFSExpert Engine.

Project implemented by

- ConSteel Solutions Ltd., Hungary;
- GORDIAS Ltd., Romania
- Politehnica University Timisoara, Romania

Implementation period

04.01.2020-31.12.2022

Main activities

- Review of existing analyses and standard design methods of CFS members and structures and identification of their limitations;
- Development of an advanced integrated analysis and of a design method for CFS members;
- Validation of the advanced CFS design methods via experimental and numerical tests;

Experimental tests on:

(1) minor and major eccentric compression of lipped channels;
(2) back-to-back plain and lipped channels in bending;
(3) Z- purlins with overlapping over intermediate supports and restrained by sheeting;

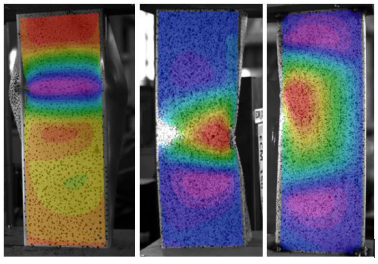
- Material testing and initial imperfection measurements;
- Implementation of the advanced CFS design methods into a complete design package.

Results

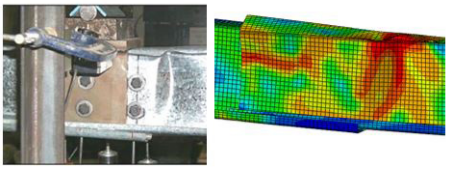
• The goal of the project is to develop a software for engineers to be used in their projects including cold-formed sections of general shape, according to a design based on Eurocode 3 - Part 1.3.
• The software is based on an innovative design process which integrates the specific modern mechanical analysis of CFS members (Constrained Finite Strip Method - cFSM) with existing and newly developed design procedures.
• The software tools will be launched at three levels for different types of target users having the same calculation core including the developed new innovative design methodology.
• The main R&D result of the project is is to implement it into three different types of software modules.
• The CFSExpert Structure is a design package implemented into the ConSteel 3D analysis and design software as an additional module for the design of cold-formed sections within a general 3D steel structural model.
• The CFSExpert Member is a stand-alone software configuration to handle a single element, with simply supported or continuous statical system, with specific graphical input and output features limited to cold-formed profiles.
• The CFSExpert Engine is a calculation engine, without graphical user interface, but having standard easy-to-use input-output interface suitable for implementing into any existing or new-to-develop specific design software tools.

Applicability and transferability of the results

• The CFSExpert software packages will fill a market gap of missing complete design tools supporting the complex design of CFS structures accordingly we expect great interest from structural engineering companies.
• The companies already having CFS products can accelerate their design process and widen their product range using this software.
• The greater part of our possible market consists of those companies which realize new possibilities in using CFS in their structures by using this software.



Major axis bending - web deformations of profiles monitored with VIC-3 for 0 mm, 45 mm and 90 mm eccentricities



Failure of purlins at overlapping: experiment vs. numeric

Financed through/by

This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI – UEFISCDI, project number EUROSTARS-2019-E!113493 – CFSExpert, within PNCDI III

Research Center

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

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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

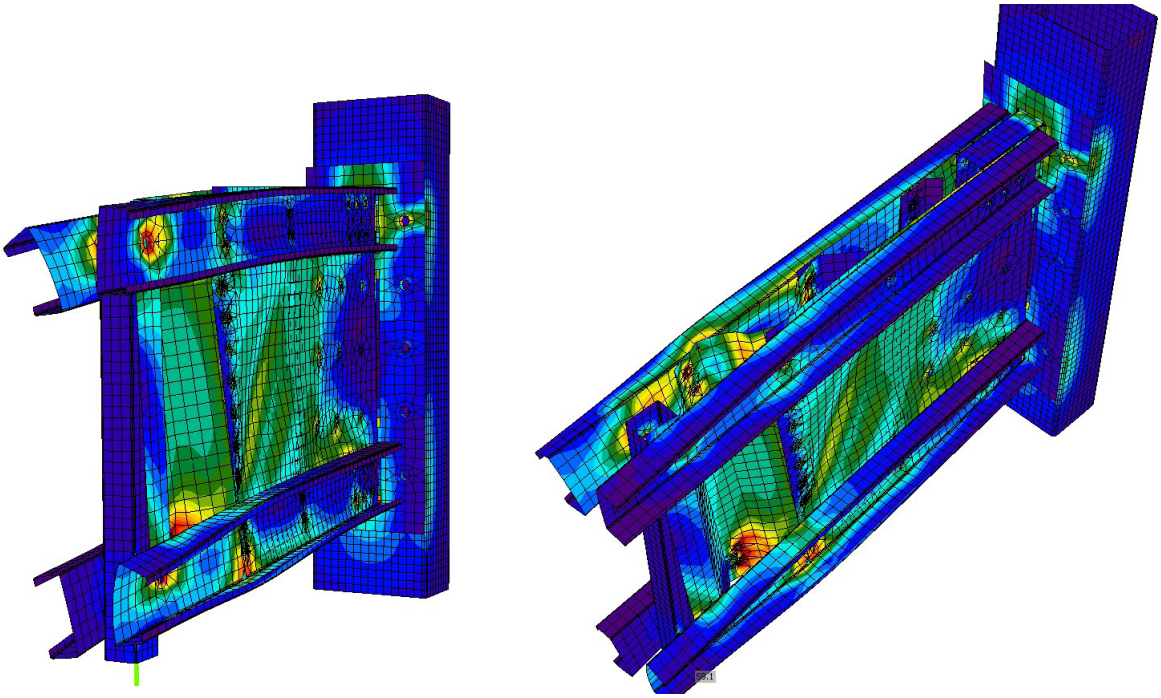
1. Guidelines for the design of structural systems made of cold-formed steel beams with corrugated web;
2. Tables for bearing capacities of joints and standardized frames composed of cold-formed steel beams with corrugated web;
3. Guidelines for the fabrication of structural systems made of cold-formed 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

• The CFSExpert software packages will fill a market gap of missing complete design tools supporting the complex design of CFS structures accordingly we expect great interest from structural engineering companies.

• The companies already having CFS products can accelerate their design process and widen their product range using this software.

• The greater part of our possible market consists of those companies which realize new possibilities in using CFS in their structures by using this software.



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

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DATA-DRIVEN CONTROLLERS FOR SHAPE MEMORY ALLOYS SYSTEMS (DDCSMASYST)

Goal of the project

Analysis, design and implementation of control solutions with nonlinear data-driven controllers (MFC, MFAC, ADRC, VRFT and IFT) in combination with other modern control algorithms in order to improve the CS performance and validate the new CSs with the proposed nonlinear controllers through experiments on laboratory equipment related to Shape Memory Alloys (SMA), and other various laboratory equipment with SMA as actuators.

Short description of the project

Nonlinear controllers whose parameters are tuned using experiments are developed and validated with experiments on laboratory equipment related to Shape Memory Alloys (SMA), and other various laboratory equipment with SMA as actuators.

Project implemented by

- Assist. Prof. Dr. Eng. Raul-Cristian ROMAN – responsible for outlining the research goals, modeling of experiments, simulation and data validation, writing scientific manuscripts, overall project;
- Prof. Dr. Eng. Stefan PREITL – mentor for the project director, research goals;
- Prof. Dr. Eng. Radu-Emil PRECUP – mentor for the project director, theoretical expert advisor regarding algorithm theory.

Implementation period

17.08.2020 – 16.08.2022

Main activities

1. The analysis, the design and the implementation of nonlinear data-driven controllers (MFC, MFAC, ADRC, VRFT and IFT) in combination with other modern control algorithms in order to improve the CS performance.
2. Validation of the new CSs with the proposed nonlinear controllers through experiments performed on laboratory equipment related to Shape Memory Alloys (SMA), and other various laboratory equipment with SMA as actuators.
3. Applying the new CSs with data-driven controllers through external partners.
4. Publication of results in visible conference and journal papers.
5. Solving issues related to project management.

Results

- The research team published in 2022 **four journal papers** indexed in Clarivate Analytics Web of Science (WoS, with one of the previous names ISI Web of Knowledge)
(FUME 2022: http://casopisi.junis.ni.ac.rs/index.php/FUMechEng/article/view/10417
IJCCC 2022: https://univagora.ro/jour/index.php/ijccc/article/view/4623
Information Sciences 2022: https://www.sciencedirect.com/science/article/pii/S0020025521011737
Information Sciences 2022: https://www.sciencedirect.com/science/article/pii/S002002552101094X).
The research team published in 2022 **seven conference papers** currently indexed in the international data bases Elsevier and IEEExplore
(COSY 2022: https://www.sciencedirect.com/science/article/pii/S2405896323000745
CCTA 2022: https://ieeexplore.ieee.org/abstract document/9966012
FUZZ-IEEE 2022: https://ieeexplore.ieee.org/abstract/document/9882748
ISIE 2022: https://ieeexplore.ieee.org/abstract/document/9831526
ICCCC 2022: https://link.springer.com/chapter/10.1007/978-3-031-16684-6_9
ICONS 2022: https://www.sciencedirect.com/science/article/pii/S2405896322010163
ITQM 2022: https://www.sciencedirect.com/science/article/pii/S1877050922000205). The proceedings of the previous editions of these conferences are indexed in WoS.

Applicability and transferability of the results

With the support of our partner from the University of Ottawa, the new CSs with nonlinear data-driven controllers presented in 2022 IEEE Conference on Control Technology and Applications, 1st IFAC Workshop on Control of Complex Systems, and 8th International Conference on Information Technology and Quantitative Management are in the validation process at Ontario Centers of Excellence.

Financed through/by

• UEFISCDI

Research Center

Research Center for Automatic Systems Engineering

Research Team

- Project leader:

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- Researchers:

Prof. Dr. Eng. Stefan PREITL

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Project Website:
http://www.aut.upt.ro/~raul.roman/PD2019.html

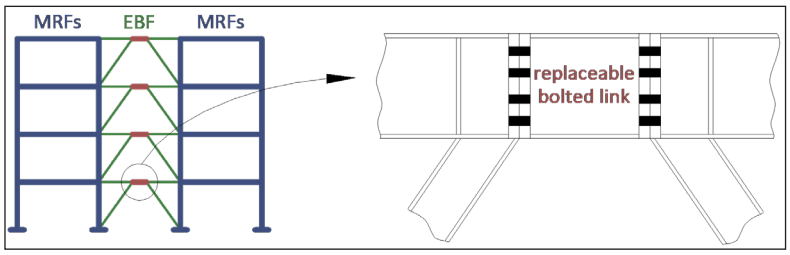
HYBRID REPLACEABLE LINKS FROM STAINLESS AND HIGH-STRENGTH STEEL (HYLINK)TREATMENT

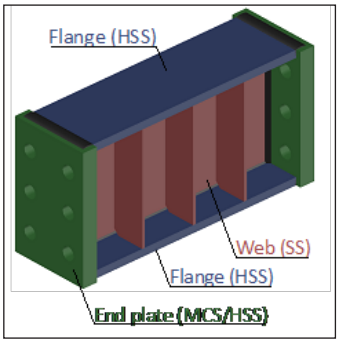
Goal of the project

The project aimed at development of a novel hybrid stainless steel replaceable link for re-centring eccentrically braced frames. Considering that the ductility of the replaceable link and the adequate resistance of the bolted connection are key requirements for the global seismic performance of the system, the goal of the project consists in numerical and experimental investigations of the hybrid link behaviour, in order to assess the benefits induced by the use of high-performance steels.

Short description of the project

The project aims at investigating numerically and experimentally a novel link, fabricated from high-performance steel.





Project implemented by

- Politehnica University Timişoara (UPT)
- National R&D Institute for Welding and Material Testing (ISIM)

Main activities

- Development of welding processes for joining dissimilar steels: stainless steel to high strength steel (SS/HSS), stainless steel to mild carbon steel (SS/MCS) and mild carbon steel to high strength steel (MCS/HSS).
- Characterisation of low-cycle fatigue (LCF) behaviour of stainless steel (SS), high strength steel (HSS) and mild carbon steel (MCS).
- Characterisation of low-cycle fatigue (LCF) behaviour of welded joints with dissimilar steel SS/MCS and SS/HSS.
- Experimental validation of inelastic cyclic performance of hybrid replaceable links.
- Development of a design recommendations for hybrid replaceable links.
- These specific objectives will be accomplished through numerical and experimental investigations on low cycle fatigue response of materials, welded joint components and structural components (hybrid links).

Implementation period

02.11.2020-31.10.2022

Results

- As a preliminary investigation, a study of the characteristics, weldability and ductility of different steel grades, together with the selection of compatible welding processes, was performed.
- A set of short links, in several combinations of steel grades (mild-carbon, stainless and high-strength steels), were designed within a dual, re-centring prototype structure.
- A pre-test numerical investigation, based on nominal steel characteristics, was developed in order to predict stainless steel and hybrid links performance. For each base material, tensile, Charpy, and low-cycle fatigue tests were performed. The experimental setup consisting of an eccentrically braced frame was designed and manufactured with the aim of testing links and assessing the cyclic performance of replaceable links. In the following phase, after comprehensive post-test numerical simulations, the project targets the development of informative documents, research reports, and design guidelines for hybrid replaceable links. Project outcomes will be disseminated through publication in conference proceedings and journal papers.

Applicability and transferability of the results

Considering that the potential for using austenitic stainless steel in applications requiring large ductility has been previously recognized, the present research project aims at promoting stainless steel for a wider adoption in structural applications.

Financed through/by

This work is supported by a grant of the Romanian Ministry of Education and Research, CCCDI - UEFISCDI, project number PN-III-P2-2.1-PED-2019-5427, within PNCDI III.

Research Center

The Research Center for Mechanics of Materials and Structural Safety – CEMSIG

Research Team

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- Ph.D student Eng. Anna PRODAN
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NEW HYBRID DC-DC SWITCHING CONVERTER FAMILIES WITH APPLICATIONS IN BATTERY CHARGING SYSTEMS FOR ELECTRIC VEHICLES AND SOLAR ENERGY CONVERSION

Goal of the project

The project proposes three new dc-dc hybrid converter families suitable for battery charging systems and solar energy processing.

Short description of the project

Synthesis, analysis, simulation and practical validation of three new hybrid converter families with emphasis on two topologies from each family.
Therefore, in total 6 new converters will be investigated.
Two converters out of the six will be used for energy conversion in two applications: a battery charging system from the single phase mains as a solution in automotive industry and a solar energy conversion system comprising a PV panel and also including MPPT control.

Project implemented by

Politehnica University Timişoara

Implementation period

01.09.2020-28.02.2022

Main activities

A1. Ć-SC family. Theoretical development of the Ć-SC family. Topologies operation validation by simulation and experimental prototypes for 2 converters.

A2. S-SC family. Theoretical development of the S-SC family. Converters operation validation by simulation and hardware test for 2 converters.

A3. SN-SC family Theoretical development of the SN-SC family. Topologies validation by simulation and experimental prototypes for 2 converters.

A4. Comparative study of the 6 new developed topologies and final decision about the converter that is best suited in the battery charging system and in the solar energy system.

A5. Battery charger system based on the proposed converter topology. Design of the current mode control and charging profiles. Measurements and evaluation of the system performance.

A6. Design and practical implementation of the solar energy conversion system and its MPPT control; LabView programs for long term monitoring of system behavior in different environmental conditions.

Results

1. Pop-Calimanu I-M, Popescu S, Lascu D. A New SEPIC-Based DC-DC Converter with Coupled Inductors Suitable for High Step-Up Applications. Applied Sciences. 2022; 12(1):178.

2. I.-M. Pop-Calimanu, L. D. Jurca, D. Lascu and M. Pop-Calimanu, "A Novel Quadratic Step-Up DC-DC Converter," 2021 IEEE 19th International Power Electronics and Motion Control Conference (PEMC), 2021, pp. 23-30.

3. D. -A. Botila, **I.-M. Pop-Calimanu** and D. Lascu, "A Novel Single Switch Step Down Converter," 2021 IEEE 19th International Power Electronics and Motion Control Conference (PEMC), 2021, pp. 31-38.

4. S. Lica, **I.-M. Pop-Calimanu** and D. Lascu, "A New High Performance Step-Down Quadratic Converter," 2021 IEEE 19th International Power Electronics and Motion Control Conference (PEMC), 2021, pp. 15-22.

5. I. -M. Pop-Calimanu, E. -A. Raducanu, D. Lascu, M. Pop-Calimanu and S. Popescu, "A Novel Quadratic Step-Up DC-DC Converter," 2021 23rd European Conference on Power Electronics and Applications (EPE'21 ECCE Europe), 2021, pp. P.1-P.10.

6. D. -A. Botila, D. Lascu and **I.-M. Pop-Calimanu**, "A Buck Converter Suitable in Low Step-Down Applications," 2021 21st International Symposium on Power Electronics (Ee), 2021, pp. 1-6.

Financed through/by

Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI). Program 1-National Plan for Research – Development. Subprogram 1.1 - Human Resources / Postdoctoral Research Projects, PN-III-P1-1.1-PD-2019

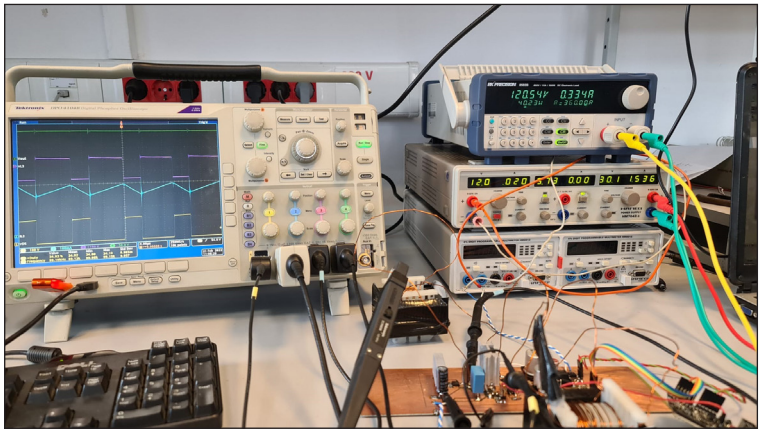

Fig. 1. View of the experimental setup

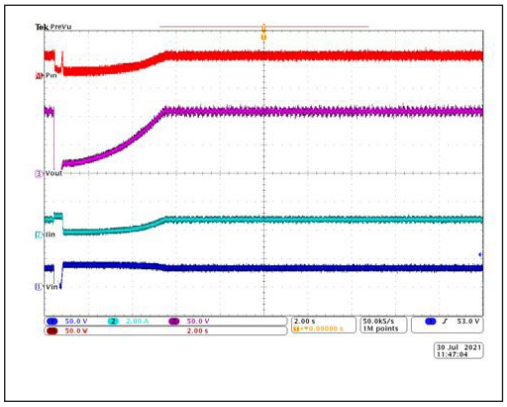

Fig. 2. Oscilloscope waveforms at start-up

Research Center

Research Center for Intelligent Electronic Systems
https://erris.gov.ro/Centrul-de-Cercetari-SEI

Research Team

Project Director:
Ioana-Monica POP-CALIMANU
Mentor:
Dan-Florentin LASCU

Applicability and transferability of the results

- Charging system for electric vehicles
- Solar energy processing and possible integration in Smart Grids and Smart Homes
- Implementation in the automotive industry – Continental Automotive Timisoara or Vitesco Technology Engineering Romania

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GETICA-INTELLIGENT, INDEPENDENT AND AUTOMATED GREENHOUSE WITH SELECTIVE ABSORPTION OF SOLAR RADIATION USING DYE-SENSITIZED SOLAR CELLS (DSSCS)

Goal of the project

For the first time, GETICA project proposes to develop and validate an energy independent and combined fully automated greenhouse standalone prototype based on DSSCs.
Our team aims to implement a completely autonomous greenhouse in which plants can grow without human intervention. Moreover, it will be sought reducing production cost of the greenhouse using 3D printing of the modular roofs and a low-cost maintenance given by near zero energy input from conventional sources and decreasing the water consumption in irrigation.
In this context, GETICA project aims to demonstrate the economic sustainability of this smart greenhouse based on DSSC in the real agriculture.

Short description of the project

• Our project involves the implementation of a prototype for an autonomous greenhouse that can provide all the necessary conditions for a proper growth of plants without the need for human intervention.
• For this, the greenhouse has numerous sensors that record and analyze environmental conditions such as temperature, humidity, wind speed and direction, etc.
• Depending on the data read from the sensors, the necessary measures will be taken in order to ensure the suitable environmental conditions for the plants (irrigation pumps or fans can be started, the roof can be closed or opened).

Project implemented by

- National Institute for Research and Development in Electrochemistry and Condensed Matter
- Faculty of Electronics, Telecommunications and Informational Technologies, Department of Applied Electronics Politehnica University Timisoara,
- SYMPH ELECTRONICS

Implementation period

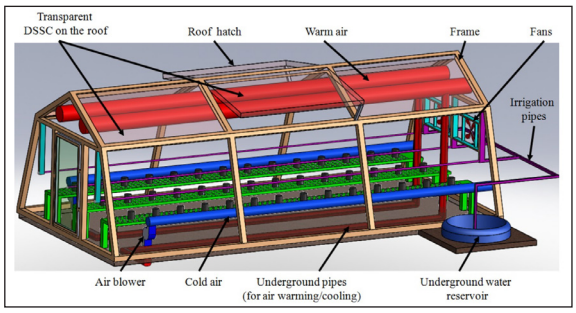
17.11.2020 – 31.10.2022

Main activities

The main activities in our project are:
- Define a block diagram for the greenhouse
- Establish the environmental conditions that must be monitored
- Establish the optimal dimensions for the greenhouse
- Design the resistance structure of the greenhouse
- Design the roof of the greenhouse
- Find methods to reduce manufacturing costs and maintenance costs
- Greenhouse implementation
- Control unit implementation
- Thermal simulation of photovoltaic cells

Results

The proposed greenhouse has transparent DSSC on the roof, fans, irrigation pipeline, underground pipelines, air blower, etc.



Applicability and transferability of the results

The implemented prototype offers an intelligent system for autonomous plant growth and for their monitoring using various sensors to record environmental conditions.
Moreover, our solution reduces the manufacturing costs and the maintenance costs.

Financed through/by

Ministery of Research and Innovation, CNCS - UEFISCDI,
Project number: PN-III-P2-2.1-PED-2019-2091

Research Team

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- Eng. Radu RICMAN
- Eng. Corina COVACI
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RANGE OF PROTOTYPES OF AUTOMATIC CAPACITIVE COMPENSATORS DESIGNED TO IMPROVE THE POWER FACTOR AND LOAD BALANCING IN LOW VOLTAGE ELECTRICAL NETWORKS

Goal of the project

The project aims at two of the most important measures to increase the performance of electrical power distribution networks: reactive power compensation and load balancing. The aim of the project is to raise the level of technological maturity from TRL4 to TRL6 of an innovative load balancing solution in three-phase low voltage distribution networks, by using an automatically unbalanced capacitive compensator. It allows the two goals to be achieved simultaneously: improving the power factor and balancing the equivalent load.

Short description of the project

Currently the solution is materialized in the form of a demonstrative experimental model, successfully completed through a previous partnership between UPT (coordinator) and ICPE (partner).
https://www.sites.google.com/site/caeredjt/

Project implemented by

- **Coordinator:** ICPE S. A. of Bucharest;
- **Partner:** Politehnica University Timisoara.

Implementation period

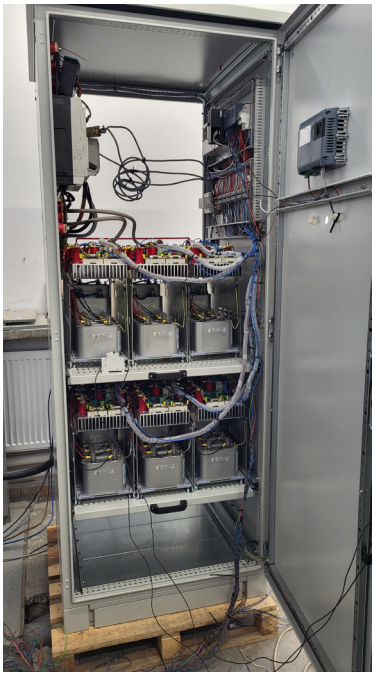
May 2020 – November 2022
Third stage: January - November 2022

Main activities

• Starting from the identification of this innovative product as having a significant market potential, ICPE is this time the project coordinator and aims to develop it together with the same partner, UPT, to the prototype level. The new project mainly contains industrial research activities:

- Transfer of intellectual property rights from UPT to ICPE;
- Technical and economic analysis followed by the design, construction and commissioning of a range of prototypes (real-scale compensators) with rated reactive powers of 50, 150, 250 kvar;
- Testing the range of prototypes in operating conditions similar to the real ones;
- Optimization of algorithms to improve functional characteristics;
- Validation of the components of the prototype range.

Results



The third stage entitled **"Prototyping and testing; Dissemination of results"** has as its main objective the development of prototypes of automatic capacitive compensators, based on a technical specification and technical documentation prepared in the previous stages.

Main final conclusions: The design and execution were correctly carried out, during commissioning and tests there were no major malfunctions that would determine the integrity of the components or the assembly.

There are prerequisites for correct, efficient and reliable operation in real, long-lasting operation.

The prototypes of the automatic capacitive compensators produced during the project have integrated solutions in configurations very close to those of future variants, intended for introduction into series production and then on the market. They are ready to successfully pass the tests at the homologation stage.

Applicability and transferability of the results

The project was successfully completed. The two partners have contributed to the realization of an innovative product, using advanced technological solutions, which has been confirmed to work efficiently and therefore has a high potential for market entry.
The beneficiary of the technology transfer, ICPE Bucharest, declares its intention to go through the next steps regarding product approval, start of series production and market launching. At this point, the beneficiary is prepared to participate in funding competitions for the activities necessary to raise to the higher levels of technological progress, TRL 8 and 9.

Financed through/by

The Government of Romania, Ministry of Education and Research, through Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI) National Plan for Research - Development and Innovation for the period 2015-2020 (PNCDI III), project code: PN-III-P2-2.1-PTE-2019-0694 contract no. 41PTE/2020

Research Center

Research Center for Power Systems Analysis and Optimization

Research Team

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- Assoc. Prof. Dr. Eng. Alexandru BĂLOI
- Assoc. Prof. Dr. Eng. Attila SIMO
- Lecturer Dr. Eng. Ilona BUCATARIU
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- Lecturer Dr. Eng. Raul-Cristian ROMAN
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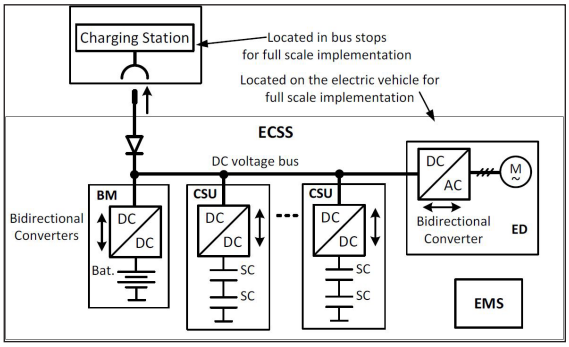
ENERGY CONVERSION SYSTEM FOR AN ELECTRIC CITY BUS/MICROBUS, WITH SUPERCAPACITOR ENERGY STORAGE AND SUPERHIGH POWER DENSITY DRIVE (ECON-BUS)

Goal of the project

The project main objective is to develop a small-scale laboratory demonstration model of an energy conversion and storage system for a public transport electric vehicle (bus / minibus), which is charged during stopping at stations. The system will be composed of a high torque density electric drive, powered by a high power density inverter associated with an energy storage unit based on supercapacitor cells, charged/discharged by DC-DC converters connected to a common voltage bus.

Short description of the project

The laboratory demonstration model of the energy conversion and storage system is designed and implemented based on preliminary research and digital simulation results. The model is validated in various operating modes, through extensive experimental tests. The dissemination of the obtained results is considered in order to find companies interested in potential industrial implementation.



Project implemented by

- Romanian Academy, Timisoara branch (Coordinator) &
- Politehnica University Timisoara (Partner)

Implementation period

17.08.2020 – 15.04.2022

Main activities

- Development and test of the simulation models for the system components (2020)
- Extensive simulation testing of the entire conversion and storage system (2020)
- Design of the energy conversion and storage system (2021)
- Implementation of the demonstration model (2021)
- Design and implementation of the test bench for the demonstration model (2021)
- Extensive testing of the demonstration model (2021/2022)
- Patenting (2021/2022)
- Dissemination of the project results in scientific and academic environment (2021/2022)
- Industrial, scientific and in mass-media results dissemination (2021/2022)

Results

- In the first stage of the project (2020) the individual simulation models of the electric drive system and of the DC-DC converter used for charging/discharging supercapacitors were developed and tested, as well as a model for determining the global power and energy data, for the energy conversion and storage system;
- The electric drive simulations were carried out for both the 1: 1 scale (100kW) and the reduced 1:20 scale (5kW) that will be used to implement the laboratory demonstration model;
- Two topologies were evaluated for the DC-DC converter. As with the electric drive, the design and simulation data were obtained for 1:1 scale (100kW) and for 1:20 scale (5kW);
- All simulation results showed that the selected electric drive and both DC-DC converter are suitable for the application.

Applicability and transferability of the results

An important component of the project is the activity of disseminating the results, which will be done in the final stage. In addition to transferring essential information related to the obtained results to the scientific and academic community, detailed test reports will be submitted to the industry. If there will be no conditions for industrial implementation, the project research team will consider obtaining a new research grant to bring the TRL to a higher level.

Financed through/by

PNCDI III, Contract no. 307PED/2020;
Project code: PN-III-P2-2.1-PED-2019-5230

Research Center

Research Center for Smart Energy Conversion and Storage

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- Prof. Dr. Eng. Nicolae TUTELEA
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- Scientific Researcer level II Ileana TORAC (Romanian Academy, Timisoara branch)
- Scientific Researcher level I Sebastian MUNTEAN (Romanian Academy, Timisoara branch)
- Assoc. Prof. Dr. Eng. Octavian CORNEA
- Assist. Prof. Dr. Eng. Prof. Ana POPA
- Assist. Prof. Dr. Eng. Dan-Cornel HULEA
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SMART MICROACTUATORS WITH LAYER-OPTIMIZED ARCHITECTURE - SMAL

Goal of the project

The SMAL Project aims to use the models developed in our research group for bimorph and trimorph architectures with at least one layer that undergoes a temperature-dependent phase transformation, in order to manufacture cantilever-type microactuator demonstrators with enhanced displacement, for use in micro electromechanical systems.

Short description of the project

The project aims to generate sensing and actuation at micro and nano level by taking into account the change in the thermoelastic properties during a phase transformation in active layer(s). The materials considered as phase transformation active layers are shape memory alloys, that will be deposited by magnetron sputtering in various bi and multimorph layered architectures. The stress developed in such cantilever-type architectures is reflected in the actuation by bending (which depends on the thermoelastic properties of the shape memory alloy layer(s) and the one(s) of the passive (non-transforming) layer, usually used as a substrate. The demonstrators will be manufactured in bimorph and trimorph architectures and will be tested to determine the materials integrity as well as the functional output (e.g. actuation and curvature) with the results used for further optimization.

Implementation period

2020-2022

Main activities

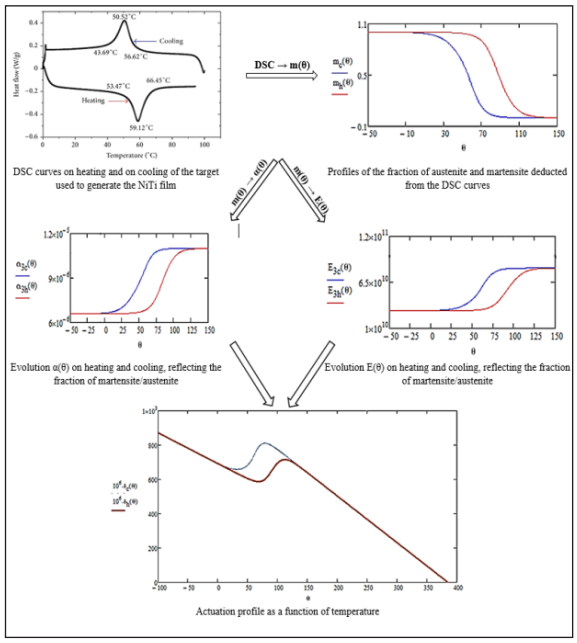
The demonstrators will be manufactured based on the analysis of the models developed by the members of the project team. The design of the bimorphs will be made in various architectures, with different deposition temperatures in order to verify the models over a larger temperature range. Magnetron sputtering will be used to generate the shape memory alloy films on several substrates, thus expanding the range of thermoelastic stresses that can be generated in the selected architectures (film/substrate). Multilayers will also be designed, taking into account the corresponding phase transformation features for each layer (e.g. transformation temperatures).

Project implemented by

Politehnica University Timisoara, Romania

Results

Models developed for analysis of different architectures based on shape memory alloy films.



Applicability and transferability of the results

The technical solutions developed in the project have the potential to be applied the micro-opto-electro-mechanical systems.

Financed through/by

UEFISCDI
PN-III-P2-2.1-PED-2019-0619-1

Research Center

Smart Materials and Structures Laboratory
https://eeris.eu/ERIF-2000-000R-4315

Research Team

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- Assoc. Prof. Dr. Eng. Aurel ERCUTA
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https://www.upt.ro/img/files/2019-2020/cercetare/ppr/Proiect_SMAL-508PED.-2020.pps

ECONOMIC POLICY UNCERTAINTY, ENVIRONMENTAL AND ENERGY POLICIES AND THEIR MACRO-FINANCIAL IMPLICATIONS IN THE EU - EPUEER-MFI

Goal of the project

As a response to growing environmental concerns, the interest for identifying the economic elements that prevent the environmental degradation increased. At the same time, the economic and financial impact of environmental and energy policies gained the interest of researchers and policy makers. Against this background, the purpose of this project is to investigate how the policy-induced economic uncertainty impacts the producers, consumers and portfolio investment behavior, influencing thus the relationship between environment, energy use and macro-financial variables.

Short description of the project

The project aims to test the connection between policy uncertainty, energy and finance, considering their environmental impact

Project implemented by

Politehnica University Timisoara

Implementation period

07.09.2020-30.09.2022

Main activities

a) Development of research on three directions:

(i) the impact of uncertainty and energy security on oil and financial assets prices connection,

(ii) the role of environmental regulations and renewables on carbon emissions,

(iii) the effect of policy-induced uncertainty and energy price shocks on bank stability.

b) Literature review and data collection

c) Econometric analyses and discussions on empirical results

d) Dissemination of results in conferences and high-ranked journals.

Results

a) 14 papers in ISI journals (out of which 5 in Q1 journals and 3 in Q2 journals):

1. **Albulescu, C.T. (2021),** COVID-19 and the United States financial markets' volatility, Finance Research Letters. (Q1)
2. **Albulescu, C.T., Ajmi, A.N. (2021).** Causal change detection between oil price and US dollar exchange rate, Energy Economics. (Q1)
3. **Albulescu, C.T.,** Tiwari, A.K., Kyophilavong, P. (2021). Nonlinearities and chaos: A new analysis of CEE stock markets, Mathemathics. (Q1)
4. **Albulescu, C.T.,** Mutascu, M. (2021). Fuel price co-movements among France, Germany and Italy: A time-frequency investigation, Energy. (Q1)
5. **Albulescu, C.T. (2022).** Health Care Expenditure in the European Union Countries: New Insights about the Convergence Process. International Journal of Environmental Research and Public Health. (Q1)
6. **Albulescu, C.T.**, Boatca, M.E., Diconescu, A. (2022). The asymmetric effect of environmental policies on CO2 emissions in OECD countries, Environmental Science and Pollution Research. (Q2).
7. Mutascu, M.I., **Albulescu, C.T.,** Apergis, N., Magazziono, C. (2022). Do gasoline and diesel prices co-move? Evidence from the time–frequency domain. Environmental Science and Pollution Research. (Q2)
8. **Albulescu, C.T.**, Turcu, C. (2022). Total factor productivity, financial performances and corporate governance: An analysis of the R&D sector in Romania, Applied Economics. (Q2)

b) 14 participations in international conferences :

1. 2020 (INFER, GCBSS, IBIMA, IMC, GEBA, EBES)
2. 2021 (SIM, INFER, ERMAS, TIMTED, FIBA, EBES)
3. 2022 (INFER, ERMAS)

c) Research stages:

- University of Macedonia
- University of Göttingen

d) Organization on the **24th INFER Annual Conference**

e) Project website:

- https://sites.google.com/view/epueer-mfi-te2019/home

Applicability and transferability of the results

The results of the project have noteworthy implications for international investors and policymakers.
In the first case, the investors will learn how the commodity and financial markets are connected and how the economic policy uncertainty will affect their risk management and portfolio optimization strategy.
In the second case, national and international regulators and policymakers receive information about the impact of shocks in energy prices on macroeconomic variables, but also about the effectiveness of environmental regulation and the role of renewable sources in reducing carbon emissions at EU level.

Financed through/by

Executive Unit for Financing Higher Education, Research, Development and Innovation - UEFISCDI

Research Center

Research Center for Engineering and Management

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- Lecturer Dr. Şerban MICLEA
- Assist. Prof. Dr. Lavinia MIHALI
- Assist. Prof. Dr. Andra DIACONESCU
- Ph.D. Student Roxana SÎRBU

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FREE RUNNER FOR SWIRLING FLOW CONTROL AT THE OUTLET OF HYDRAULIC TURBINES

Goal of the project

The main objective of the project is to design and investigate a new concept by using a free runner downstream on the main hydraulic runner turbine. The free runner concept supposes that rotates at the runaway speed with vanishing mechanical torque. The main purpose is to redistribute between the shaft and the periphery the total pressure and the moment of momentum such that the flux of total pressure and the moment of momentum are not altered. Moreover the free runner does not modify the operating point.

Short description of the project

• The research topic deals with the fundamental aspects of the decelerated swirling flows in conical diffusers, applied to the flow in the draft tube cone of hydraulic turbines. The variable demand on the energy market, as well as the limited energy storage capabilities, requires a great flexibility in operating hydraulic turbines.
• When the hydraulic turbine operates far from the best efficiency point, the flow downstream the runner becomes unstable (with formation of a precessing spiral vortex in the draft tube cone).
• The decelerated swirling flow and the precessing spiral vortex are responsible for severe pressure fluctuations which reduce the operating regime and diminish performances. The project propose a new concept in order to control the flow by adding a free runner downstream the hydraulic runner turbine. The free runner will be designed taking into account the flow from the exit of the main turbine runner, such that at the inlet of the conical diffuser a uniform flow should enter. Numerical and experimental investigations will evaluate the new concept in order to minimize the effects of hydraulic instabilities.

Project implemented by

Politehnica University Timisoara

Implementation period

02.11.2020 – 03.10.2022

Main activities

The main activities are programmed as follows:

Activity 1. Flow field analysis in the draft tube cone of the swirl apparatus using Laser Doppler Velocimetry – first year 2020.

Activity 2. 3D hydrodynamic design of the free runner blades and mechanical design for the free runner rotating system;

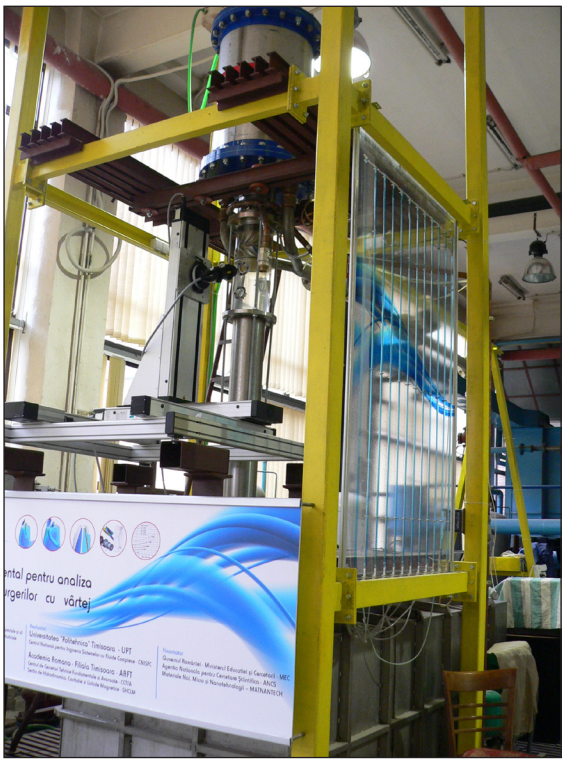
Numerical simulation of the swirl apparatus with the new concept of free runner – second year 2021.

Activity 3. Implementation and first tests of the free runner system. Experimental investigations of the free runner performances – **third year 2022**.

Results

The project will develop a free runner which can be mounted downstream of the turbine runner in order to diminish the hydraulic instabilities.

First results concentrated on the experimental investigations of the velocity profiles in the divergent part of the swirl apparatus. Therefore the LDA velocity profiles measured at the exit of the runner will be used as design inlet conditions for the free runner blades new concept..



Applicability and transferability of the results

The results obtained from this project can be implemented in the hydraulic turbines in order to operate in safety conditions far from the best efficiency point.

Financed through/by

UEFISCDI, P1 Human Resources Program, Research Projects to Stimulate Young Independent Teams (TE)

Research Center

Research Center for Complex Fluid Systems Engineering

Research Team

- Lecturer Dr. Eng. Alin BOSIOC
- Ph.D. Student Eng. Timotei ARDELEAN
- Ph.D. Student Eng. Raul SZAKAL
- Eng. Constantin TANASA, Scientific Researcher level II
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- Prof. Dr. Eng. Romeo SUSAN-RESIGA

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EFFICIENCY INCREASE IN WATER DOMAIN SYSTEMS FUNCTIONING THROUGH PROACTIVE SUPERVISION

Goal of the project

The objective of the project is to provide tested and validated solutions to increase efficiency of water domain systems functioning, in the IIoT context, targeting a proactive supervision. The solutions are focusing on a proactive historian targeting efficiency improvements of water domain systems, on securing local structures that are interfacing on legacy protocols, respectively on a flexible and configurable supervision of processes using the OPC UA protocol and mobile devices.

Short description of the project

The project proposes to increase the efficiency of water domain systems functioning through proactive supervision, in the IIoT context, providing two tested and validated solutions contributing to reduce costs of water producing-treatment-distribution, wastewater collection-treatment, the environmental impact, and to increase water, wastewater quality and the availability of services. The first solution refers to a water system oriented, low-cost and platform independent proactive historian, in a decentralized concept, integrated non-invasively with the local structures. The proactive historian will accumulate data according to technological process patterns, constraints and objective functions, will generate dependencies and conclusions, respectively it will elaborate and apply efficiency increasing recipes on local control structures. In connection with the proactive historian, to increase the applicability area, a security solution is developed for the communication on legacy protocols. The second solution refers to a monitoring and control application focused on water domain processes, for mobile devices with Android operating system and OPC UA interfacing with local systems.

Project implemented by

- Coordinator: Aquatim
- Partner: Politehnica University Timisoara

Implementation period

27.06.2022-27.12.2023

Main activities

Phase 1 (2022):
Researching and developing proactive supervisory solutions in the water domain, to enable the pilot structures.

Results

Phase 1 results:

1. Pilot structures in function for the proactive historian in the operational environment;
2. TPM-based security solutions for legacy structures finalized for the local automation;
3. The Android and OPC UA based supervisory solution is structured for the operational environment.

Applicability and transferability of the results

- The applicability and transferability of results is assured by solutions that are applied in the operational environment. All historians are in function within water and wastewater treatment facilities and are interfacing real automation systems. All efficiency increasing solutions are using real data and have impact on the operational level. The four proactive historian pilots were successfully deployed within functioning legacy systems in a completely non-invasive manner over local developments.

- The activities related to securing legacy protocols are also considering the rapid applicability in real scenarios and also minimal interference over functioning systems during deployment. The Android and OPC UA mobile supervising solution is focused on OPC UA interfacing that was tested using various real and functioning local automation/ SCADA systems and also using various future specifications that are in research and not yet available in the industry, respectively the foreseen pilots will be tested in real scenarios.

Financed through/by

UEFISCDI

Research Team

Project leader:

- Assoc. Prof. Dr. Eng. Adrian KORODI

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- Prof. Dr. Eng. Ioan SILEA
- Lect. Dr. Eng. Octavian ȘTEFAN
- Lect. Dr. Eng. Ruben-Dan CRIȘAN
- Ph.D. Student Inf. Alexandra ȚIDREA
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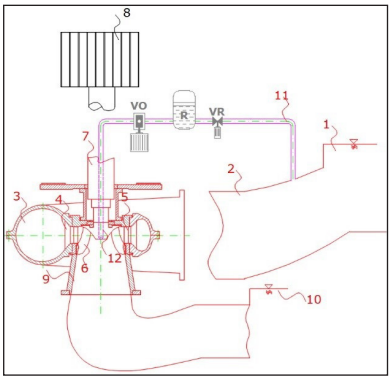
A NEW TYPE OF VALVE TO CONTROL AND MITIGATE THE SWIRLING FLOW INSTABILITIES FROM THE CONICAL DIFFUSER OF HYDRAULIC TURBINES – HYDROVALVE

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

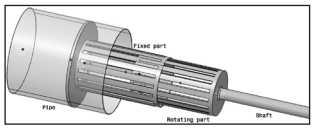
07.2022 - 07.2024

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 1** with the planned activities, related to the stage of 2022, were fulfilled, with the obtaining of an original device (Fig. 2), which in the next stage is to be implemented on the test rig and tested by unstady pressure field measurements. The degree of achievement of the deliverables in this stage was 100% (patent application).



Applicability and transferability of the results

- Next step is to implement the new device on the test rig to proff the concept by experimental measurements of unsteady pressure field.

Financed through/by

UEFISCDI

Research Center

Research Institute in Renewable Energies

Research Team

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Researchers:
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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)

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

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Mentor:

- Assoc. Prof. Dr. Eng. Ladislau MATEKOVITS

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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.

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

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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,
- P2: Politehnica University Timisoara

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.

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

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Researchers:
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- Assoc. Prof. Dr. Eng. Narcis DUTEANU

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SAFETY OF BUILDING WALLS AND CLADDINGS AGAINST ACCIDENTAL EXPLOSIONS SAFE-WALL

Goal of the project:

Explosions produced in urban areas or industrial platforms are low-probability but high-impact events. When occur in the vicinity of buildings, the explosions can pose a high risk to the structural/non-structural components and to the safety of occupants (risk of severe injury or death). While heavy/rigid wall systems have long been considered suitable for protecting buildings from explosions, light and flexible steel systems are increasingly used in modern buildings. The goal of the project is to provide more robust building envelope solutions and to increase the protection of occupants against the direct effects (pressure wave) and secondary hazards (local failures, flying debris) resulting from explosions.

Short description of the project

The experimental building model includes several typologies of wall elements attached to a full-scale two-story steel frame structure. The building is tested against near-field blasts. The fixing/anchoring systems of the walls are investigated to validate their performance under extreme loading.

Project implemented by

The project is implemented by a partnership between:

•Politehnica University Timisoara UPT, project coordinator Prof. Dr. Eng. Florea Dinu;

•National Institute for Research and Development in Mine Safety and Protection to Explosion INSEMEX Petrosani, responsible Ph.D Student Eng. Robert Laszlo;

•Technical University of Cluj-Napoca UTCN, responsible Lecturer Dr. Eng. Mihai Senila.

Implementation period

August 2020 – August 2022

Main activities

WP1: Preliminary analyses, design and fabrication of experimental specimens

- Preliminary analysis of building envelopes under explosions
- Design of walls for static and blast tests, and small-scale specimens from materials and components
- Fabrication of specimens

WP2: Experimental program

- Experimental tests on materials and components
- Full-scale static tests on wall sub-structures
- Full-scale blast tests on wall-frame structure systems

WP3: Validation of a full-scale building envelope under blast loading in laboratory environment

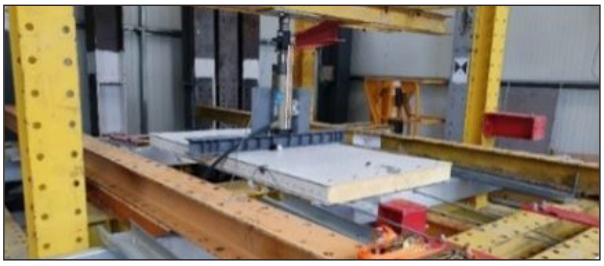
- Validation of full-scale blast test model in laboratory environment
- Numerical simulations on external wall systems with enhanced protection against near field explosions

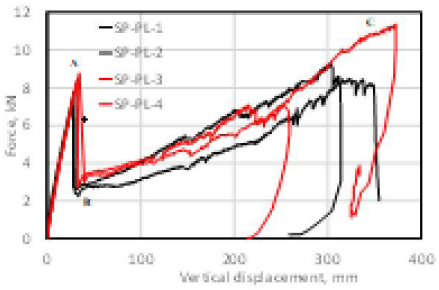
WP4: Project management and dissemination

Main Results:

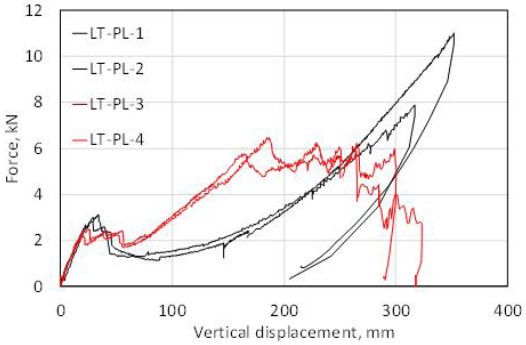
Full-scale static tests on wall sub-assemblies (Fig. 1)

- Wall panels can have significantly higher capacity than considered in practice if appropriate connections with the supporting structure (side rails, columns) are adopted
- After reaching the maximum bending strength, significant axial forces develop in panels if the end fasteners have adequate capacity





1.a)



1.b)

Fig. 1. Static tests on wall panels:
1.a) test setup and force-displacement curves, sandwich panels;
1.b) failure mode and force-displacement curves, liner trays

2.a)

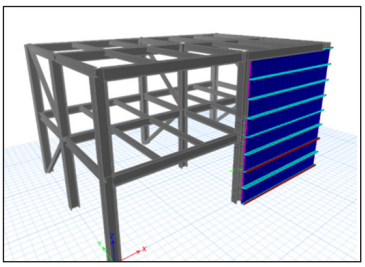
2.b)

2.c)

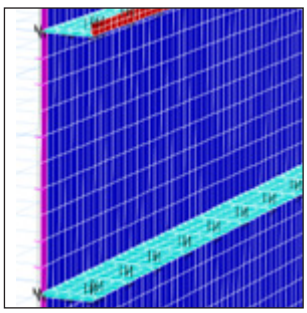
Fig. 2. Blast tests on site: 2.a) sandwich panels; 2.b) liner trays; 2.c) close view of charge detonation

Full-scale blast tests on wall systems (Fig. 2)
-The tests outlined the high ultimate resistance provided by light building wall systems against near field blasts
-The risk to occupants and passersby is greatly reduced

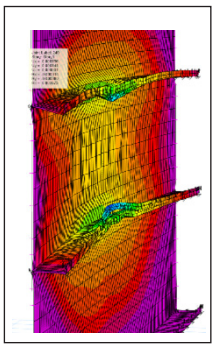
- Numerical model calibration (see Fig. 3)
- The calibration was done using experimental data from tests on subassemblies and joints
- The accuracy of the numerical model in reproducing the structural response is adequate



3.a)



3.b)



3.c)

Fig. 3. Full-scale building with liner tray walls 3.a) , detailed mesh of the wall 3.b) and 3.c) deformed shape after detonation

Applicability and transferability of the results

- Experimental validation of the response of an integrated building system in laboratory environment represents the bridge from the scientific research to the practical application (structural engineering).
- The qualification of acceptance criteria for wall components and connections under the near field blast loading environment is an important step toward the codification and implementation of design rules in practice, guarantying improved performance and capacity to provide protection in case of extreme events.

Financed through/by

Romanian National Authority for Scientific Research and Innovation ANCSI, project number PN III 279PED/2020 (PN-III-P2-2.1-PED-2019-1765), Safety of buildings walls and claddings against accidental explosions SAFE-WALL (2020-2022).

Research Center

The Research Center for Mechanics of Materials and Structural Safety - CEMSIG & Department of Steel Structures and Structural Mechanics CMMC

Research Team

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Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

INTERNATIONAL RESEARCH PROJECTS

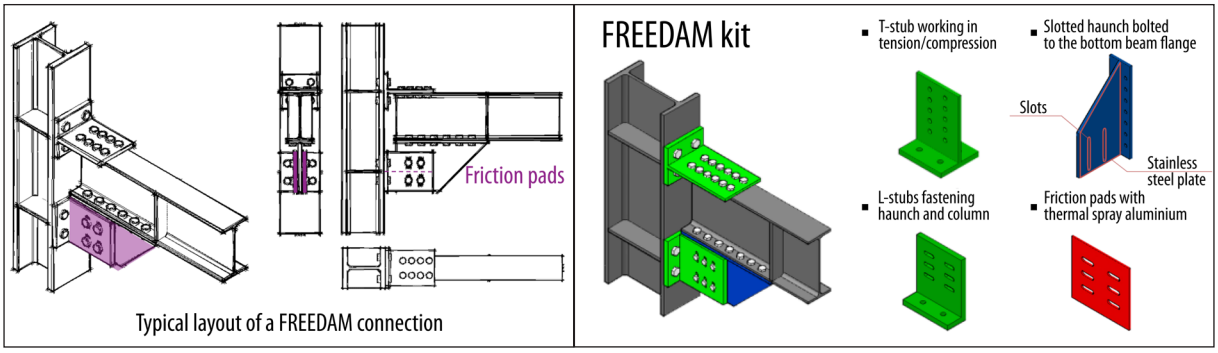
VALORISATION OF KNOWLEDGE FOR FREE FROM DAMAGE STEEL CONNECTIONS (FREEDAM-PLUS)

Goal of the project

The project aimed at valorisation, dissemination and extension of the results of previous investigations regarding the design and testing of innovative connections equipped with friction dampers able to withstand without any damage severe seismic events, to a wide audience of academic institutions, engineers and architects, construction companies, and steel producers by producing informative documents, design guidelines and organizing seminars, webinars and workshops.

Short description of the project

The project developed design guidelines for innovative connections equipped with friction dampers.



Project implemented by

- Universita degli Studi di Salerno (UNISA)
- Universita degli Studi di Napoli Federico II (UNINA)
- Universite de Liege (ULIEGE)
- Universidade de Coimbra (UC)
- Politehnica University Timisoara (UPT)
- Convention Europeenne de la Construction Metallique ASBL (ECCS)
- National Technical University of Athens (NTUA)
- Ceske Vysoke Uceni Technicke v Praze (CVUT)
- Institut National des Sciences Appliquees de Rennes (INSA RENNES)
- Technische Universiteit Delft (TU DELFT)
- Univerza v Ljubljani (UL)
- Universitet po Architektura Stroitelstvo i Geodezija (UASG)
- Universitat Politecnica de Atalunya (UPC)
- Rheinisch-Westfaelische Technische Hochschule Aachen (RWTH AACHEN)

Implementation period

01.07.2020-30.06.2022

Main activities

- Development and translation of the informative documents concerning the connections equipped with friction dampers, from English into 12 additional languages.

- Development of pre-normative design recommendations on FREEDAM connections.

- Development of a design handbook for building structures equipped with FREEDAM connections.

- Software and mobile app development, allowing to select prequalified solutions from FREEDAM standardised connections.

- Organization of seminars, webinars and workshops for disseminating the gained knowledge in EU, EU associated and non-EU Countries.

- Development of a web site with free access to the users in order to promote the obtained results.

- Preparation of videos about the benefits of FREEDAM solutions, for an You-Tube channel.

Results

• Informative material concerning the connections equipped with friction dampers was prepared in 12 languages to reach not only academic and scientific communities but mostly structural engineers and architects, construction companies, steel producers.

• The pre-normative design recommendations for the seismic resistant steel beam-to-column joints equipped with FREEDAM devices were developed, and are being considered for the implementation in the next version of the European seismic design code.

• Additionally, a handbook including a set of technological and constructional requirements concerning friction devices design was developed and translated into 12 languages, and will be further published in EN 1090-2. The research group developed a tool package including design and manufacture guidelines, codified design procedures, software and mobile app tools for practitioners, website, YouTube channel, etc., in order to provide specialists access to this information and to facilitate the application of this typology of seismic resistant joints. The research team from Politehnica University Timisoara organized a one-day workshop, in which the main results of the experimental program on friction dampers, design recommendations and technical support elaborated by 14 European partners within the **FREEDAM** and **FREEDAM+** research projects, were presented.

Financed through/by

Research Fund for Coal and Steel
Grant agreement RFCS-02-2019
Project number 899321

Research Center

The Research Center for Mechanics of Materials and Structural Safety (CEMSIG)

Applicability and transferability of the results

- Use of the design guidelines with simplified procedures for designing steel beam-to-column connections equipped with friction dampers, which could significantly reduce seismic damages. The produced design recommendation and criteria will be used in setting up limits of applicability between EN 1993:1-8 and EN 1998-1 concerning the design of seismic resistant steel beam-to-column joints equipped with FREEDAM device.
- Increased structural safety against the seismic hazard in large parts of Europe.
- Improvement in life cycle costs and sustainability due to the reduction of losses caused by seismic hazards.

Research Team

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- Prof. Dr. Eng. Aurel STRATAN
- Ph. D. Student Eng. Anna PRODAN
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MITIGATION OF THE RISK OF PROGRESSIVE COLLAPSE IN STEEL AND COMPOSITE BUILDING FRAMES UNDER EXCEPTIONAL EVENTS (FAILNOMORE)

Goal of the project

Recent natural and man-made disasters have highlighted the necessity to ensure the structural integrity of buildings under exceptional events and to mitigate the risk of progressive collapse; the main objective is to save lives (occupants, emergency/rescue units) and reduce collateral damages. The overall objective of the project was the preparation of scientific background documents, design manual, and demonstration of application through case studies.

The design manual can be considered as a reference document for the practical design of structures for which the structural integrity has to be ensured under exceptional events.

Short description of the project

The proposed project, which involves European academic, research, and industrial partners with expertise in robustness, brings together extensive knowledge acquired on various related aspects, i.e., risk analysis, loading scenarios, mechanical responses of structures, and components subject to extreme loading conditions such as impact, earthquake, and explosions.

Project implemented by

The project is implemented by a partnership of 14 European Universities and Industrial partners:

- Universite de Liege (coordinator);
- Universidade De Coimbra;
- Imperial College of Science Technology and Medicine;
- Universitaet Stuttgart;
- Universita Degli Studi Di Trento;
- Politehnica University Timisoara;
- Ceske Vysoke Uceni Technicke V Praze;
- Politechnika Rzeszowska Im Ignacego Lukasiewicza Prz;
- Technische Universiteit Delft;
- Universitat Politecnica De Catalunya;
- Institut National Des Sciences Appliquees De Rennes;
- Convention Europeenne De La Construction Metallique Asbl;
- Feldmann + Weynand Gmbh;
- Arcelormittal Belval & Differdange Sa.

Implementation period

July 2020 – June 2022

Main activities

WP1: Development of a consistent design approach for robustness

- Collection of all relevant information available worldwide on the relevant accidental loading events (Fig. 1, Fig. 2);
- Integration of the knowledge based on different research works into a fully consistent design approach for robustness.

Fig.1. Gas explosion in an apartment building, Galati, 2020

Fig. 2. Near field blast (FRAMEBLAST project, https://www.ct.upt.ro/centre/cemsig/frameblast.htm)

WP2: Derivation of design guidelines, application to study cases and preparation of the dissemination material (English version)

- Drafting of a fully consistent set of up-to-date and practice-orientated design recommendations.
- The applicability will be demonstrated through the preparation of four worked examples.

WP3: Translation and editing of the dissemination material

- Translation of deliverables in 10 European languages.

WP4: Dissemination activities

- Training workshops
- Post-project dissemination

Results

Derivation of practice-oriented design guidelines

The manual contains a set of practical and user-friendly design guidelines for mitigating the risk of progressive collapse of steel and composite frame structures subjected to exceptional events (e.g., impact, explosion, fire, earthquake). The design manual is drafted in 10 languages (English, Czech, Dutch, French, German, Italian, Polish, Portuguese, Romanian, and Spanish) (Fig. 3).

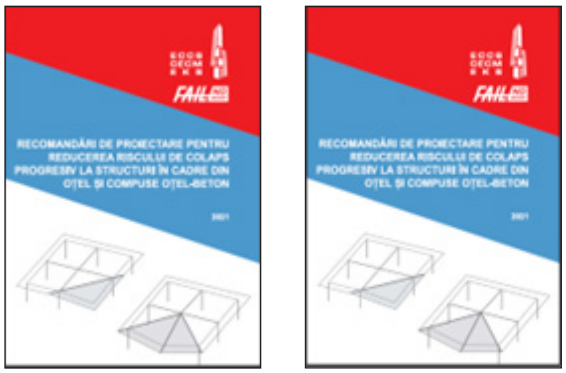

Fig.3. Design manuals, translated in 10 languages

Design and critical analysis of the worked examples

To illustrate the application of the design guidelines, four full worked examples (a steel building and a composite building initially designed to be constructed both in a non-seismic and in a seismic area) were developed and compared.

Fig. 4 presents the deformed shape and failure mode in case of an internal column removal.

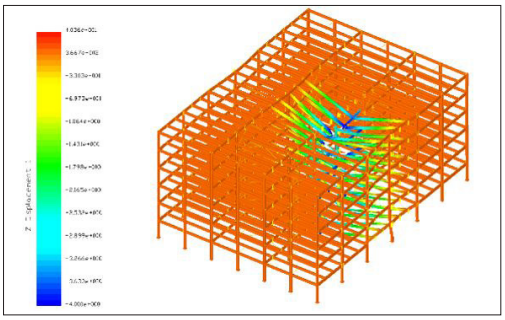

Fig. 4 Failure mode after C4 after column removal

Applicability and transferability of the results

The derivation of a consistent set of practice orientated design guidelines and relevant worked examples are useful tools for construction professionals, including designers, fabricators, and proof engineers, within a clear and easy-to-apply format.

Financed through/by

Research Fund for Coal and Steel: Grant agreement number RFCS 899371 / 2020, European Union

Research Center

The Research Center for Mechanics of Materials and Structural Safety CEMSIG

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EASTERN EUROPEAN TWINNING ON STRUCTURAL INTEGRITY AND RELIABILITY OF ADVANCED MATERIALS OBTAINED THROUGH ADDITIVE MANUFACTURING (SIRAMM)

Goal of the project

The overall objective of the SIRAMM project is to significantly strengthen research in the Additive Manufacturing (AM) field at the Politehnica University Timisoara. To achieve this aim, SIRAMM will build upon the existing science and innovation base of UPT, creating a network with two internationally-leading counterparts at EU level: Norwegian University of Science and Technology (Norway) and the University of Parma (Italy).

In the long term, the project aims at laying the foundations for creating a pole of excellence on AM in Eastern Europe. For this reason, other two partners from low R&I performing countries, the University of Belgrade (Serbia) and the Institute of Physics of Materials, Academy of Sciences (Czech Republic) also take part in this Twinning project.

Short description of the project

The project is focused on the implementation of knowledge transfer activities such as workshops and staff exchange, training events (i.e. summer schools, seminars) for early stage researchers, dissemination and communication actions (i.e. web site, videos, open access publications, public engagement activities) for different audiences.
To keep maintaining the knowledge transfer well beyond the duration of this project, a regular master course on AM technology was implemented in the coordinating institution.

Project implemented by

1. **Coordinator: Politehnica University Timisoara (UPT), Romania**
2. Faculty of Mechanical Engineering, University of Belgrade (UBG), Serbia
3. Institute of Physics of Materials, Academy of Sciences of the Czech Republic (IPM), Czech Republic
4. University of Parma (UniPR), Italy
5. Norwegian University of Science and Technology (NTNU), Norway

Implementation period

01.10.2019 – 31.03.2023

Main activities

- Organization of the 2nd **Workshop on Structural Integrity of Additively Manufactured Materials**, Brno (Czech Republic), 4-5 February 2022 and 2nd **Winter School Trends on Additive Manufacturing for Engineering Applications**, Brno (Czech Republic), 6 – 10 February 2021;

- Organization of the 3rd **Workshop on Reliability and Design of Additive Manufactured Materials**, Belgrade (Serbia), 4 - 6 October 2022;

- Study of the influence of manufacturing parameters on the mechanical properties and fracture toughness of 3D printed specimens.

- Continuation of the staff and PhD exchange between partners.

Results and Publications

In 2022 the consortium published the following journal papers:

- AILINEI, I. I., GALATANU, S. V., & **MARSAVINA, L.** (2022). INFLUENCE OF ANISOTROPY ON THE COLD BENDING OF S600MC SHEET METAL. ENGINEERING FAILURE ANALYSIS, 137, 106206, DOI: 10.1016/J.ENGFAILANAL.2022.106206

- BRIGHENTI R., **MARSAVINA L.**, MARGHITAS M.P., COSMA M.P., MONTANARI M. (2022) MECHANICAL CHARACTERIZATION OF ADDITIVELY MANUFACTURED PHOTOPOLYMERIZED POLYMERS. MECH. OF ADVANCED MATERIALS & STRUCTURES, DOI:10.1080/15376494.2022.2045655

- **L. MARȘAVINA,** C. VĂLEAN, M. MĂRGHITAȘ, E. LINUL, S. M. J. RAZAVI, F. BERTO, R. BRIGHENTI (2022) EFFECT OF THE MANUFACTURING PARAMETERS ON THE TENSILE AND FRACTURE PROPERTIES OF FDM 3D-PRINTED PLA SPECIMENS. ENG. FRACTURE MECHANICS, 274, 108766, 2022, DOI: 10.1016/J.ENGFRACMECH.2022.108766

- ȘERBAN, D. A., COȘA, A. V., BELGIU, G., & NEGRU, R. (2022). FAILURE LOCUS OF AN ABS-BASED COMPOUND MANUFACTURED THROUGH PHOTOPOLYMERIZATION. POLYMERS, 14(18), 3822., DOI:10.3390/POLYM14183822

- IMANI, D. M., ALIHA, M. R. M., LINUL, E., & **MARSAVINA, L.** (2022). A SUITABLE MIXED MODE I/II TEST SPECIMEN FOR FRACTURE TOUGHNESS STUDY OF POLYURETHANE FOAM WITH DIFFERENT CELL DENSITIES. THEORETICAL AND APPLIED FRACTURE MECHANICS, 117, 103171, DOI: 10.1016/J.TAFMEC.2021.103171

- STOIA, D. I., LINUL, E., & **MARSAVINA, L.** (2022). MIXED-MODE I/II FRACTURE PROPERTIES OF SELECTIVELY LASER SINTERED POLYAMIDE. THEORETICAL AND APPLIED FRACTURE MECHANICS, 121, 103527, DOI: 10.1016/J.TAFMEC.2022.103527

- STOIA, D. I., GALATANU, S. V., & **MARSAVINA, L.** (2022). IMPACT PROPERTIES OF LASER SINTERED POLYAMIDE, ACCORDING TO BUILDING ORIENTATION. JOURNAL OF MECHANICAL SCIENCE AND TECHNOLOGY, 36, 1-5, DOI: 10.1007/S12206-022-2108-0.

2nd Workshop on Structural Integrity of Additively Manufactured Materials, Brno (Czech Republic), 4-5 February 2022

3rd Workshop on Reliability and Design of Additive Manufactured Materials, Belgrade (Serbia), 4 - 6 October 2022

Financed through/by

European Commission, H2020-WIDESPREAD-2018-03 (action: CSA) under the grant agreement No. 857124

Research Team

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- Institute of Physics of Materials, Czech Academy of Sciences, (IPM):
IPM's project coordinator: Dr. Lubos Nahlik,
- University of Parma, Dept. of Engineering & Architecture (UNIPR):
UNIPR's project coordinator: Prof. Dr. Eng. Roberto Brighenti;
- Norwegian University of Science and Technology (NTNU) Trondheim, Norway:
NTNU's project coordinator: Prof. Dr. Eng. Filippo Berto

Research Center

"St. Nadasan" Research Laboratory for Strength, Integrity and Durability of materials, structures and conductors

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LIVED-IN HERITAGE: PERSPECTIVES ON EUROPEAN CULTURAL LANDSCAPES FROM ARCHITECTURE SCHOOLS

Goal of the project

• The impact of the proposed project is to promote cooperation between academia and practice in the field of cultural heritage at European level, with a specific focus on the notion of cultural landscape in historic urban context through the paradigm of living heritage: engaging people in heritage decision-making and ensuring heritage serves their wellbeing.

• Building on the experience of European exchanges within the Network of Schools of Architecture connected with European Heritage Cities - SAWHC, we propose a collaboration of three universities and their proximal World Heritage Sites:

Politehnica University Timisoara has near the Monumental Ensemble of Târgu Jiu enlisted on World Heritage Tentative List, The University of Edinburgh and the Old and New Towns of Edinburgh listed od World Heritage Sites no. 728, in 1995

Yuriy Fedkovych Chernivtsi National University and the Residence of Bukovinian and Dalmatian Metropolitans listed od World Heritage Sites no.1330 in 2011.

Short description of the project

• The project involved academics and postgraduate students from the three universities and colleagues from the wider network of Schools of Architecture connected with European Heritage Cities for a series of two online 1-day meetings and one 4-day on-site workshop in Târgu Jiu.

• The choice of sites was meant to pre-empt the impact of potential Covid travel restrictions on the project, meaning the universities will still have access to their respective sites.

Likewise, the joint on-site workshop in Târgu Jiu will be planned with alternative, on-line collaborative means in place in case of Covid restrictions.

• The final, corollary meeting in September 2022 was dedicated to developing together ideas and methodologies for understanding the cultural landscape dimension of heritage and its role for the wellbeing of communities.

• This was meant to feature online public events in the form of case-studies/guided tours of the three sites for European Heritage Days in 2022.

Project implemented by

Coordinator: Politehnica University Timisoara

Partners:

- The University of Edinburgh
- Scottish Centre for Conservation Studies
- Yuriy Fedkovych Chernivtsi National University, Ukraine

Council of Europe

Romanian Ministry of Culture
Ukrainian Ministry of Culture

European Heritage Days

Implementation period

8.03.2022 – 28.02.2023

Main activities

• The first, exchange meeting in March 2022 provided a fertile medium for cross-border cooperation sharing experiences from different European perspectives on the cultural landscape dimensions of their respective European Heritage.

• The on-site workshop in July 2022 aimed to connect with the local community and co-operate with heritage institutions managing the site in investigating the cultural landscape dimension of the Monumental Ensemble of Târgu Jiu.

• The final, meeting in September 2022 was dedicated to developing together ideas and methodologies for understanding the cultural landscape dimension of heritage and its role for the wellbeing of communities. The proceedings of the meetings and the findings of the workshop will be written up by February 2023 for a multi-lingual online publication in open access format, hosted by the University of Edinburgh.

Results

• Due to the fact that all 3 sites chosen for the workshops contain high values, from historical events, landscape, fine arts, personalities, represents a good opportunity to maintain awake the public interest in each local community. The gain of these experiences will be the fresh view, within the students eyes, filtrated by personal experience. The published results will enter in public domain, with the possibility to access by EHDs followers from any country. The programme proposed for EHD 2021-2020 CROSS-FRONTIER CO-OPERATION PROJECTS is direct connected to the next two years of EHD themes voted, in Romania, as title and content - 2022 – **Sustainable heritage and 2023 – Living heritage**. This would fit well with the Doors Open Day programme, with scheduling of events and activities that could fit with the regional programme for Edinburgh, as well as offering a national output through the **Doors Open Days website.**

Applicability and transferability of the results

Workshop tasks established were: familiarisation with the site and its contexts (visits and discussions); investigation of lived-in heritage in mixed groups from the three universities (historic data, surveys/interviews, photography, video); presentation of preliminary findings.

Financed through/by

Council of Europe
"European Cross-Frontier Cooperation Projects" within the framework of the European Heritage Days joint action of the Council of Europe and the European Union **EAC/A05/2021 – BH4788 PMM 2847**

Research Center

Research Center in Urban Planning and Architecture, Faculty of Architecture

Research Team

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DESIGN AND DEVELOPMENT OF AN ENERGY EFFICIENCY MANAGEMENT AND CONTROL SYSTEM WITH COST-EFFECTIVE SOLUTIONS FOR RESIDENTIAL AND EDUCATIONAL BUILDINGS – DOITSMARTER

Goal of the project

DOITSMARTER will provide an end-to-end solution for customers' energy management needs, based on demand side management for energy & cost savings. The proposed Energy Management and Control System will elaborate control decisions from cost perspective among other factors.
The main objectives of the project are:
• To design, develop and test Energy Management and Control algorithms and tools for the optimization of a Smart Building, with residential homes and apartments reducing the energy consumption of the house and the costs with up to 20%;
• To develop, test and demonstrate cost-effective power-to-heat solutions using heat pumps and heat boosters with relay plug-in communication modules for district heating and cooling systems;
• To install and demonstrate cost-effective and user-friendly solutions in three Demo pilots with Residential Houses and public buildings in Romania and Norway.

Short description of the project

The project focuses on the integration and coordination aspects of an enhanced set of technologies and tools applied to demonstrate how to improve efficient and secure exploitation smart buildings under increasing share of renewables.

Project implemented by

- Technical University of Cluj-Napoca
- Oestfold University College
- NxTech AS
- Politehnica University Timisoara
- Center for the Study of Democracy
- Alba Iulia City Hall

Implementation period

May 2022 - December 2023

Main activities

- Specification analysis/Requirements, Standardization activities, Reference cases & Business models;

- Development of innovative algorithms & tools for an Energy Management and Control System;

- Design and development of an IoT communication platform-based hierarchy building energy management system for different setups in existing buildings;

- Development and testing different Smart Buildings Pilot Concepts in Norway and Romania;
- Dissemination, exploitation and communication.

Results

• The project will focus on developing practical solutions for an Energy Management and Control System demonstrated in 3 pilot sites for building environment, that integrate and combine different energy technologies – RES with Battery Storage technologies, HVAC system control, lighting, heating and cooling, Demand Response (DR) - into an innovative Building Energy Management System, to ensure an efficient and optimized energy management and the coverage of the highest possible share of RES, both at the single building level and at a community of building level.

Applicability and transferability of the results

The practical solutions proposed for the Energy Management and Control System developed in this project can be further adapted to be used in other similar scenarios.

Research Team

- Assoc. Prof. Dr. Eng. Cristian VASAR
- Assist. Prof. Dr. Eng. Dorin BORDEASU
- Assoc. Prof. Dr. Eng. Iosif SZEIDERT
- Prof. Dr. Eng. Ioan FILIP

Financed through/by

Innovation Norway

Research Center

Research Center for Automatic Systems Engineering

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COMBINATORIAL DESIGN OF NOVEL BIPOLAR PLATE COATINGS FOR PROTON EXCHANGE MEMBRANE ELECTROLYZERS (CODE-PEM)

Goal of the project

The CoDe-PEM project aims to contribute towards the development of affordable PEM electrolysis systems with the development of lower cost coating materials for bipolar plates and sinters. In order to lower the costs, a reduction in use of expensive materials and the introduction of new low(er) cost materials are key elements. In addition, new materials should allow for fast and low-cost manufacturing processes, such as stamping of BPP flow structures.

Short description of the project

In order to achieve its goals, the CoDe-PEM Project will:
• Accelerate innovation research of novel coating compositions by the use of combinatorial exploration.
• Improve efficiency and reduce time of testing and characterization of BPPs by the use of advanced electrolyser test cell
• Identify factors affecting the durability of BBP materials based on in situ experiments and post mortem failure analysis.
• Raise public awareness concerning the importance and advantages of using hydrogen based clean energy and the potential for growth in a healthy and sustainable economy.

Project implemented by

Politehnica University Timisoara, Romania
SINTEF Industry, Norway

Implementation period

2019-2023

Main activities

- Coating development via combinatorial exploration
- Ex-situ characterization of coatings and coated substrates
- Bipolar plates design, testing and evaluation
- Dissemination and public awareness activities

Results

Fig. 1. System for deposition of compositional spread libraries installed in Politehnica University Timisoara

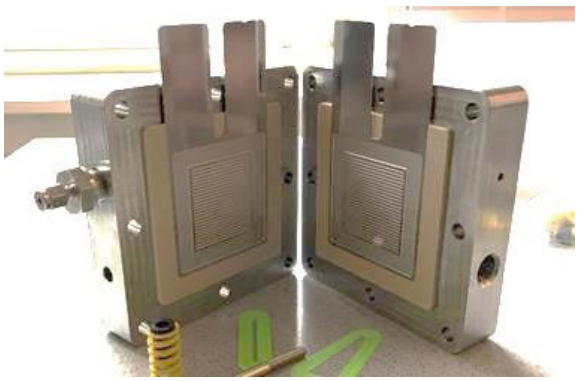

Fig. 2. Test cell developed in SINTEF

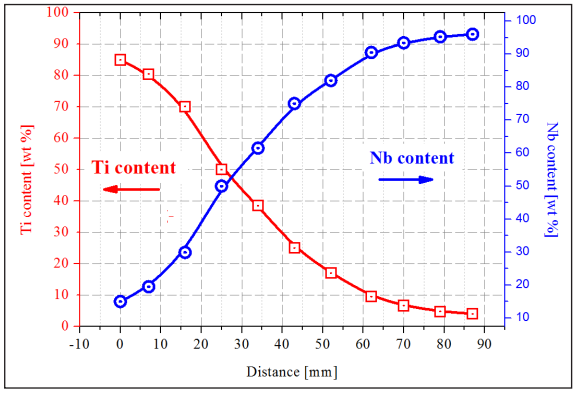

Fig. 3. Compositional map of a binary library manufactured in Politehnica University Timisoara

Fig. 4. Partner's meeting in SINTEF

Applicability and transferability of the results

The technical solutions developed in the project have the potential to reduce the costs for hydrogen generated via proton exchange membrane electrolysis.

Financed through/by

Iceland Liechtenstein Norway grants

Executive Agency for Higher Education, Research, Development and Innovation Funding

EEA Grants 2014-2021
Administered by UEFISCDI

More information about EEA Grants can be found here:
www.eeagrants.org/ and www.eeagrants.ro

Research Center

Politehnica University Timisoara:
- Combinatorial exploration group
- Fuel cell group

SINTEF Industry:
- New energy solutions group
- Corrosion and tribology group

Research Team

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PHOTOVOLTAIC SYSTEMS FOR IMPROVING THE ENERGY EFFICIENCY IN SOME PUBLIC BUILDINGS

Goal of the project

The goal of the project is the design and implementation of PV systems in public buildings in Ghiroda town, including smart power monitoring (SCADA) for energy conversion evaluating and control, using "smart grid" technologies. The systems work without injection of energy in the power grid. The additional energy will be stored in domestic hot water or will be used to charge electric vehicles.

Short description of the project

The project aims is to increase the capacity to deliver renewable energy, by integration of the PV systems, in order to reduce the power consumption from fossil fuels.

Project implemented by:

The project Promoter is Ghiroda City Hall, having as partners: Politehnica University Timisoara, Romania, and Western Norway Research Institute.

Main activities

1. Power consumption measurements in each location for identifying the necessary electrical energy;
2. Dimensioning the installed power (peak power) of each PV system, according to the energy demands;
3. Dimensioning the storage (the installations for heat water production) for each location;
4. Integrating (design) "smart grid" technologies in order to maximize the efficiency, avoid the injection of electrical energy in the grid;

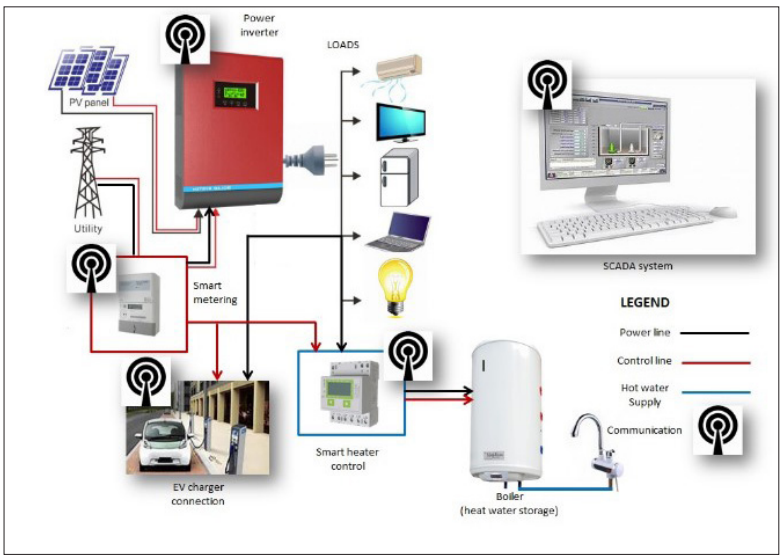

Fig. 1. System configurations

5. Integrating (design) smart power monitoring (SCADA) systems for evaluating and control the energy conversion, with a central unit and distributed automation;

6. Acquisition and installation of the PV system, including the automation and supervising elements;

7. Testing and monitoring the installations in order to obtain maximum efficiency and reliability;

8. Disseminating the results in workshops, with potential other beneficiaries, and in international conferences with compatible subjects.

Implementation period

2020-2022

Results

- 8 PV systems with an installed PV capacity of 49 kWp, design and implementation;
- 60 MWh/year estimated PV electrical energy production;
- Annual CO_2 emission reduction estimated at 19.8 tons per year;
- Smart power monitoring and control of entire system using "smart grid" technologies;
- Life cycle assessment for all proposed solar energy harvesting installations.

Applicability and transferability of the results

The project has an applicative purpose, through the integration of PV electrical energy production systems in some public buildings, in an "intelligent way", using "smart grid" technologies.
The project can be an example of the transformation of a commune into a green energy pole as a compulsory and necessary measure for a consolidated economic development, minimizing the impact on the environment and implicitly increasing the quality of life of the inhabitants.

Financed through/by

EEA and Norway Grants

Research Center

"Intelligent Control of Energy Conversion and Storage", part of the "Research Institute for Renewable Energies".

Research Team

- Prof. Dr. Eng. Nicolae MUNTEAN - UPT team leader;
- Assoc. Prof. Dr. Eng. Octavian CORNEA;
- Assoc. Prof. Dr. Eng. Ciprian ŞORANDARU;
- Assist. Prof. Dr. Eng. Dan HULEA
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THE METAPHORICAL DIMENSION OF SPECIAL LANGUAGES: ANALYSIS AND TRANSLATION OF TECHNICAL METAPHORS (METATRADUTECH)

Goal of the project

The **METATRADUTECH research project (CE/MB/051/2021)** aims to explore the metaphorical dimension of special languages and focuses on the use of metaphor in technical language in the automobile field, given the wealth of metaphorical linguistic expressions associated with this type of discourse. The research objectives centre on the identification of the peculiarities of metaphor analysis in specialized languages, in terms of comprehension and translation.

Short description of the project

The project highlights the communicative function of metaphor and its presence in specialized languages.

Project implemented by

The project is implemented by the Politehnica University Timisoara, in partnership with Ibn Zoh University of Agadir, Morocco.
Coordinator: Politehnica University Timisoara
Partner: Ibn Zoh University of Agadir, Morocco

Implementation period

1.05.2021-30.04.2022

Main activities

The main project activities consist in: setting up the research consortium (distribution of tasks and responsibilities, acquisition of resources necessary to complete the project activities); project implementation (documentation, selection of publications in the three project languages: French, Romanian and Arabic, analysis of texts containing metaphorical language, data collection, setting up the corpus of metaphorical linguistic expressions in the automobile field, interpretation of the results); the exploitation of the results (dissemination by publication of research findings) and project evaluation.

Results

The main results of the project are as follows: the creation of the research consortium; the creation of the corpus, the selection of relevant contexts; the identification of metaphorical mappings; the contrastive analysis of the metaphorical linguistic expressions in French and the corresponding expressions extracted from publications in the mother tongue (Romanian and Arabic); the classification of problematic metaphorical linguistic expressions, likely to pose comprehension and translation problems; the exploitation of the project results by disseminating the research findings; the publication of two books (a contextual dictionary and a collective volume in French):

1. **Mirela-Cristina POP,** Mounia TOUIAQ (coord.), La dimension métaphorique des langages de spécialité. Études sur les métaphores de l'automobile, Politehnica Publishing House, Publishing house of the Western University of Timisoara, Timisoara, 2022, 346p. ISBN 978-606-35-0483-9 ; ISBN 978-973-125-922-2.

2. **Mirela-Cristina POP,** Mounia TOUIAQ (coord.), Dictionnaire contextuel de métaphores de l'automobile, Politehnica Publishing House, Publishing house of the Western University of Timisoara, 2022, 329 p. ISBN 978-606-35-0476-1 ISBN 978-973-125-908-6.

Applicability and transferability of the results

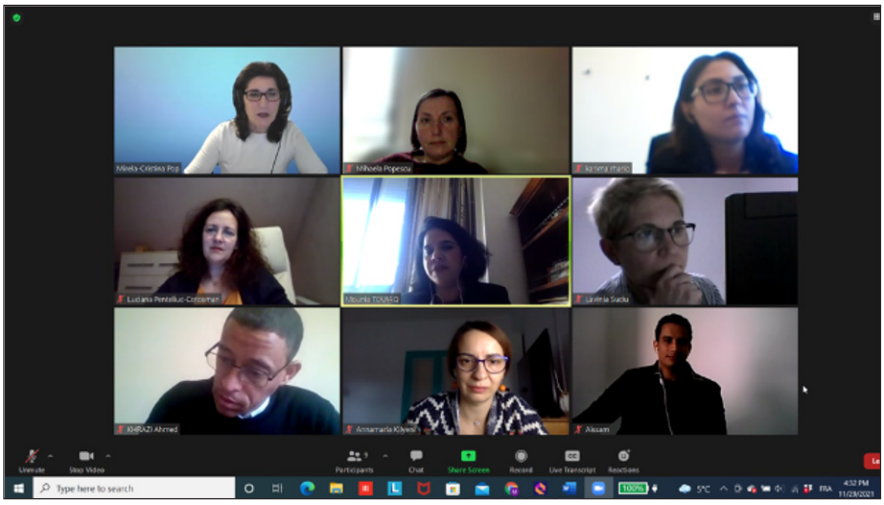
Technical discourse differs from other types of discourse (legal, economic, etc.) by its terminological density and extension. Metaphor in discourse serves to expand meaning, and hence, metaphorical instantiations are used to catch the readers' attention and to put forth a specific representation of reality for the members of a linguistic and cultural community who share the code necessary to understand metaphorical language. The results of the research led to the identification of problematic metaphorical structures, which may pose comprehension and translation problems. The use of similar corpora in different mother tongues can validate the solutions used to translate the technical metaphors in the corpus.

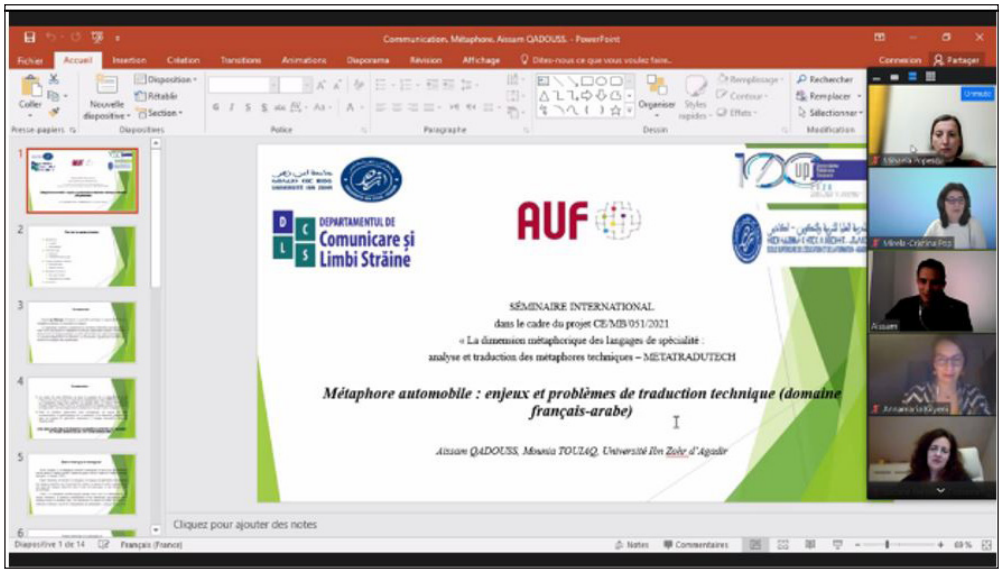
Financed through/by

Francophone University Agency in Central and Eastern Europe

Research Center

Department of Communication and Foreign Languages





Research Team

Project leader:

- Prof. Dr. Mirela-Cristina POP

Researchers (Politehnica University Timisoara):

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- Lecturer Dr. Annamaria KILYENI
- Lecturer Dr. Maria-Dana GROSSECK
- Assist. Prof. Dr. Luciana Penteliuc- COTOȘMAN
- Assist. Prof. Dr. Mihaela POPESCU

Researchers (Ibn Zohr University of Agadir, Morocco):

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- Ph.D. Student Karima El Rharib
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KINETICS OF MOLECULAR CATIONS INDUCED BY ELECTRONS IN THE EDGE PLASMA OF ITER (CICAM - ITER)

Goal of the project

The project proposes a theoretical study of reactive collisions between electrons and molecular cations using the MQDT (Multichannel Quantum Defect Theory) method, providing cross sections and rate coefficients. The goal is to provide information in the industry with energy applications.

Short description of the project

Reactive collisions of molecular cations with electrons are major elementary processes in the kinetics and energy balance of ionized media involving fusion plasma at the reactor walls and in other environments of technological interest.

Project implemented by

Politehnica University Timisoara –coordinator
Université Le Havre Normandie- partner
West University of Timisoara-partner

Implementation period

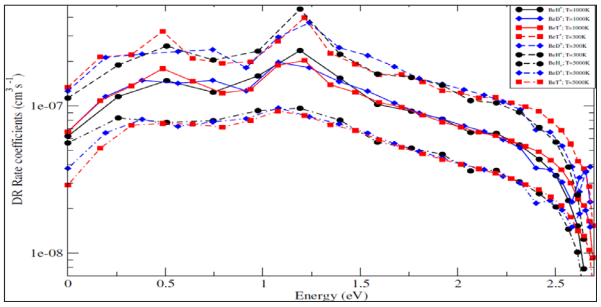
01.05.2021-30.04.2022

Main activities

• Numerical calculations of cross sections and rate coefficients for dissociative recombination, ro-vibrational and dissociative excitation for the diatomic cations H2 +, BeH + and their isotopomers;
• Development the tools of the methods used to increase the accuracy of characterization and understanding of the mechanisms governing these processes;
• Dynamic calculations;
• Study of the isotopic effects;
• Applications of energetic interest.

Results

• Participation of the member of project team participation to the international conferences:
- VICPEAC2021 (the 32th International Conference of Photonic Electronic Atomic Collisions); TIM20/21 Physics Conference; La fraction d'ionisation de l'interstellaire Media" (https://ifism2021.sciencesconf.org/)
• Publication a scientific paper in specialized journals with a high impact factor:
- Dissociative recombination and rotational transitions of D^+_2 in collisions with slow electrons, accepted to Monthly Notices of the Royal Astronomical Society (MNRAS) journal (IF 5.287) (2022)



Applicability and transferability of the results

• The current storage ring measurements of dissociative recombination acquired an accuracy hardly to be imagined some years ago, especially for the light ions, and in particular for the isotopomers of Hydrogen. The MQDT method that we are using sequentially takes into account the electronic and vibronic interactions.

• This method is very effective for most diatomic molecules. It gives correct cross-sections and branching ratios in the case where the major interactions occur at short distances between the incident particles and the fragmentation products. In addition to this strategic position, our originality is above all methodological. Our results on HD + and H2 + DR and rotational excitation are in the best agreement with the experimental results.

• Beryllium has been proposed as a plasma facing material candidate in the edge of the International Thermonuclear Experimental Reactor (ITER).

• Unfortunately, due to the high toxicity of beryllium, no measurement on electron scattering process with BeH+ is available. Thus, calculations seem to be the only way to obtain these data. We provide cross sections and rate coefficients of BeH+ at low, intermediate and high energies/temperatures.

Financed through/by
AUF-ECO 2021 - Support to Research and Innovation Structures in Central and Eastern Europe

Research Center
Research Center for Advanced Study Methods for Physical Phenomena

Research Team

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- Lecturer Dr. Felix IACOB

Members:
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DANUBE URBAN BRAND + BUILDING REGIONAL AND LOCAL RESILIENCE THROUGH THE VALORIZATION OF DANUBE'S CULTURAL HERITAGE (DANURB+)

Goal of the project

• DANUrB+ addresses peripheral regions in the Middle and Lower Danube sections and aims to analyze and react to the shrinkage that affects such areas. Lacking tourism resources and the valorization of local values and heritage, often disregarded and underused the project approaches these issues as interconnected processes: without the valorization of authentic local heritage tourism will find no values in such remote areas.

• To stop socio-economic shrinkage DANURB+ creates a dense network of stakeholders and projects along the Danube implementing EUSDR actions in the peripheral and border regions along the river. The main objective is the capacity building for local stakeholders to enable them to cooperate locally and inter-regionally for the valorization of their Danube related heritage with local actions under a unified brand strong enough to increase local prosperity and international tourist attractiveness.

• The novelty of DANUrB+ is to bring down to earth strategic goals to real stakeholders with action plans and measures usable in peripheric situations in all sections of the Danube, and to brand these initiatives in inclusive and effective ways.

Interreg
EUROPEAN UNION
Danube Transnational Programme
DANUrB+

Short description of the project

DANUrB+ aims to reactivate underused cultural heritage and resources in shrinking settlements along the Danube.

Project implemented by:

The partnership consists of 19 partners, universities and NGOs, and 23 associated strategic partners, local administrations, associations, institutions, from 6 countries: Hungary, Slovakia, Croatia, Bulgaria, Romania, and Serbia.

Implementation period

01.07.2020 - 31.12.2022

Main activities

• As shrinking urban situations often entail the decay of the built environment, creating an economical vicious circle, the ambition of the project is to initiate 6 local physical interventions (building, public space) selected according to their potential positive effect on the whole urban development and in close collaboration with the local communities. The objective is to provide planning, technical measurement, and documentation, so that those pilot sites are ready for funding application.

• The project aims at the creation of a Quality Label, an enlarged Danube Cultural Promenade, an Atlas, audio guided tours, a documentary movie, and guidelines for educational programs to raise awareness of the local values.

Results

The results include a series of research outputs and deliverables, as following:

• An Atlas of the Danube regions, focusing on settlements, culture and local values;

• Creation of the DANUrB Platform (danurb.eu), with online support for stakeholders;

• A regional conference on the values of peripheral situations along the Danube;

• A Local plan for effective cooperative heritage valorization;

• Documentations of piloted local heritage sites (buildings or public spaces).

• Regional Student workshops to find solutions to shrinking areas;

• Educational programs for young people in local schools on the cultural resources of the Danube;

Results also provide a Quality Label seal for heritage activities and products, audio guided tours and a documentary movie.

Applicability and transferability of the results

• As **DANUrB+** aims to reactivate underused cultural heritage to increase local prosperity and international tourist attractiveness in shrinking settlements its stakeholder network building framework and methodology are easily transferable to other cities in a similar situation.

Financed through/by

• Co-funded by the European Union through the Joint Secretariat of the Danube Transnational Programme

Research Team

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ENGAGED AND ENTREPRENEURIAL EUROPEAN UNIVERSITY AS DRIVER FOR EUROPEAN SMART AND SUSTAINABLE REGIONS (E³UDRES²)

Goal of the project

E³UDRES² is a **European Universities Alliance** – a network of higher education institutions located in Europe, that have decided to closely work together and collaborate in the field of research, teaching, innovation and much more. The project is focusing on:

- Co-Innovate Smart and Sustainable European Regions
- Co-Ideate a Future University for future-skilled learners
- Co-Create a European Multi-University Campus

E³UDRES² co-creates outstanding ideas and concepts for future universities for future-skilled learners, integrates challenge-based education, mission-oriented research, human-centered innovation as well as open and engaged knowledge exchange as interrelated core areas and establishes an exemplary multi-university campus across Europe.

E³UDRES²

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

Short description of the project

The project is one of the 41 consortiums selected for funding as part of the European Commission Initiative towards creating a number of European Universities.

Project implemented by:

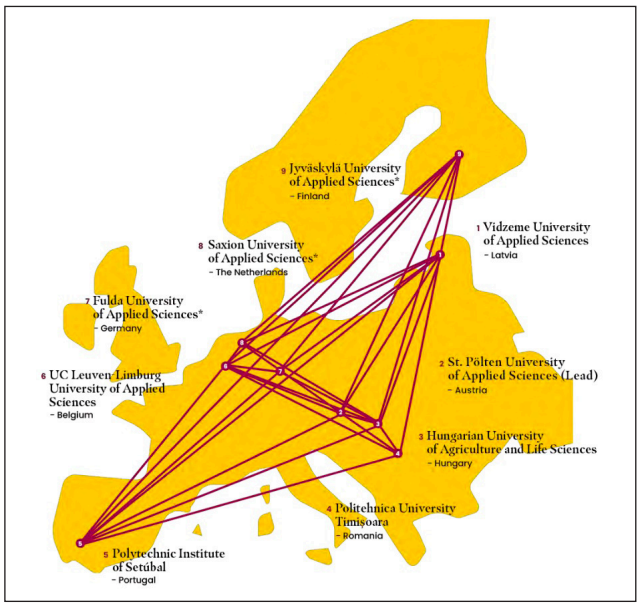
Coordinator: St. Pölten University of Applied Sciences, Austria

Partners:

- Politehnica University Timisoara, Romania
- Polytechnic Institute of Setúbal, Portugal
- Hungarian University of Agriculture and Life Sciences, Hungary
- UC Leuven-Limburg University of Applied Sciences, Belgium
- Vidzeme University of Applied Sciences, Latvia
- Saxion University of Applied Sciences, Netherlands
- Fulda University of Applied Sciences, Germany
- Jyväskylä University of Applied Sciences, Finland

Implementation period

01.11.2020 – 30.09.2023



Main activities

E³UDRES² is looking for new and innovative educational formats:

- **EUDRES Hackathons** are short, challenge-based events where teams of students, university staff and citizens try to come up with an innovative solution to their challenge

- **EUDRES Bootcamps** are involving student teams to get together to work on regional challenges for one week, always being closely linked to the needs of the region and local challenge owners

- **EUDRES I Living Labs** are making international student teams collaborate to work on challenges over the course of several weeks, having the time to tackle challenges with in-depth solutions (in total, 273 ILL were organized in intensive, classical or blended formats)
The researchers collaborating in **EUDRES** are organized in three research networks – Circular Economy, Wellbeing & Active Ageing and Human Contribution to Artificial Intelligence. They are responsible for writing proposals, carrying out Citizen Science projects as well as hosting annual **Research Living Labs.**

Results

The EUDRES alliance officially established and adopted its Vision & Mission document. This vision is put into practice through key deliverables:

• A model for the governance of a progressive European University.

• A common educational model for students by offering open educational resources, shared modules and joint degrees with mobility opportunities.

• Offer of I-Living Labs, I-research networks and I-cubator programmes for future universities and smart sustainable regions. The I stands for inspiring, innovative, international, interdisciplinary, inter-sectoral, inclusive and intense.

• Co-creation activities that promote open and engaged knowledge exchange that contribute and interact with regional communities, and are acknowledged as good practice on a European level.

• EUDRES 2030 Blueprint (Vision for the University of the Future)

Applicability and transferability of the results

E³UDRES² promotes the development of small and medium-sized cities and their rural environments into smart and sustainable regions and shapes a prosperous future with the best possible quality of life for a self-determined people in a progressive European society. 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, EPP-EUR-UNIV-2020

Research Team

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- Prof. Dr. Eng. Cosmin CERNĂZANU-GLĂVAN
- Prof. Dr. Ec. Claudiu ALBULESCU
- Dr. Ec. Roxana SÎRBU
- Alexandru LUCA, student
- Mihai MUȚIU, external advisor
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Project Website: https://eudres.eu

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

Goal of the project

In line with its vision, mission, core values, culture and principles the **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 Research and Innovation Hub for Smart and Sustainable Regions.

E³UDRES² Ent-Re-Novators includes, interacts and collaborates with a diverse variety of smart and ambitious people, academic institutions, regional authorities, companies, European R&I networks and regional innovation ecosystems. **E³UDRES² Ent-Re-Novators** is committed to scientific excellence and research integrity within its cross-disciplinary and cross-sectoral key R&I networks and promotes (future) R&I competences, skills, resources, methods, training, services and management for collaborative research and open innovation for smart and sustainable regions.

Short description of the project

The project's objective is the co-creation of a common strategy and agenda to accelerate the transformation into a European Research and Innovation Center for Smart and Sustainable Regions, as well as to develop structured support programs aimed at enabling scientific communities to fully embrace Open Science, Open Innovation, Open Education, Engaged Science and Engaged Education.

The project promotes dialogue with peer alliances and Higher Education Institutions (HEI), HEI associations, as well as with policy makers. With an innovative and collaborative approach, the **E³UDRES² Ent-r-e-novators** project seeks to transform the region into a center of excellence in Research and Innovation, creating a sustainable and intelligent future for all.

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 more knowledge and scientific culture, ensuring access to open science and education as an unalienable right for all. The project aims to further develop the E³UDRES² Research & Innovation dimension, by employing innovative and future-oriented co-creation methodologies and environments. Ent-r-e-novators set itself six objectives to reach:

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

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

3. Develop structured support programmes aimed at empowering our scientific communities to fully embrace Open Science, Open Innovation, Open Education, Engaged Science and Engaged Education

4. Achieve institutional strategies and policies for Human Resources for Research, to address challenges such as brain mobility, new career assessments and joint recruitment strategies

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 3 October 2022, the project representatives met online with EU Commissioner Mariya Gabriel, who showed a lot of support for the project;
• On 6-7 October 2022, took place the kick-off meeting of the Ent-r-e-novators project at the Polytechnic Institute of Setubal (IPS), where the work teams presented their view for the implementation of the following transformation modules:
• RD&I activities, lines, groups and networks;
• Sharing and gaining access to research infrastructures;
• Science, education and open innovation;
• Involvement of society and citizens in RD&I;
• Human resources for research and RD&I ecosystems

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

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E³UDRES² ENTREPRENEURSHIP AND INNOVATION NETWORK FOR SMART AND SUSTAINABLE EUROPEAN REGIONS – E.I.N.S.

Goal of the project

The E³UDRES² Entrepreneurship and Innovation Network for Smart and Sustainable European Regions (E.I.N.S.) co-ideates novel pathways for entrepreneurial universities, drives the development of entrepreneurial education, co-creates advanced support for innovation and business creation, and enhances collaboration across the knowledge triangle beyond the state of the art. As a project of the E³UDRES² alliance, the actors collaborating in E.I.N.S. comprise the six E³UDRES² founding institutions, as well as the University Industry Innovation Network (UIIN).

Short description of the project

E.I.N.S. project is based on three pillars:
- Novel Pathways for Entrepreneurial Universities
- Support of Startups & established businesses
- Facilitation of collaboration across the knowledge triangle beyond the state of the art

Project implemented by:

Coordinator: St. Pölten University of Applied Sciences, Austria
Partners:
- Politehnica University Timisoara, Romania
- Polytechnic Institute of Setúbal, Portugal
- Hungarian University of Agriculture and Life Sciences, Hungary
- UC Leuven-Limburg University of Applied Sciences, Belgium
- Vidzeme University of Applied Sciences, Latvia

Implementation period

01.10.2021 – 30.09.2023

Main activities

In order to further develop and strengthen innovation capacity, E.I.N.S. defines four long-term strategic priorities:

1. **Empower and support „Ent-r-e-novators" to** bridge the gaps within the knowledge-triangle

2. **Enhance entrepreneurial education to enable** learner-driven innovation

3. **Link** smart specialisation and open innovation **to** connect regional ecosystems **with** Pan-European networks

4. Provide expertise and resources **to turn ideas into value for** smart and sustainable European regions

The projects' work packages are:
WP1: Management & Dissemination
WP2: Entrepreneurial Universities & Innovation Policies
WP3: (Open) Innovation and Entrepreneurship
WP4: Connected Research & Innovation
WP5: Networked Innovation Ecosystems & OI-Hubs
WP6: Continuous Coaching and Training on staff level in R&I Skills
WP7: Entrepreneurial Education
WP8: Support Innovation and Business Creation

Results

The E.I.N.S. team established a number of supporting methodologies and pilot activities able to support international collaboration in innovation and research:
- A structured knowledge base and resources for entrepreneurial HEIs
- An innovation foresight report
- A comparative analysis of accessible E&I expertise
- A structured pool of resources for innovation-promoting research
- A regional innovation ecosystem map of core stakeholders
- Open Innovation Hubs Co-creation Intervention methodology and implementation
- Creation of a Network of OI-Hubs
- An up-dated pool of coachers, trainers and mentors
- A structural pool of entrepreneurial education inside the EUDRES alliance
- A comparative analysis of Open Entrepreneurial Innovation

Until this moment 6 E.I.N.S. Open Innovation Hubs have been created:
- Food
- Digital Health % Social Innovation
- Creative Industries & Digital Media
- Digital technologies & Advanced Manufacturing
- Smart and Sustainable Working and Learning Environments

• Smart and Sustainable Cities, Regions and Villages

Applicability and transferability of the results

E.I.N.S. promoted and disseminated the practical results and gained experience through a series of Open Lectures delivered both face-to-face and online for a large audience.
The results have been transferred between partner universities. They are also promoted and made available for the three new members of the EUDRES alliance, from the Netherlands, Germany and Finland.

Financed through/by

European Institute of Innovation and Technology HEI Initiative, through EIT RawMaterials

Research Team

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- Lecturer Dr. Eng. Valentin NIȚĂ
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- Lecturer Dr. Eng. Andrei TERNAUCIUC
- Dr. Ec. Roxana SÎRBU
- Alexandru ILIESCU, student
- Marius POPA, external expert

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EBSI4RO – CONNECTING ROMANIA THROUGH BLOCKCHAIN

Goal of the project

The central scope of the CEF Telecom Action **"EBSI4RO: Connecting Romania through Blockchain"** is to create an extendable and sustainable ecosystem to facilitate and accelerate the awareness, knowledge, and adoption of the **European Blockchain Services Infrastructure (EBSI)** by the Romanian citizens, businesses, institutions, and administration. It will also support the participation and contribution of Romanian stakeholders to the EBSI, in particular as regards the Diplomas use case.

Short description of the project

The central scope of the EBSI4RO project is to create an extendable and sustainable ecosystem to facilitate and accelerate the adoption of EBSI by the Romanian citizens, institutions and administration.
The main objectives of the projects are:
• To set the first EBSI node in Romania, functional and integrated with the EBSI infrastructure and operations;
• To deploy the Diplomas' use-case, by developing applications and services for digital credentials and micro-credentials, integrating with the national Single Enrollment Register of students;
• To support capacity building and training activities for universities, institutions and companies, targeting a broader uptake of the EBSI by public services.
As a result of the project, the Romanian educational system will be connected to the network of 41 European EBSI nodes and will be part of the European infrastructure.

Project implemented by:

Coordinator:

Executive Agency for Higher Education Research, Development and Innovation Funding (UEFISCDI), Romania

Partners:

Politehnica University Timisoara, Romania

Implementation period

01.04.2021 – 31.03.2023

Main activities

Specifically, the project covers:
1. EBSI infrastructure development and operations by supporting the setup and operation of a Romanian EBSI node, functional and integrated with the EBSI network and operations;
2. EBSI cross-border use cases through the deployment of the Diplomas use-case, by developing applications and services for digital credentials and micro-credentials, integrated with the (Single) National Student Enrolment Registry (Registrul Matricol Unic or RMU). Specifically, a Credentialing System will be implemented as a solution for verifiable digital qualifications (official diplomas), but also for verifiable micro-credentials, awarded upon the completion of short stand-alone courses or modules done in a blended format.
The Credentialing System will issue on Blockchain (EBSI) the diplomas managed by the RMU operated by the Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI);
3. EBSI capacity building and training activities for universities, institutions, and companies, targeting a broader uptake of the EBSI by public and private services, through the creation of MOOCs for online and blended learning on the UniCampus (https://unicampus.ro/) platform, hosted by the Politehnica University Timisoara.
4. Communication and blockchain community strengthening in Romania, with the aim to raise awareness of EBSI and EBSI use cases and disseminate the results of the Action.
As a result of this Action, the rollout of the ESBI (including a relevant use case) will be supported in Romania, allowing the delivery of cross-border public services based on the blockchain technology and enhancing the way citizens, government and businesses interact.

Results

Enrollment in the EBSI Early Adopters Programme, launched on 15 July 2021.
Successful demonstration of the first use case on delivering a university diploma through blockchain by using the EBSI infrastructure, on 31 May 2022, as part of the EBSI Demo Day. The diploma has been issued for one of the UPT graduates and was successfully validated by the EBSI nodes in Greece and France. **Romania is one of the first 12 countries in Europe that are delivering diplomas through the European Blockchain Services Infrastructure (EBSI).**

On the UniCampus platform of UPT there were 5 MOOC modules developed in order to provide training in **blockchain technologies**:
• Blockchain technologies. Possible applications. Applications in Education;
• EU priorities and programs. EBSI services in the context of the CEF Telecom Programme;
• EBSI open technical specifications. EBSI Use cases;
• How to test EBSI functionality and how to deploy applications;
• Developing DApps on EBSI for different use-cases.
As a recognition of the contributions to the digitalization process, the **EBSI4RO** project has been mentioned in 2022 in the country report Digital Economy and Society Index for 2021.
The **EBSI4RO** project has been presented at the Bloxberg (Blockchain Consortium) meeting in October 2022, in Cyprus.
As a result of the activities performed during EBSI4RO, UPT became a member of the Bloxberg Association for the Advancement of Science and Blockchain in November 2022.

Applicability and transferability of the results:

EBSI4RO is considered as a pilot project in the field of using blockchain technologies in education. Its results will allow generalization of:
• Delivery of higher education degrees through a credible and verifiable European infrastructure
• Validation of micro-credentials offered by different universities
• International validation of joint courses offered by consortium of universities
• Validation of acquired competence through different levels of education.

Financed through/by

European Commission, Innovation and Networks Executive Agency (INEA)

Research Team

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Partner universities in the EBSI network

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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

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SBAS ADOPTION ON MULTI-COPTER VTOL AIRCRAFTS (SAMVA)

Goal of the project

SAMVA project (SBAS Adoption in Multicopter VTOL Aircraft) will increase the adoption of EGNOS technology within the provision of rotorcraft services, and will pave the way towards seamless integration of VTOL autonomous aircraft, by means of:

- Achieve operational use of EGNOS within the provision of Helicopter Emergency Medical Services, by implementing first Point-in-Space and Low-Level-Route operation in Spain;
- Deploy first EGNOS VTOL operation at a European airport (LEDA), and demonstrate how EGNOS can support ATM tasks for entry into operations;
- Unleash EGNOS capabilities on-board a VTOL Autonomous Aerial Vehicle (AAV) (EHANG EH216) for the provision of precise and integer navigation guidance and support U-Space Airspace integration;
- Develop, in-flight test and validate, an EGNOS RNP flight procedure design criteria based on the specific navigation performance from an AAV passenger capable;
- Demonstrate how current EGNOS Safety-of-Life Service can best support VTOL urban operations by hybridizing data from on-board sensors;
- Evaluate how current EGNOS service could evolve to provide high accuracy integrity values in combination with the Galileo High Accuracy Service; and
- Promote the adoption of EGNOS services towards the provision of Urban Air Mobility services through the support of Stakeholders from different European cities and regions.

Short description of the project

- A new European project, SAMVA, meant to increase the adoption of EGNOS technology within the provision of rotorcraft and eVTOL services has formally started in October 2022.

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 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 (SBAS Adoption in Multicopter VTOL Aircraft) 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 2021, a consortium formed by the partners decided to apply to the call for proposals "GSA/GRANT/01/2021 – Acceleration of EGNOS Adoption in Transport". A proposal was written, and it was successfully selected among other applicants. The end goal is to increase the adoption of EGNOS technology within the provision of rotorcraft and eVTOL services. In collaboration with TAS-F, UPT will be in charge of processing the fish eye camera collected data / videos, and provide 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

SAMVA project will increase the adoption of EGNOS technology within the provision of rotorcraft services, and will pave the way towards seamless integration of VTOL autonomous aircraft. The project kick-off meeting took place on 7 November 2022 at Lleida-Alguaire airport. The importance of the SAMVA project was highlighted by the project coordinator, Josep Montolio, Aeronautical Engineer at PildoLabs, who stated that "this project will establish relevant milestones towards the nominal use of EGNOS-based operations for both rotorcraft and eVTOLs aircraft. These new procedures will offer all the EGNOS benefits to the different service operators and users, achieving a better positioning solution backed up by high precision, accuracy, and integrity".

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://com.upt.ro/isprc/

Research Team

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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 codimension 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 2022

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 codimension k bifurcations in non-smooth systems;
6. Study bifurcations in non-smooth systems with impacts.

Results

Published articles:

1. J. Ginoux, J. Llibre, C. Valls, Dynamics and Darboux Integrability of the D-2 Polynomial Vector Fields of Degree 2 in R-3, Mathematical Physics, Analysis and Geometry 24, 2021

2. J. Llibre, R Oliveira, On the limit cycle of a Belousov–Zhabotinsky differential systems, Mathematical Methods in the Applied Sciences 45 (2), 579-584, 2021

Financed through/by

Horizon2020-RISE-777911, "Dynamics"

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RESPECT-DEM - RELIABLE SIGNAL PROCESSING DATAPATHS DESIGN USING CONTROL TECHNIQUES BASED ON DIFFERENCE EQUATION MODELS

Goal of the project

The project aims at developing iterative based methods for increasing the reliability of DSP circuits operating in radiation prone space environments. The ingredients are: iterative correction loops using gradient based optimizations, and error correction codes. The first are well known methods from the optimization theory, whilst the second offer an efficient way to obtain redundant data. The remaining problem is to fuse these concepts such that the error correction protected data is efficiently processed by the linear transform, and in case errors occur it is corrected by the gradient descent based method iterative loop.

Short description of the project

This project aims at building reliable implementations of linear transforms, such as the ones used for Digital Signal Processing (DSP) circuits that operate in radiation prone environments.

Project implemented by

Politehnica University Timisoara,
Department of Computer and Information Technology

Implementation period

04.05.2021-01.11.2022

Main activities

- Development of optimization based iterative methods and error correction codes fault tolerant methodologies for small scale linear DSP circuits;
- Scaling up the fault tolerant methodologies for complex linear DSP circuits;
- Assessment of the proposed techniques

Results

- We have managed to implement a fully parallel 8-point FFT design using a gradient descent correction loop, and efficient redundancy.
- The redundancy is by means of BCH codes.
- The correction iterative loop used gradient descent optimization.

Applicability and transferability of the results

The project aims at developing iterative based methods for increasing the reliability of DSP circuits operating in radiation prone space environment.

Financed through/by

European Space Agency (ESA)

Research Center

CTI - Research Center for Computers and Information Technology

Research team

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- Alexandru AMARICĂI (Researcher)
- Mircea-Bogdan RĂDAC (Researcher)
- Daian-Narcis STEIN (Researcher)

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https://indico.esa.int/event/286/contributions/5279/attachments/3711/5283/1130b_-_REDOUBT.pdf

PROJECTS SUPPORTED BY PRIVATE FUNDS

REHABILITATION OF THE CS 19 CANAL PARALLEL TO THE PRODUCTION WAREHOUSE BELONGING TO SC SUMIDA ROMANIA S.R.L. IN THE TOWN OF JIMBOLIA, TIMIȘ COUNTY

Goal of the project

The project aimed to establish the main measures and technical solutions necessary for the rehabilitation and refurbishment of a specific discharging canal, main within a complex hydro-ameliorative arrangement in the western area of Timiș County, both in order to ensure the optimal functioning of the hydrotechnical system under the conditions of the expected discharge flows, and in order to protect the foundations of the constructions in its immediate vicinity.

Short description of the project

In the context of the necessity of resuming the efficient and safe operation, both for the own component elements and for the neighboring structures, of the hydro-ameliorative system, the present project establishes the specific rehabilitation measures for one of the main canals, measures to be extended to the other ones.

Project implemented by

Coordinator:
Politehnica University Timisoara
Partners:
ISPIF București, Banat Branch;
S.C. SUMIDA ROMANIA S.R.L.

Implementation period

September 2021 – April 2022

Main activities

As a technical study with a practical implementation objective, the project proceeded with a detailed research of the existing hydrotechnical arrangement and the local hydrological data.

Further on, based on a specific hydraulic approach of the system foreseen optimized running mainly under special discharging conditions, the corresponding structural measures were drown, together with their proper technical accomplishment solutions.

The reached conclusions were also materialized in technical execution plans, following that their implementation to be carried out under the coordination of the team members.

Results

Specific structural solutions have been established in order to properly operate under the nowadays water discharge conditions.

Applicability and transferability of the results

The correct functioning of the hydro-ameliorative systems directly depends on the proper and continuous maintenance of their components. In the same time, for an optimal functioning, it is necessary to adapt both to the up-to-date hydrological conditions and to the evolved requirements.

The technical conclusions established by the project can be extended to other elements with similar development and operating conditions within the arrangements of this kind. However, for a full validity of the structural proposals, it is necessary to resume the carried out procedures.

Financed through/by
• SC ID ROMENG CONCEPT SRL

Research Center

Research Center for Hydrotechnical Engineering and Environmental Protection
https://www.ct.upt.ro/centre/cchpm/

Research Team

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TECHNICAL DOCUMENTATION FOR OBTAINING THE WATER MANAGEMENT PERMIT REGARDING GOZNA, SECU, VĂLIUG AND TIMIȘ - TREI APE DAMS AND ACCUMULATIONS (1) AND RESPECTIVELY TECHNICAL DOCUMENTATION FOR OBTAINING THE WATER MANAGEMENT PERMIT REGARDING GREBLA, BREAZOVA, CRĂINICEL 1 AND CRĂINICEL 2 HYDROPOWER PLANTS (2).

Goal of the project

• The project had as general purpose the operation analysis of the specific hydrotechnical constructions – four water retention dams and four hydropower plants, fundamental within the hydropower and flows regularization arrangement from the upper basin of the Bârzava River, Semenic Mountains, south-western area of Romania.
• Specifically, the analysis led to the elaboration of a complex documentation that reflects the current state of the dams' structures, as well as of the hydropower plants, documentation that accompanies and justifies the owner's request to obtain the re-issuance of the operating permit from the competent national authority.

Short description of the project

• Considering the special importance of the hydrotechnical arrangement of the Bârzava River upper basin, both from the point of view of high waters regulation and floods protection, respectively for the production of energy from a renewable source, it is necessary to periodically perform a professional check of the component structures condition, as well as the permanent monitoring of the functioning mode under the general conditions of changing the hydraulic regime.
• Built in different stages, the dams are of different types: Secu Dam – concrete buttresses (41m, 1963), Văliug Dam – arched from stone masonry (27m, 1909), Gozna Dam – rock-fill with metallic face (46m, 1952), Timiș - Trei Ape Dam – rock-fill with clay core (31m, 1973).

Project implemented by

Coordinator:
Politehnica University Timisoara
Partners:
TMK Hydroenergy Power S.R.L.
Romanian Water National Administration, Banat Water Basin Administration

Implementation period

March – November 2022

Main activities

• The activity of the project team started with an extensive and detailed documentation in the field upon the composition and operation under load of the hydrotechnical constructions (both individually and interconnected within the complex scheme), respectively on the specific state in which they find themselves after long-term exploitation.

• Further on, through a specific professional analysis, the degree of functionality and safety in operation were established for each of the structures, respectively the constructive and operating measures required for extending their running under a most efficient behavior. The drafted documentations summarized the information and conclusions submitted to the national authority whose attributions include the (re)issuance of the hydrotechnical constructions operation permit.

Results

• The conclusion of the study regarding the structural and functioning state of the hydrotechnical constructions within the upper Bârzava complex arrangement is that, although their commissioning was made up to 114 years ago, after the rehabilitation and refurbishment works carried out in the last two decades, all the components as well as the ensemble meet the exploitation conditions under the nowadays loading circumstances and requirements.
• Following the developed study, respectively on the basis of the reached conclusions, the operating authorization (water management permit) for all distinct constructions was obtained from the Romanian Water National Administration.

Applicability and transferability of the results

• The owner of the structures comprising the complex hydrotechnical system – TMK Hydroenergy Power – is to maintain and exploit the hydropower development based on the obtained permit, taking into account the conclusions of the performed study, benefiting of course from the support of the team that performed it.

• Although the study was led on the situation characteristic for the presented complex arrangement, the approach method and the study procedures can also be employed for the analysis of the constructions that make up other hydrotechnical developments.

Financed through/by

• TMK Hydroenergy Power SRL

Research Center

Research Center for Hydrotechnical Engineering and Environmental Protection
https://www.ct.upt.ro/centre/cchpm/

Research Team

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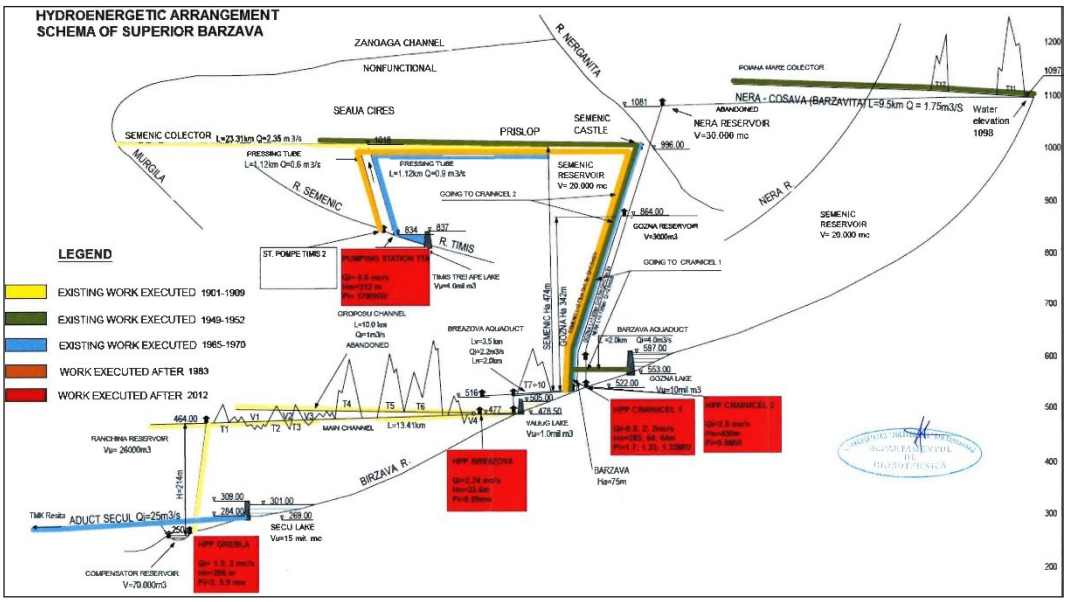
- Lecturer Dr. Eng. Șerban Vlad NICOARĂ
- Prof. Dr. Eng. Ion Dragoș UȚU



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INTERVENTION WORKS FOR THE SAFE EXPLOITATION OF THE GURA APELOR DAM - DALI

Goal of the project

The global objective is the safe exploitation of the dam, ensuring the conditions for the performance of the activity of monitoring the behavior of the development constructions.
The specific objective is to define the solutions to remedy the degradations found in order to develop within the technical project, based on which the execution works will be purchased.
The works required to secure the Gura Apelor dam objective are:
- Construction of stairs from the access well to the galleries and from the route of the injection gallery;
- Repairing the stairs on the route of the local collection gallery;
- Construction of the safety balustrade on the route of the injection galleries, respectively collection and drainage;
- Realization of the lighting in the access well, in the injection gallery, the collection gallery, in the drainage gallery and the exit window; the lighting will be made with sealed lighting fixtures, the circuits of the internal electrical installation will be executed in reinforced cable shown apparently;
- Voltage supply of AMC niches;
- Rehabilitation of constructions for the AMC equipment of the dam in provisional solution compared to the solution in the project and its equipment entrance barrage in well;
- Rehabilitation of the telemetry system, teletransmission (terminal boxes and automatic stations) of the dam parameters and completion of the AMC assembly for the UCC;
- Rehabilitation of access to the injection gallery with a well lift;
- Construction of the injection gallery communication (telephony) installation

Short description of the project

Considering the advanced state of decay of the existing metal staircase, the lack of lighting in the galleries, the state of the barracks and the state of the existing AMC equipment, the staff's activity is greatly hampered.
By achieving the proposed investment objective, the aim is to increase the safety in operation of the dam and the operation in good conditions of the entire set of components of the hydrotechnical arrangement that meet the requirements and recommendations from the technical expertise, as well as those regarding the evaluation of the safety condition in operation.

Project implemented by

Coordinator: Politehnica University Timisoara

Implementation period

10.01.2022 - 12.09.2022

Main activities

- Visit to the objective
- Carrying out technical expertise
- Analysis of the existing situation and identification of needs and deficiencies
- Identification of technical-economic scenarios/options
- The technical solution, from a technological, constructive, technical, functional-architectural point of view and economic
- Financial and economic analysis related to the realization of the works
-Optimumtechnical-economicScenario/Option,recommended

Results

- Presentation of the objectives that must be addressed and the methods that must be used

Applicability and transferability of the results

- Based on this work, a technical project will be created and the necessary works will be executed.

Financed through/by

Confidentially

Research Center

Research Center for Hydrotechnical Engineering and Environmental Protection
https://www.ct.upt.ro/centre/cchpm/

Research Team

- **Project leader:**
- Lecturer Dr. Eng. Cristian Adrian GÎRBACIU
- **Researchers**:
- Lecturer Dr. Eng. Irina Alina GÎRBACIU
- Assoc. Prof. Dr. Eng. Constantin Albert TITUS
- Prof. Dr. Eng. Constantin FLORESCU
- Eng. Violeta ȘUMALAN
- Lecturer Dr. Eng. Camelia ȘTEFĂNESCU
- Lecturer Dr. Eng. Adia GROZAV
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RISC-V ARCH - DEVELOPMENT OF INNOVATIVE SOLUTIONS FOR MICROCONTROLLER ARCHITECTURES BASED ON RISC-V ISA

Goal of the project

The goal in our project is to design, simulate, implement (including the design files sent for tape-out) a low-cost microcontroller with a RISC-V core, such that it can be used as a computational and communication platform in IoT applications.

Short description of the project

Our research project involves the use of a new instruction set based on the ISA RISC-V standard (which can be extended) to define, specify, simulate, and implement a microcontroller related to this architecture.

Project implemented by:

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

Implementation period

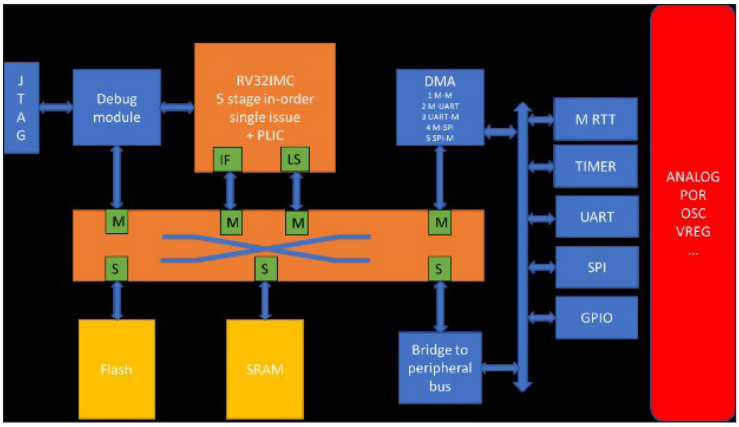
03.01.2022 – 23.12.2022

Main activities

The main activities we focused on are the following:
• Develop a working prototype of microcontroller based on RISC-V ISA on an FPGA demonstrator
• Generate the output files and documentation for the tape out the proposed platform as an ASIC
• Design, simulate and validate the low-power consumption architecture of the core
• Scalable design for subsequent developments
• Compare the performance with similar designs:
SiFive Freedom E310 , AndesCore N22

Results

• The block diagram of our controller is presented in figure below. To be compliant with the RISC-V specification, in the structure of the core pipeline RV32IMC we implemented the integer instruction set.
• For best performance, as well as code size, we also implemented both the Multiply/Divide instruction set extensions and the compressed instruction set.
• In addition, we implemented a low latency interconnect for the connection between the core and the memories in order to be able to get the best performance from the core.



Applicability and transferability of the results

The fact that the ISA RISC-V is open source allows the microarchitecture developed by us to be specialized for the needs of a particular application, all of these at a low cost. Our microarchitecture can be extended with custom instructions to efficiently perform AES encryption therefore it can target the growing field of smart sensors that collect data from the environment and need to communicate it securely.

Financed through/by

Continental Automotive Timisoara

Research Center

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

Research Team

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- Lecturer Dr. Eng. Ciprian SEICULESCU
- Assoc. Prof. Dr. Eng. Alexandru AMĂRICĂI-BONCALO
- Elisei Ștefan ILIEȘ
- Magdalena Patricia MARINCA

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ENVIRONMENTAL QUALITY CONTROL SERVICE AT TIMISOARA WASTEWATER TREATMENT PLANT

Goal of the project

The quality of the environment, respectively the water quality of the Bega river, will be monitored in the sector 1 km upstream of the first discharge of the treatment plant and 5 km downstream of the last discharge of the treatment plant into the Bega river.

samples area

Short description of the project

Interdisciplinary analysis of the physico-chemical and biological parameters and the influence of these parameters on the ichthyofauna, as a result of fish mortality on the Bega River.

Project implemented by:

Coordinator: Politehnica University Timisoara
Partners:
-University of Life Sciences "King Mihai I" from Timisoara
-West University of Timisoara

Implementation period

- 2022-2023

Main activities

The sector 1 km upstream from the first discharge of the treatment plant and 5 km downstream from the last discharge of the treatment plant in Bega river is analyzed.
The following are analyzed:
1. Water and sediment quality control,
2. Ichthyofauna study (fish habitats, identification of anthropogenic pressures),
3. Malacofauna study (shells and water snails as bioindicators),
4. Study of marsh macrophyte vegetation,
5. Analysis of the physico-chemical and biological parameters, as well as the influence of these parameters on the ichthyofauna,
6. Identify some intervention solutions to protect aquatic flora and fauna.

Results

The population of microorganisms at the level of the analyzed water samples shows quantitative differences depending on the parameter, respectively the sampling point. Microbiologically (NTG, fecal coliforms, fecal enterococci, fecal streptococci), the highest values are found in the water samples and sediment taken from collection points P3 and P4, which indicates the existence of considerable amounts of waste of organic origin. The best numerically represented are the ammonifying bacteria followed by the nitrifying and denitrifying ones. From a chemical point of view, very high concentrations of ammonia, nitrites and nitrates were recorded, especially in the lower part of the water layer. The ichthyofauna inventory identified specimens that showed congested and hemorrhagic areas on the body / integument / gills, only in medium/large species.

Applicability and transferability of the results

Nitrogen compounds in different stages of metabolism, as a result of the action of the communities of microorganisms present, can interact with the existing biota at the level of the aquatic ecosystem, causing a negative impact on the survival rate. The obtained results support the finding of intervention solutions to protect aquatic flora and fauna.

Financed through/by

AQUATIM S.A.

Research Center

Research Institute for Renewable Energies
https://www.icer.ro/

Research Team

Project leader:
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STUDIES AND TESTS TO OBTAIN A MEDICAL DEVICE WITH AN ANTIBACTERIAL EFFECT

Goal of the project

- The project goal is to design a versatile medical device comprising an irradiating lamp and a surface coated with a film of metal oxide nanoparticles suitable for disinfecting a wide variety of hospital indoor environments contaminated with germs, adaptable to the destination of each specific category of hospital indoor environment; easy to carry it from one place to another; having low electricity consumption and a high lifespan.

Short description of the project

- Better disinfection of the hospital indoor environments as compared with classic disinfection technologies.

Project implemented by:

Coordinator: Politehnica University Timisoara

Implementation period

- 2022

Main activities

- It was tested two types of germs:
i) reference bacterial and fungal strains (ATCC) used for quality control testing and
ii) bacterial strains and fungi, originating from various hospital indoor environments.
• It is difficult to assess which way each microorganism is spreading, it is important to proceed to disinfect at the same time both the air and all the objects placed within indoor environments.
• Disinfection of the surfaces and/or air can be done with devices using combined disinfectants that have photocatalytic properties, such as the devices based on UV radiation.
• The ability of metal oxides to act as a photocatalyst has been known, the killing mechanism involves degradation of the cell wall and cytoplasmic membrane of due to the production of reactive oxygen species such as hydroxyl radicals and hydrogen peroxide.

Results

- The medical device used to disinfect a certain volume of an internal hospital environment contaminated with germs, includes a portable activation panel, covered with a film of metal oxide nanoparticles that acts as a photocatalyst, an irradiation lamp that includes LEDs placed at an adjustable activation distance and an electronic control unit.
- Several elements are essential: the surface/volume to be disinfected, the power of the irradiation lamp, the irradiation time, the activation distance of the reactive oxygen species generated.

Applicability and transferability of the results

- The increased level of disinfection depends on the type of germs, with the best results when using the medical device achieved on C. albicans and E. coli ESBL germs and was proportional to inoculum density and exposure time.
- The project implementation will improve the air quality in the indoor environments of hospital medical care, which, otherwise, through the nosocomial infections that they can produce, could bring serious damage to the health of patients.
- Given the various ways of transmission and the fact that many times it is difficult to assess which way each micro-organism is spreading, it is important to proceed to disinfect at the same time both the air and all the objects placed within hospital indoor environments (operating room, wards, patient rooms, emergency room, intensive care unit, hallways).

Financed through/by

ROMEDICIS MEDICAL VENTURE SRL

Research Center

Research Institute for Renewable Energies
https://www.icer.ro/

Research Team

Project leader:
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- Scientific Researcher level II Dr. Chem-Biol. Nicoleta Sorina NEMEȘ

Researchers:
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REHABILITATION OF HYDRO UNIT 1 SLATINA – OPTIMUM CAM DETERMINATION FOR EFFICIENCY MAXIMIZATION AND A LOW LEVEL OF VIBRATION

Goal of the project

The goal of the project was determination for Hydro Unit 1 Slatina the combinatorial cam using constant-power index tests. More precisely, we keep the operating point (electrical power and net head) while simultaneously adjusting both the guide vanes (GV) opening and runner blade (RB) opening. It is found that the points GV-RB openings for constant power and head can be mathematically represented by a three-coefficients hyperbola fitted using a least squares procedure. The on-cam point practically corresponds to the maximum curvature of the hyperbola. Moving to the right branch we have a decrease in efficiency while moving to the left branch increases the vibration level.

Short description of the project

For double regulated turbines, the correlation between guide vanes opening and runner blades opening, and the operating point (head and power) is given by the so-called combination (CAM) curve/ surface. Operating the machine „on-cam" should provide an efficiency maximization and a low level of vibration.
For a refurbished bulb turbine, it was found that the implemented CAM is rather far from being optimal, with unexpectedly high level of vibration. The index tests performed in situ were unreliable due to uncertain discharge measurements. The challenge was to verify and update the cam surface with in-situ measurements, without primarily relying on discharge measurements.

Project implemented by

Politehnica University Timisoara
Department of Mechanical Machines, Equipment and Transportation
Research Center for Engineering of Systems with Complex Fluids

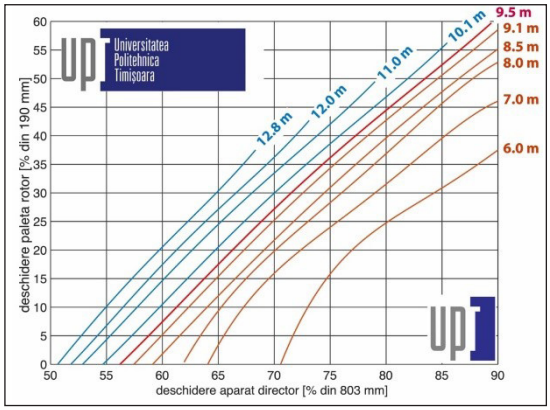
Implementation period

01.09.2022-31.12.2022

Main activities

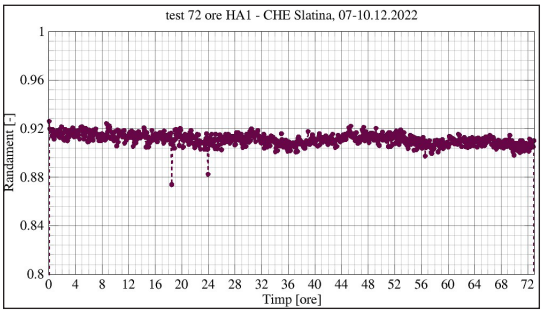
The main activities have been programmed as follows:
- **Activity 1**. Preparation of the test program (review of Hydro Unit 1 documentation, CFD verification of pressure taps on the bulb turbine for the flow rate measurement, verification of equipment available in the powerplant, installation of new additional equipment's).
- **Activity 2.** Test program in the powerplant (measurements, acquisition, and preliminary data processing), preliminary results.
- **Activity 3.** Implementation and testing of the combinatorial CAM for Hydro Unit 1 Slatina. 72-hour continuous test of the Hydro Unit 1 while monitoring the efficiency and the vibrations.

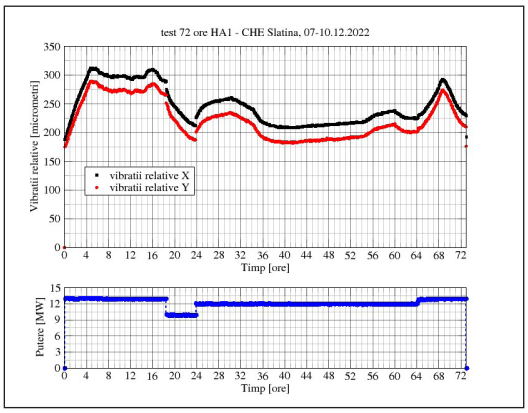
Results



- With the on-cam points determined for various power and head values, we adjust the whole initial cam using a least squares procedure. With the on-cam points determined for various power and head values, we adjust the whole initial cam using a least squares procedure.
- The initial cam surfaces are mathematically described using the Multivariate Adaptive Regression Splines (MARS) method, and the correction is determined in the least-squares sense to fit the in-situ measured GV and RB on-cam openings.

A 72-hour test on the updated cam shows a stable operation with significantly reduced level of vibrations.





Applicability and transferability of the results

The results obtained in the project developed an efficient method for in-situ cam determination using constant-power index tests. The method can be applied on all double regulated hydraulic turbines for updating the cam surface (for rehabilitated turbines) or determining the cam surface (for new installed hydraulic turbines). The main advantage of the method, consist in the fact that is not based on discharge measurement.

Financed through/by

Confidentially

Research Center

Research Center for Complex Fluid Systems Engineering
https://eeris.eu/ERIF-2000-000U-0101

Research Team

Project leader:
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Researchers:
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- Eng. Marin ANICA

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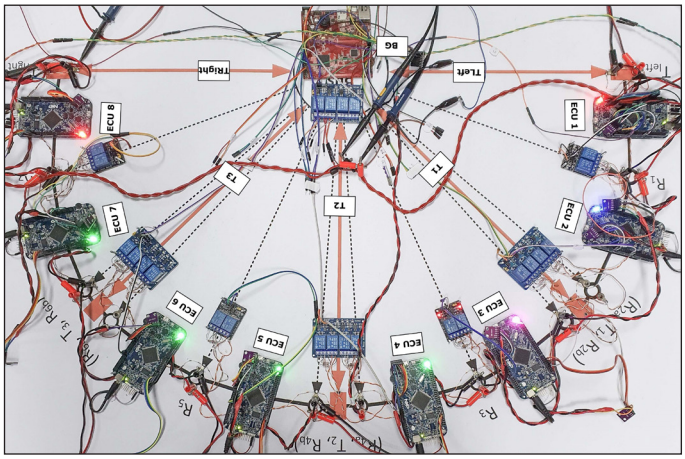
NEW CONCEPTS FOR SECURE CONNECTIVITY INSIDE CARS

Goal of the project

The over-increased connectivity inside cars triggers the need for innovative solutions for protecting vehicles. This applies both to in-vehicle networks, such as the Controller Area Network (CAN) bus, but also to connections with mobile devices that are brought by users inside cars. Our project targets innovative solution to secure CAN buses by the use of active relays as well identification techniques for mobile devices based on physical characteristics.

Short description of the project

Our project will design active defence mechanisms for in-vehicle networks and physical fingerprint based identifications for smart-phones.



Project implemented by

Politehnica University Timisoara (Romania),
Department of Automation and Applied Informatics and Ben Gurion University of the Negev (Israel)

Implementation period

16.08.2021 - 31.03.2022

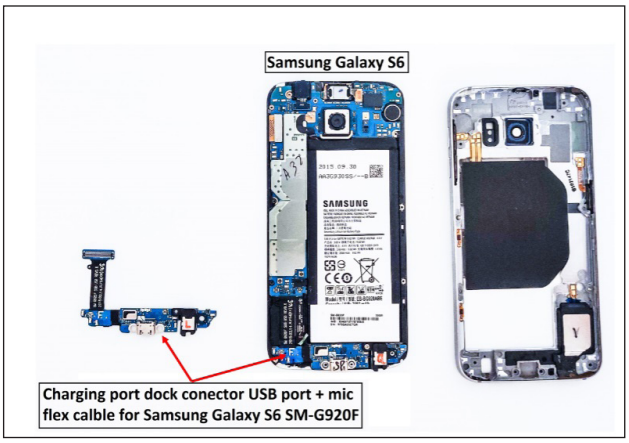
Main activities

The main activities of our project are twofold:

1. Designing architectural modifications for CAN buses which open road for new mechanisms that can be used for intruder localization and isolation. The proposed modifications allow a bus guardian to monitor and isolate intruders on the bus while all traffic is redirected so that legitimate nodes carry their tasks without significant disturbances. A decentralized version delegates these abilities to regular nodes, reducing costs and wire lengths, while also being able to localize and isolate the intruders much faster. We prove the effectiveness of the proposed topologies on an experimental setup with automotive grade controllers and collected in-vehicle traffic.

2. Investigating smartphone fingerprints obtained from microphone data which will facilitate smartphone identification. We also consider the presence of several types of noise that is specific to vehicular scenarios, e.g., traffic and market noise at distinct volumes, which may reduce the reliability of the data.

We analyse several classification techniques based on traditional machine learning algorithms and more advanced deep learning architectures that are put to test in recognizing devices from the recordings they made.



Results

Two research papers submitted at top event or journals in the field:
[1] **Bogdan Groza**, Lucian Popa, Tudor Andreica, Pal-Stefan Murvay,
Asaf Sthabtai, Yuval Elovici, "PanoptiCANs - Adversary-resilient Architectures for Controller Area Networks", under submission, 2022.

[2] Adriana Berdich, **Bogdan Groza**, Efrat Levy, Asaf Shabtai, Yuval
Elovici, Rene Mayrhofer, "Fingerprinting Smartphones Based on Microphone Characteristics from Environment Affected Recordings", under submission, 2022.

Applicability and transferability of the results

The proposed technologies can be used by various industries for securing in-vehicle networks and smartphone applications.

Financed through/by

Ben Gurion University of the Negev

Research Team

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- Ph.D. Student Eng. Lucian POPA
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SMART CITY CONSULTANCY FOR THE IMPLEMENTATION OF THE GRCF2 W2: 2022.005424/15763/112065 - GRCF2 W2 - TIMISOARA CITY TRAMS: GREEN CITY ACTION PLAN

Goal of the project

- Develop the **Action Plan for Timisoara Green City**, with the support of the EBRD.
- Identify and implement actions and investments to address priority environmental issues in the city.

Short description of the project

Assessment of the Smart Maturity of the city of Timisoara and other actions for developing the **Action Plan for Timisoara Green City**.

Project implemented by

Research Center for Multimedia, Politehnica University Timisoara
Green Partners SRL, Cluj-Napoca

Implementation period

15.12.2022 – 31.10.2023

Main activities

Main activities of the Research Center in Multimedia:
a). Provide specific input to legal framework assessment on Urban Planning – especially on Smart Maturity Assessment.
b). Input on relevant sectors indicators / identifying additional indicators to be considered, in case of data gaps, irrelevance of indicators in methodology – Smart Maturity assessment.
c). Review draft report, provide technical feedback on areas of expertise, ask further questions if needed for understanding the City's needs and developing of proposed actions.

Results

Smart Maturity Assessment for Timisoara Green City Action Plan consisting of 48 pages with the following structure:
1. Foundational Components
a. Policies, strategies, and programs
b. Institutional Ecosystem
c. Technical components

2. Sectoral Assessment
a. Transport and Infrastructure
b. Energy and Buildings
c. Industry
d. Waste
e. Water
f. Land-Use

3. Data Integration & Cross-Sectoral Approaches

4. Smart Maturity Assessment

Applicability and transferability of the results

- Timisoara is in its Enabling stage of smart initiatives and digital transformation. This means that the Municipality acknowledges the importance of smart components, has already developed / implemented certain smart solutions and is making efforts to digitalize as many processes as possible.
Still, there is room for improvements in all sectors and at the Municipality level.
The main challenges that the city is facing concerning the digitalization process refer to:
- Limited institutional capacities for Smart Integration and Digital Transformation.
- Low-level and difficult online interaction of the citizens with the Municipality.
- Limited capacity for capturing, processing and exposing data for traffic modelling, route planning, land management.
- Limited data capturing and sharing in a cross-sectorial approach.
- Limited engagement and involvement of private / industry ecosystem in smart initiatives.

Financed through/by

EBRD Green Climate Fund

Research Center

Research Center for Multimedia

Research Team

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https://www.cm.upt.ro/proiecte-nationale/smart-city-gcap-timisoara/

RESEARCHING COMPUTER VISION ALGORITHMS FOR DETECTING THE GROUND PROFILE IN 3D

Goal of the project

The goal of the project is to increase the collaboration between the company and university scholars by doing research in automotive Autonomous Driving (AD) domain. The main task of the project is to implement a solution regarding the removal of flat world assumptions in AD.

Short description of the project

Accurate localization of other traffic participants is a vital task in autonomous driving systems. State-of-the-art systems employ a combination of sensing modalities such as RGB cameras and LiDARs for localizing traffic participants, but most such demonstrations have been confined to plain roads. With the advent and subsequent commercialization of autonomous driving, there is an increased interest in monocular object localization for urban driving scenarios.
The goals of the project:
- Investigating current state of the art solutions for ground plane profile detections.
- Researching and developing own solution for ground plane profile detection based on single image from a fish-eye camera model situated on the vehicle. Solution that runs on a PC environment.
- Implementing the solution on Continental products and specific SoC taking into account the limitations in processing power and processing time.
- Researching and developing a testing framework which is able to verify and validate the given solution

Project implemented by:

Coordinator: Politehnica University Timisoara

Implementation period

- 01.04.2022 - 31.03.2023

Main activities

- Research in the field of ground plane profile detection (GPD)
- Image acquisition using Continental equipment
- Image labelling
- Finding the most appropriate models for GPD
- Algorithm development and implementation for GPD.
- Testing and validation of the algorithm that runs on a PC environment.
- Implementing the solution on Continental products and specific SoC taking in account the limitations in processing power and processing time.
- Researching and developing a testing framework which is able to verify and validate the given solution
- Project management
- Dissemination of results

Results

The results of the project consist in:
- A study regarding the state of the art solutions for ground plane profile,
-Identification of publicly available datasets,
-Algorithm implementation, testing and validation.

Applicability and transferability of the results

- In order to estimate the ground profile, there were identifed two main approaches: one that focuses on geometrical features using classical computer vision paradigms, and the other one employing deep neural networks.
- During the research we try to circumvent the lack of manually labeled automotive datasets by using reliable automatic feature detectors.
- Future preoccupation could by represented by optimizing the neural models for deployment to EdgeAI devices.

Financed through/by

CONTINENTAL AUTOMOTIVE ROMANIA S.R.L

Research Center

Research Center for Intelligent Electronic Systems

Research Team

Project leader:

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Researchers:

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- Assoc. Prof. Dr. Eng. Popa CĂLIN
- Assoc. Prof. Dr. Eng. Ioan JIVEȚ
- Lecturer Dr. Eng. Ciprian DAVID
- Ms.C. Student Eng. Ionatan Robert ȘOFRAC

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RESEARCH IN AUTOMOTIVE ELECTROMAGNETIC COMPATIBILITY AND RELIABILITY FOR QL

Goal of the project

- The goal of the project was divided into several work packages:

WP-1: 3D simulations for assessing the contact and Shielding Effectiveness/Radiated Emissions of different enclosures and comparison with practical validation;
WP-2: Signal and power integrity simulations for different scenarios (including LPDDR4 and IR Drop specific interfaces);
WP-3: Physical and numerical workflow for PCBs assembly characterization (simulation and laboratory results);
WP-4: Variation of mechanical properties due to printing orientation of SLM printed AlSi10Mg alloy;

Short description of the project

- For electronic modules tested in Qualification Laboratories (QL), which failed the tests, we want to offer consulting solutions through simulations and design and based on these proposals, the products to be retested to obtain the result of the laboratory pass.
- Research on the consistency between the results obtained by simulations (using CST Microwave Studio, PSpice and LTSpice) and those related to the testing of prototypes in the laboratory in terms of electromagnetic compatibility (EMC).
- Research on the concordance between the results obtained by simulations (with the help of Ansys Sherlock) and those related to the testing of prototypes in the laboratory in terms of reliability (Reliability).

Project implemented by:

Coordinator:

Politehnica University Timisoara,
Faculty of Electronics, Telecommunications and Information Technologies, Department of Measurements and Optical Electronics

Implementation period

01.03.2022 - 28.02.2023

Main activities

- This project proposes the theoretical study, numerical analysis (by means of CST Microwave Studio and Ansys Sherlock) and optimization of different scenarios that can be used in laboratory testing. Also, the correlation with laboratory testing will be done, both in EMC areas, and in Reliability.
- Design solutions to improve EMC and Reliability testing for automotive products will be given, based on predictions obtained by simulation. Thus, papers will be published, concerning this topics, which will present the novel elements that appear from this research. Like stated before, in the literature, a variety of solutions exist, but the ones proposed in this research will focus on combining cost effective solutions with the ones that lead to an improvement in laboratory testing results.

Results

1. C. Pescari, **A. Silaghi**, A. De Sabata, C. Bleoju, "On Using EMC Simulation for Solving Power Integrity Issues", COMM 2022, 16-18 June 2022, Bucharest, Romania (DOI: 10.1109/COMM54429.2022.9817274).
2. C. Pescari, **A. Silaghi**, A. De Sabata, C. Bleoju, "IR Drop Simulation for an Automotive Device", SIITME 2022, 26-29 October 2022, Bucharest, Romania (DOI: 10.1109/SIITME56728.2022.9988610).
3. R. Trip, **A. Silaghi**, A. Buta, A. De Sabata, "TEM cell Measurements in Automotive EMC: A Case Study", ISETC 2022, 10-11 November 2022, Timisoara, Romania (DOI: . 10.1109/ISETC56213.2022.10010216).
4. I. Tinca, I. Ailinei, A. Davidescu, "Printed Circuit Board Orthotropic Material Calibration for Static and Dynamic Loading", ESTC 2022, 13-16 September 2022, Sibiu, Romania (DOI: 10.1109/ESTC55720.2022.9939509).

Applicability and transferability of the results

Design solutions to improve EMC and Reliability testing for automotive products have been proposed, based on predictions obtained by simulation.

Initially, the project team from UPT proposed that 2 articles to be published at International Conferences, concerning the previously mentioned topics, which should present the novel elements that appear from this research. Following the research activity, 1 scientific report was conceived, and 4 articles have been published at International Conferences.

Financed through/by

Continental Automotive Romania SRL

Research Team

Project leader:

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

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- Prof. Dr. Eng. Aldo DE SABATA
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Universitatea Politehnica Timișoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

GRANTED PATENTS

INVENTORS: CORNELIA-VERONICA MUNTEAN, MARCELA ELENA STOIA

PATENT NO. RO 133044 B1/ 2022

MANGANESE FERRITE PREPARATION PROCEDURE

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 133044

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

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: PROCEDEU DE PREPARARE A FERITEI DE MANGAN

Inventatori: MUNTEAN CORNELIA-VERONICA, TIMIŞOARA, TM, RO; STOIA MARCELA ELENA, TIMIŞOARA, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 20/07/2017, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea şi aplicarea sigiliului
Director General
Marian - Cătălin BURCESCU

OFICIUL DE STAT PENTRU INVENTII SI MARCI · ROMÂNIA ·

Bucureşti, Data eliberării 30/03/2022

Tipărit la Tipografia OSIM

• The invention refers to a process for the preparation of manganese ferrite by the co-precipitation method in an organic-aqueous medium. The process consists in the dissolution of Mn(II) and Fe(III) salts in a diol-water mixture, the precipitation of the metal ions with an alkaline hydroxide dissolved in a diol-water mixture, followed by heating with a controlled temperature regime of the obtained suspension. Through this process, magnetic manganese ferrite is obtained directly, without additional treatments, as a single crystalline spinel phase.

• Spinel ferrites with nanometer-sized particles have attracted special attention due to their technological applications in magnetic recordings, catalysts and ferrofluids. The nanoparticles of such magnetic materials have different characteristics compared to compact material, due to their small size and the effect of magnetic interactions between the particles.
Manganese ferrite is a magnetic ferrite with uses in various technological applications: magnetic materials, gas sensors, adsorbent material for hot gases.

• Nanometric manganese ferrite particles are also used for applications in the field of environmental protection: as adsorbent material for various inorganic and organic pollutants, and as catalyst for the activation of peroxomonosulfate and peroxodisulfate to produce sulfate radicals for the degradation of organic pollutants such as phenol and organic dyes.

• The use of this magnetic material in these applications presents the advantage that after the adsorption/oxidation of the pollutants, the solid material can be removed from the treated solution by using a magnetic field.

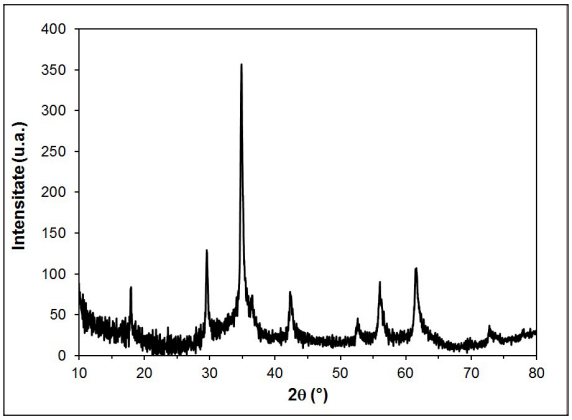

Fig. 1. XRD pattern of $MnFe_2O_4$

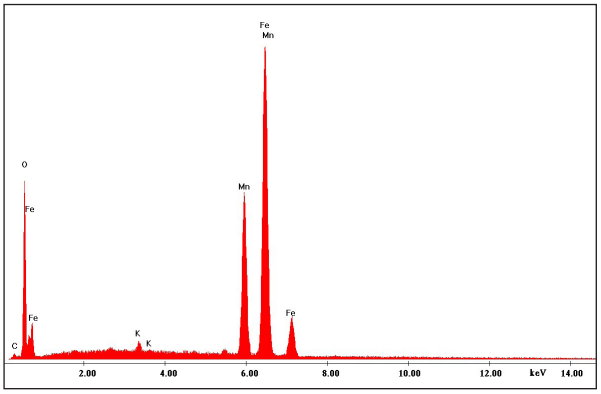

Fig. 2. EDX spectrum of $MnFe_2O_4$

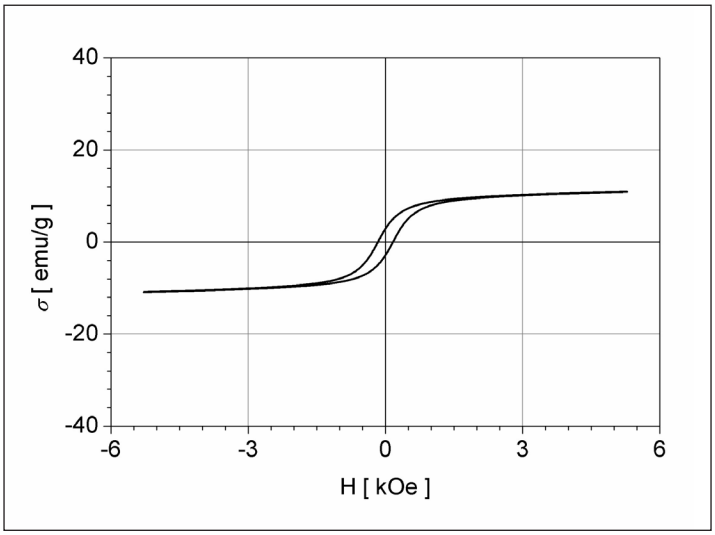

Fig. 3. Magnetization curve of $MnFe_2O_4$

INVENTORS: LAURA COCHECI, LAVINIA AFRODITA LUPA, MARIUS TRAIAN GHEJU, DELIA ANDRADA DUCA, PETRU NEGREA, RODICA PODE

PATENT NO. RO 132138 B1/ 2022

PROCEDURE FOR THE PREPARATION OF LAYERED DOUBLE HYDROXIDES, ZnRAl-CO_3 TYPE

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 132138

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

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: PROCEDEU DE PREPARARE A HIDROXIZILOR DUBLI STRATIFICAŢI, DE TIPUL $Zn_nAl\text{-}CO_3$

Inventatori: COCHECI LAURA, TIMIŞOARA, TM, RO; LUPA LAVINIA AFRODITA, TIMIŞOARA, TM, RO; GHEJU MARIUS TRAIAN, TIMIŞOARA, TM, RO; DUCA DELIA ANDRADA, TIMIŞOARA, TM, RO; NEGREA PETRU, TIMIŞOARA, TM, RO; PODE RODICA, GIROC, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 10/02/2017, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea şi aplicarea sigiliului
Director General
Marian - Cătălin BURCESCU

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI · ROMÂNIA ·

Bucureşti, Data eliberării 29/04/2022

Tipografia OSIM

• The present invention refers to a procedure for the preparation of ZnRAl-CO_3 type layered double hydroxides by starting from zinc ash (a solid waste of hot-dip galvanization process) as zinc source. The procedure proposes the acid dissolution of zinc and zinc oxide present in zinc ash and the utilization of the obtained product as a precursor of layered double hydroxides of ZnRAl-CO_3 type, with $R = 2.0 - 3.0$. The results of the invention related to the recovery of zinc from industrial wastes.

• The technical problem of the invention lies in the realization of a process for obtaining intelligent materials with the lowest possible costs by recovering waste or industrial by-products. The source of zinc is zinc ash, a waste resulting in large quantities from the industrial process of hot-dip galvanizing; the use of this waste reduces the amount of waste generated and lowers the costs of the raw materials utilized in the preparation of layered double hydroxides.

• According to the invention, the process of preparing ZnRAl-CO_3 layered double hydroxides from zinc ash consists in: dissolution of metallic compounds of zinc ash in 20% HCl solution; filtration for insoluble separation; the use of a part of the filtrate as zinc precursor in the preparation of layered double hydroxides; the preparation of layered double hydroxides by using coprecipitation at low supersaturation method with strict monitoring of the pH of the reaction mass.

By comparing the X-ray diffractogram of the prepared product ZnRAl-CO_3 with R = 3.0 with that of the layered double hydroxide with the formula $Zn_6Al_2(OH)_{16}CO_3 \cdot 4H_2O$ (card number 00-038-0486), it can be confirmed that a product of the type Zn3Al-CO3 has been obtained.

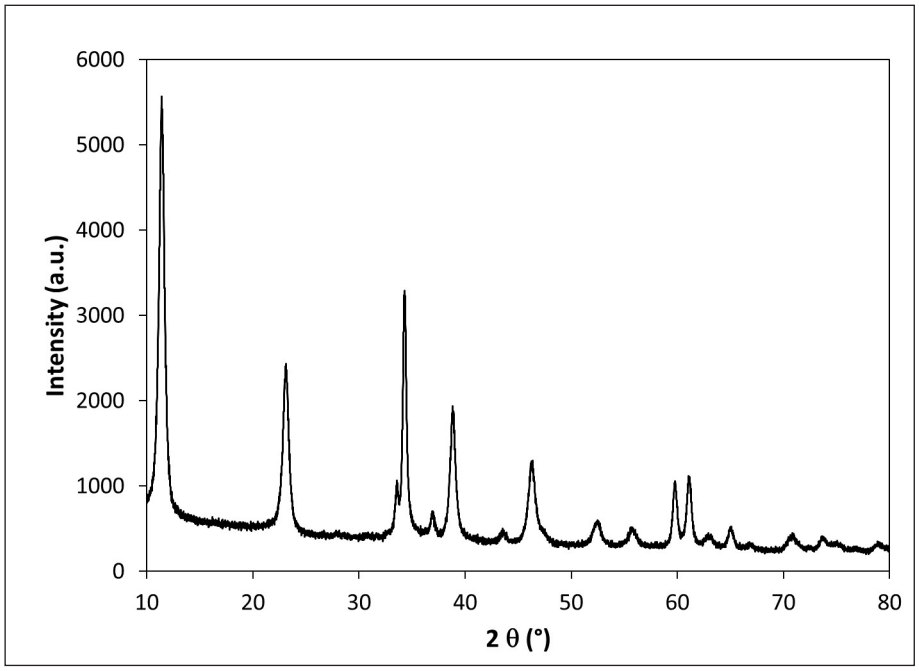

Fig. 1. XRD pattern of the prepared Zn3Al-CO3 (Zn_RAl-CO3 with R = 3)

INVENTORS: ANIELA POP, FLORICA MANEA, RALUCA VODĂ

PATENT NO. RO 133045 B1/ 2022

ELECTRODE AND PROCEDURE FOR SIMULTANEOUS AND SELECTIVE VOLTAMETRIC DETECTION OF CARBARYL AND PARAQUAT FROM AQUEOUS SOLUTIONS

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 133045

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

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: ELECTROD ŞI PROCEDEU DE DETECŢIE VOLTAMETRICĂ SIMULTANĂ ŞI SELECTIVĂ A CARBARILULUI ŞI PARAQUATULUI DIN SOLUŢII APOASE

Inventatori: POP ANIELA CARMEN, SATU MARE, SM, RO; MANEA FLORICA, TIMIŞOARA, TM, RO; VODĂ RALUCA DIANA, TIMIŞOARA, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 24/07/2017, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea şi aplicarea sigiliului
Director General
Marian - Cătălin BURCESCU

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI · ROMÂNIA ·

Bucureşti, Data eliberării 29/04/2022

• The invention refers to obtaining a working electrode by modifying the surface of the boron-doped diamond electrode with an intermediate layer of graphene covered with cobalt particles (BDD|G|Co) and to the development of a method for the simultaneous and selective voltammetric detection of two pesticides: carbaryl and paraquat from aqueous solutions.

• The problem that the invention solves consists in developing of a protocol for the simultaneous and selective electrochemical detection of the above mentioned two target analytes, by obtaining an electrode whose surface can be renewed by simple cleaning and electrodeposition of graphene and cobalt. This operation leads to a significant increase of the useful signal obtained in the presence of carbaryl and paraquat, compared to the detection on the surface of simple boron-doped diamond electrode. The actual voltammetric analysis is carried out on the basis of the oxidation-reduction reactions that take place on the surface of the working electrode.

• The voltammetric signal of carbaryl detection corresponding to its oxidation at the potential of +1.48 V/SCE and the voltammetric signal of paraquat detection corresponding to its reduction at the potential of -0.76 V/SCE were recorded. The electroanalytical results achieved for the detection of these two target analytes by the cyclic voltammetry technique indicate the possibility of rapid, simultaneous or selective detection of the two pesticides from water.

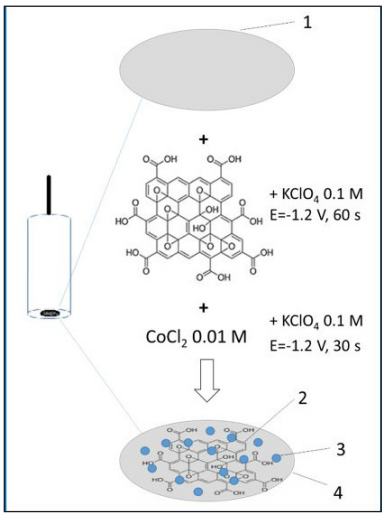

Fig. 1. Scheme of obtaining the boron-doped diamond electrode modified with an intermediate layer of graphene covered with cobalt particles

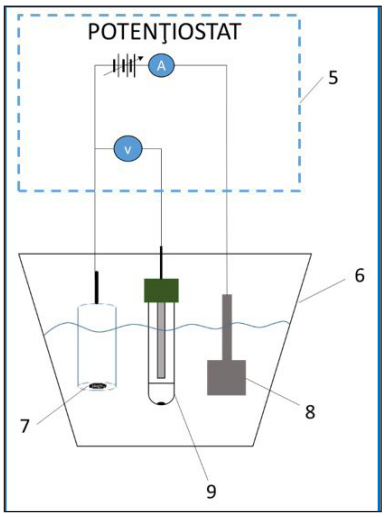

Fig. 2. Simplified scheme of the simultaneous and selective voltammetric detection assembly of carbaryl and paraquat

• The modified electrode applied for the simultaneous and selective electrochemical detection of carbaryl and paraquat consists in a boron-doped diamond substrate characterized by a graphene layer (2) deposited on the surface of the boron-doped diamond substrate (1) which constitutes the substrate for the deposition of cobalt particles (3) resulting in a boron doped diamond/graphene/cobalt composition that represents the electroactive part of the electrode (4) that interacts with the solution to be analyzed (Fig. 1).

• Simultaneous and/or selective voltammetric detection process of carbaryl and paraquat in aqueous solutions using above described modified electrode, as a working electrode in a classic three-electrode system (Fig. 2) composed of: reference electrode (9), platinum counter electrode (8) and working electrode (7) immersed in the electrochemical cell (6) composed of supporting electrolyte, acetic acid and sodium acetate aqueous buffer solution (pH=5.6) mixed with water polluted with carbaryl and paraquat, and connected by branch links to a potentiostat (5) is suitable for analysis with a sensitivity level corresponding to the required determination accuracy, by applying the specific potential range for each type of simultaneous or selective detection.

• For the simultaneous detection of carbaryl and paraquat a potential range between -1.00 and +1.75 V is applied. For the selective detection of paraquat in the presence of carbaryl a potential range between -1.00 and 0 V is applied, and for the selective detection of carbaryl in the presence of paraquat a potential range between 0 and +1.75 V is also applied.

INVENTOR: CORNELIU MARIUS CRĂCIUNESCU

PATENT NO. RO 132242 B1/ 2022

THERMAL FLUID FLOW REGULATION DEVICE USING MEMORY SHAPE ELEMENT

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 132242

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

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: DISPOZITIV DE REGLARE A DEBITULUI UNUI FLUID TERMIC PRINTR-UN ELEMENT CU MEMORIE A FORMEI

Inventatori: CRĂCIUNESCU CORNELIU MARIUS, TIMIŞOARA, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 15/07/2016, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

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

STAT PENTRU INVENTII SI MARCI · ROMÂNIA ·

Bucureşti, Data eliberării 30/06/2022

• The invention refers to a device for regulating the flow of thermal fluids depending on the temperature of the fluid and/or on the basis of an electrical command exerted on an alloy wire with shape memory.

• The device for regulating the flow of thermal fluids through the shape memory effect according to the invention, characterized in that in order to change the fluid passage section, it uses the change in the length of a memory alloy wire in opposition to an elastic element, so as to result in the actuation, proportional to the temperature of the fluid, of the shutter blades of a diaphragm.

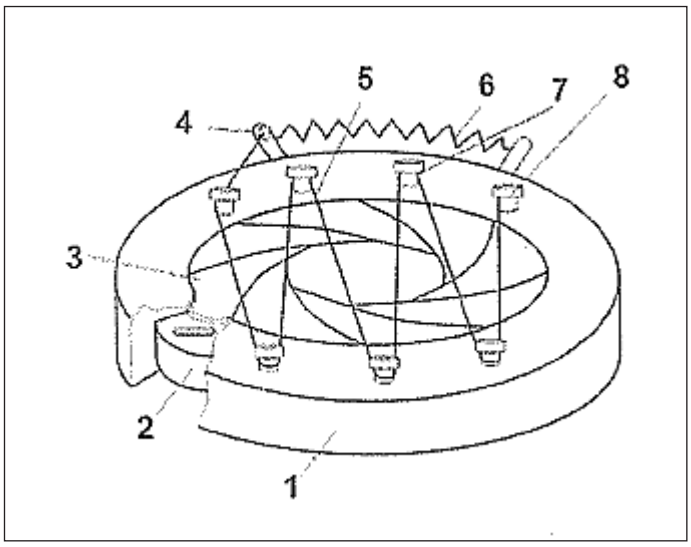

Fig. 1. Device for regulating the flow of a thermal fluid through an element with shape memory

The proposed solution has the following advantages:
- It allows the creation of a thermal regulator for the passage of a fluid, with a section whose opening is proportional to the temperature of the fluid.
- It allows the gradual modification of the passage section by using for this purpose a diaphragm controlled by the martensitic transformation of a shape memory alloy wire exposed directly to the fluid crossing the section.
- Allows the control elements of the circular section to be operated in a compact space, without motors, by electric heating of the memory alloy wire.
- Allows operation either automatically, through the caloric energy captured from the fluid, or manually through the Joule-Lenz effect when an operator supplies - in an electrical circuit - the memory alloy wire.

INVENTORS: CORNELIU MARIUS CRĂCIUNESCU , VICTOR BUDĂU, ION MITELEA

PATENT NO. RO 132239 B1 / 2022

ACTUATOR WITH MEMORY ALLOY FILM

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 132239

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

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: ACTUATOR CU ALIAJ CU MEMORIE

Inventatori: CRĂCIUNESCU CORNELIU MARIUS, TIMIŞOARA, TM, RO; BUDĂU VICTOR, TIMIŞOARA, TM, RO; MITELEA ION, TIMIŞOARA, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 16/11/2015, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

Confirm cele de mai sus prin semnarea şi aplicarea ştampilei
Director General

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI · ROMÂNIA ·

Bucureşti, Data eliberării 29/07/2022

Tipografia OS

• The invention refers to a device for actuation and control of positions used mainly in the construction of machines and devices for the control and amplification of the actuation capacity using actuators with shape memory alloys and can be incorporated into micro-electro-mechanical systems.

• The actuator with reinforced substrate and memory alloy film according to the invention, in order to control the actuation profile and the actuation capacity, uses the reinforcement of the homogeneous substrate with an additional film of metallic or non-metallic material deposited on one side or another of the substrate, with the same thickness or with different thickness, before or after, respectively at the same temperature or at a different temperature compared to the deposition of the shape memory alloy film, which has the effect of changing the elastic properties of the reinforced substrate.

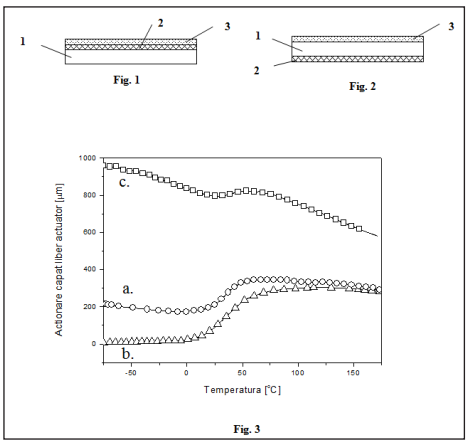

Fig. 1. The actuator with reinforced substrate and memory alloy film on the same side as the reinforcer

Fig. 2. The actuator with reinforced substrate and memory alloy film deposited on the side opposite to the one on which the reinforcement was deposited

Fig. 3. Comparative experimental results for the case of actuators with reinforced substrate and memory alloy film:
a. With non-reinforced substrate;
b. With reinforced substrate on the opposite side of the memory alloy film;
c. With reinforced substrate on the same side as the memory alloy film.

The proposed solution has the following advantages:

- Allows the modification of the action profile depending on the temperature, as a result of the modification of the thermoelastic properties of the bimorph;
- Allows the increase of the actuation capacity through the appropriate choice of the elastic properties in the memory alloy film assembly reinforced substrate;
- Allows the controlled modification of the elastic properties of the polymer substrates used to make actuators based on deposited films;
- Allows increasing the actuation capacity by changing the state of tension in the substrate as a result of heating the substrate prior to the deposition of the shape memory alloy film;
- Allows the controlled adjustment of the actuation amplitude as a result of the phase transformation of the shape memory alloy based on the relative thickness and the position of the reinforcing film in the substrate-reinforcing film-shape memory alloy triplet.

INVENTORS: MIHAI V. MICEA, ANDREI STANCOVICI, VLADIMIR I. CREȚU

PATENT NO. RO 129802 B1/ 2022

SYSTEM AND METHOD FOR ORIENTATION AND RELATIVE LOCALIZATION OF AUTONOMOUS SUBSYSTEMS

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 129802

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

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO

Titlul invenţiei: SISTEM ŞI METODĂ PENTRU ORIENTARE ŞI LOCALIZARE RELATIVĂ A UNOR SUBSISTEME AUTONOME

Inventatori: MICEA MIHAI-VICTOR, TIMIŞOARA, TM, RO; STANCOVICI ANDREI, TIMIŞOARA, TM, RO; CREŢU VLADIMIR IOAN, TIMIŞOARA, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 08/05/2014, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

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

Bucureşti, Data eliberării 29/07/2022

The invention relates to a system and a method for orientation and relative localization of autonomous subsystems as related to a common reference system. According to the invention, the system consists of a set of autonomous subsystems, each of which are provided with an orientation and localization hardware device, and communicating by electromagnetic and mechanical waves, and a central node having the role of summarizing the coordinates, which can be a steady equipment or a preset system.

The method, as claimed by the invention, comprises a first stage of subsystem localization based on mobility prediction, a second stage of localization by distributed processing and cooperation with the proximal subsystems and a third stage of coordinate summarizing and subsystem mobility management with a view to maintaining the localization accuracy coefficient at high values.

A robotic system consisting of several subsystems is needed. Each subsystem is a mobile robot equipped with several modules including a perception module. The orientation and localization device (Fig. 1) is composed of a processing unit (5), a perception module (1) equipped with two transducers (3) for mechanical waves (ultrasound), mounted back at 180 ° on a turret whose horizontal position can be controlled with a motor (4), turret control drivers (8), stops (6) for detecting the reference angle, a temperature sensor (9) and a module (10) of communication with electromagnetic waves, and to expand the functionality of the proposed solution, the above described composition can be optionally extended with: a second motor (7), for controlling the position in the vertical plane and a digital compass (2).

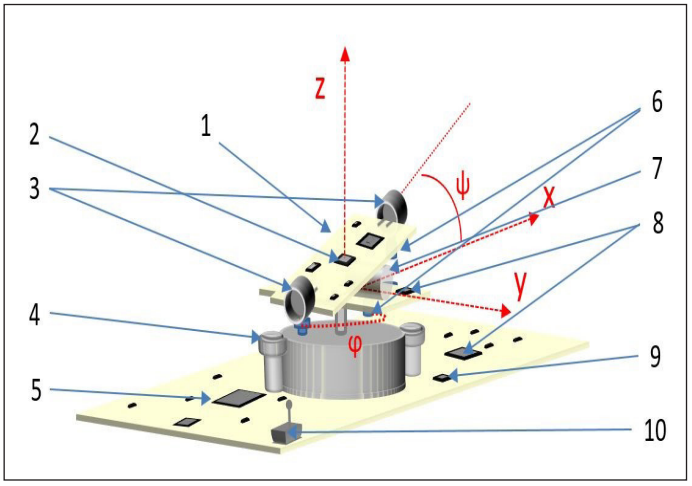

Fig. 1. Robotic orientation and localization device

• Each transducer (3) has a conical directivity range of approximately 50 degrees and can emit or receive ultrasonic signals at a frequency of 40 KHz. Ultrasonic transducers are directed by the turret to obtain the orientation and position of the robot in the navigation process.
• By rotating the turret, each transducer can cover a visibility angle of 240 degrees (Fig. 2).

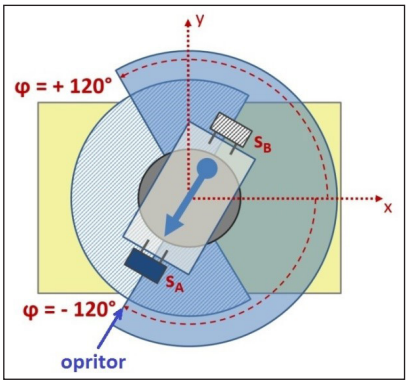

Fig. 2. The 240° viewing angle of the ultrasonic transducers on the perception module

• The block diagram of the orientation and localization device is shown in Fig. 3. The TMS320F28016 (Texas Instruments) processor is used for speed, periodic data acquisition and processing. Two similar transducers are used for both transmitting and receiving ultrasonic signals. The BPU-164010AH12 sensor (Bestar Electronics) was selected due to its convenient features, which include low cost, bidirectional operation, 40 kHz nominal frequency, and 120 Vpp maximum input voltage. The switching part at the transducer level (bidirectional operation), was implemented with the help of SÎ4894DY MOSFET circuits.

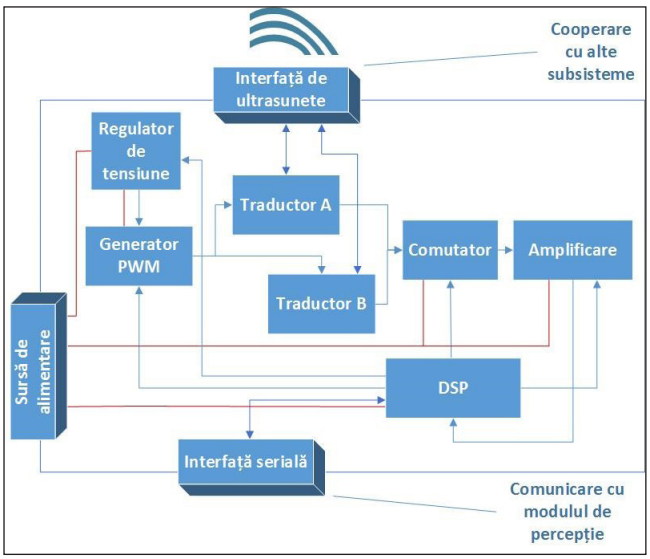

Fig. 3. Block diagram of the orientation and localization device

INVENTORS: L.V. ORDODI, G.A.DUMITREL, A.M.PANĂ, A.TODEA, L.MÂȚIU-IOVAN, R.C. IONEL, D. SĂNDESC, O. H. BEDREAG, M. PĂPURICĂ, A.F. ROGOBETE, I. SIMION, A. MOTICA, D.S. GROAPĂ, V. PĂUNESCU, M.F. BOJIN, O.I. GAVRILIU

PATENT NO. RO 134883 B1/ 2022

DEVICE FOR REDUCING THE MICROBIOLOGICAL LOAD OF EXHALED AIR BY MECHANICALLY VENTILATED PATIENTS

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 134883

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

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO; UNIVERSITATEA DE MEDICINĂ ŞI FARMACIE "VICTOR BABEŞ" TIMIŞOARA, TIMIŞOARA, TM, RO; ASOCIAŢIA PENTRU ATI "AUREL MOGOŞEANU", TIMIŞOARA, TM, RO; SPITALUL CLINIC JUDEŢEAN DE URGENŢĂ" PIUS BRÂNZEU", TIMIŞOARA, TM, RO

Titlul invenţiei: DISPOZITIV PENTRU REDUCEREA ÎNCĂRCĂTURII MICROBIOLOGICE A AERULUI EXPIRAT DE PACIENŢII VENTILAŢI MECANIC

Inventatori: ORDODI LAURENŢIU VALENTIN, TIMIŞOARA, TM, RO; DUMITREL GABRIELA ALINA, TIMIŞOARA, TM, RO; PANĂ ANA-MARIA, TIMIŞOARA, TM, RO; TODEA ANAMARIA, MUNICIPIUL CAREI, SM, RO; MÂŢIU-IOVAN LILIANA, MOŞNIŢA NOUĂ, TM, RO; IONEL RAUL CIPRIAN, TIMIŞOARA, TM, RO; SĂNDESC DOREL, TIMIŞOARA, TM, RO; BEDREAG OVIDIU HOREA, TIMIŞOARA, TM, RO; PĂPURICĂ MARIUS, MOŞNIŢA NOUĂ, TM, RO; ROGOBETE ALEXANDRU FLORIN, GIROC, TM, RO; SIMION ION, TIMIŞOARA, TM, RO; MOTICA ALIN, TIMIŞOARA, TM, RO; GROAPĂ DAN SERGIU, TIMIŞOARA, TM, RO; PĂUNESCU VIRGIL, TIMIŞOARA, TM, RO; BOJIN MARIA FLORINA, TIMIŞOARA, TM, RO; GAVRILIUC OANA ISABELA, TIMIŞOARA, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 22/05/2020, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

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

Bucureşti, Data eliberării 30/08/2022

• The invention refers to a device that is directly connected, by means of a special disposable tubing, to the exhaust of the artificial respiration apparatus and that allows the reduction of the microbiological load (bacterial, fungal and viral) of the exhaled air by intubated and mechanically ventilated patients by exposing to UVC ultraviolet radiation before it reaches the atmosphere of the intensive care unit.

• The device for reducing the microbiological load of the air exhaled by mechanically ventilated patients, according to the invention, removes the disadvantages of the currently widely applied solutions in that the reduction of the microbiological load is carried out immediately upon evacuation from the ventilator, by using type C ultraviolet radiation (UVC) which is intensely germicidal through its direct destructive effect on the nucleic acids of infectious agents, as well as through the generation of ozone quantities which also have a strong disinfecting effect. Ozone production is favored by the higher concentration of oxygen in the exhaled air of these patients, who are ventilated in most cases with fractions of inspired oxygen (FiO_2) greater than 30%.

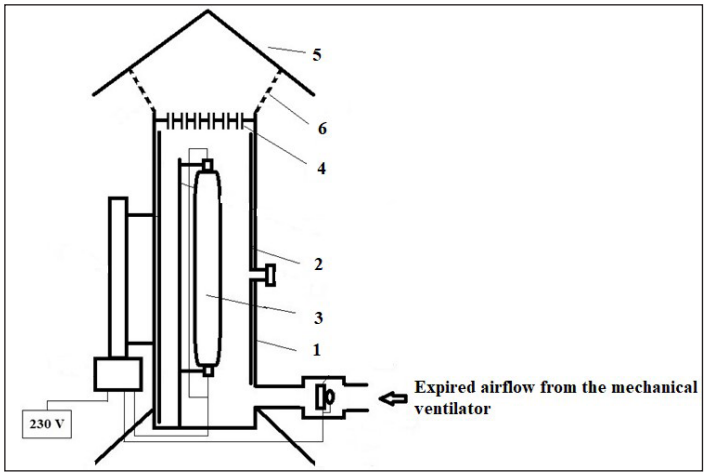

Fig 1. Schematic of the proposed device

• The device has the shape of a cylinder (1) with a reflective inner surface (2) in which the tube with low-pressure mercury vapour discharges (3) generating UVC radiation is positioned axially.

• The exhaled air with the microbiological load enters the lower part of the proposed device and travels the length of the cylinder in a sufficiently long time interval to obtain the germicidal effect of the exposure.

• On the upper part there is a copper subassembly (4) which has the role of neutralizing the ozone formed during the operation of the device through the catalytic effect of copper in the ozone decomposition reaction and to complete the sterilization of the air through the strong biocidal effect of the copper surfaces.

• The cover of the device (5) is provided with slits (6), having an anti-reflective inner surface, allows the easy evacuation of purified air and protects the patient and the medical staff from exposure to ultraviolet radiation.

• The proposed device ensures an average duration of air stagnation, i.e. exposure to UVC type radiation of approximately 0.8÷1.2 minutes, sufficient to obtain the direct destructive effect of UVC radiation on the nucleic acids of the infectious agents contained in the treated air, but also for the generation of a significant amount of ozone, an effect favored by the higher concentration of oxygen in the air exhaled by intubated patients, the control of the operation of the device within the limits set by the medical staff being ensured by an electronic optical and sound warning module in case of accidental disconnection from the mechanical fan, respectively an hour counter for monitoring the duration of the device's operation and a device for monitoring the intensity of ultraviolet radiation.

INVENTORS: CRISTIAN-GHEORGHE TURC, AUREL TULCAN, OCTAVIAN VICTOR OANCĂ , DANIEL VOICU STAN

PATENT NO. RO 128369 B1/ 2022

TOOL HOLDER DEVICE WITH BUILT-IN ULTRASONIC ACTIVATION SYSTEM FOR ULTRASONIC CUTTING, ABRASION AND ULTRASONIC ASSISTED MACHINING

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

Brevet de invenţie

Nr. 128369

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

Titular: UNIVERSITATEA POLITEHNICA DIN TIMIŞOARA, TIMIŞOARA, TM, RO; INSTITUTUL NAŢIONAL DE CERCETARE-DEZVOLTARE ÎN SUDURĂ ŞI ÎNCERCĂRI DE MATERIALE - ISIM TIMIŞOARA, TIMIŞOARA, TM, RO; SMD ELECTRONICS S.R.L., TIMIŞOARA, TM, RO

Titlul invenţiei: DISPOZITIV PORTSCULĂ, CU SISTEM DE ACTIVARE ULTRASONICĂ ÎNCORPORAT, PENTRU PRELUCRAREA PRIN AŞCHIERE, ABRAZARE ŞI EROZIUNE ULTRASONICĂ

Inventatori: TURC CRISTIAN-GHEORGHE, TIMIŞOARA, TM, RO; TULCAN AUREL, TIMIŞOARA, TM, RO; OANCA OCTAVIAN VICTOR, TIMIŞOARA, TM, RO; STAN DANIEL VOICU, TIMIŞOARA, TM, RO

Descrierea invenţiei, revendicările şi desenele la care se face referinţă în acestea, fac parte integrantă din prezentul brevet de invenţie.
Durata brevetului de invenţie este de 20 ani, cu începere de la data de 01/11/2012, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

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

STAT PENTRU INVENŢII ŞI MĂRCI • ROMÂNIA •

Bucureşti, Data eliberării 30/09/2022

Tipă... Tipografia OSIM

• The invention relates to a rotary tool holder device for machining by ultrasonic cutting, abrasion or ultrasonic erosion, with a built-in ultrasonic system and an inductive system for transmitting the excitation signal to an electrical transducer (see fig. 1).

• There are known applications of ultrasonic activation in cutting processes, where the high frequency vibratory motion applied to the cutting tool improves the material removal conditions by fragmenting the cutting chip and reducing the cutting forces.
Also, the process of processing hard and extra-hard materials by ultrasonic erosion material removal is well known in the industry.

• By the proposed constructive solution, the tool holder device according to the patent has several advantages:
- It can be used on drilling and milling machine tools, of conventional or numerically controlled construction, universal or specialised, with standardised cone for clamping the tools;
- Extends the technological capacity of the machine tool by allowing the attachment of standardised cutting tools (drills, milling cutters), abrasive tools or ultrasonic-assisted machining tools to the tool head;
- The piezoelectric converter is powered by an inductive, non-contact system which allows the device to be used at high speeds.

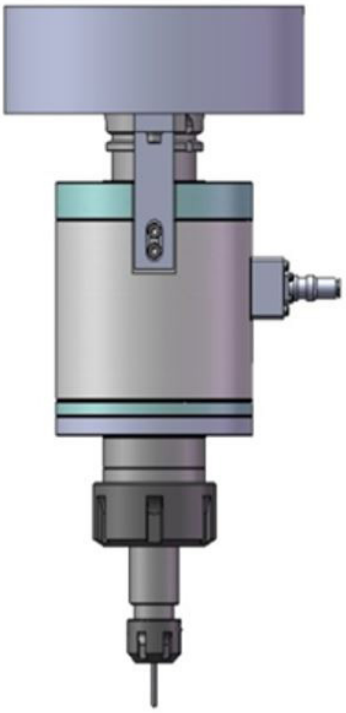

Fig 1. Rotary tool holder device for machining by ultrasonic cutting, abrasion or ultrasonic erosion, with a built-in ultrasonic system and an inductive system for transmitting the excitation signal to an electrical transducer

• The capability of this device is to process various materials, with the possibility to be mounted on a wide range of machine tools, working at high speeds. These advantages ensure high machining accuracy, in accordance with the quality requirements of modern mechanical manufacturing.

INVENTORS: LENDEK ZSOFIA, AMĂRICĂI-BONCALO ALEXANDRU, AMĂRICĂI-BONCALO OANA

PATENT NO. RO 134587 B1/ 2022

METHOD AND SISTEM FOR ATTENUATING THE FAULTS THAT APPEAR IN DATA PROCESSING UNITS IMPLEMENTED USING DIGITAL CIRCUITS

ROMÂNIA

OSIM

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

Brevet de invenție

DUPLICAT

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

Nr. 134587

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 TEHNICĂ DIN CLUJ-NAPOCA, CLUJ-NAPOCA, CJ, RO; UNIVERSITATEA "POLITEHNICA" DIN TIMIȘOARA, TIMIȘOARA, TM, RO

Titlul invenției: METODĂ ȘI SISTEM PENTRU ATENUAREA ERORILOR CARE APAR ÎN UNITĂȚILE DE PROCESARE A DATELOR IMPLEMENTATE CU CIRCUITE DIGITALE

Inventatori: LENDEK ZSOFIA, CLUJ - NAPOCA, CJ, RO; AMĂRICĂI - BONCALO ALEXANDRU, TIMIȘOARA, TM, RO; AMĂRICĂI - BONCALO OANA, TIMIȘOARA, 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 03/12/2019, 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 28/10/2022

Tipărit la Tipografia OS

• The patent, **RO 134587 B1**, refers to an iterative method and system for mitigating probabilistic errors that occur in digital circuit implementations where the data processing is based on addition, multiplication, and accumulation operations or can be decomposed into such operations.

• The method relies on control engineering principles for the modeling of the digital system, and uses control engineering design methods for the design of the error correction feedback loop. The system, depicted in Fig.1, consists of two instances of the data processor connected in parallel, each consisting of the one hand of the block that implements the procedure, usually a mathematical rule, and on the other hand of the block for calculating the correction input, each having access and using the results produced by the other circuit.

• The method, according to the invention, involves the creation of a dynamic model that describes the current state of the circuit and the calculation of correction factors based on this model.

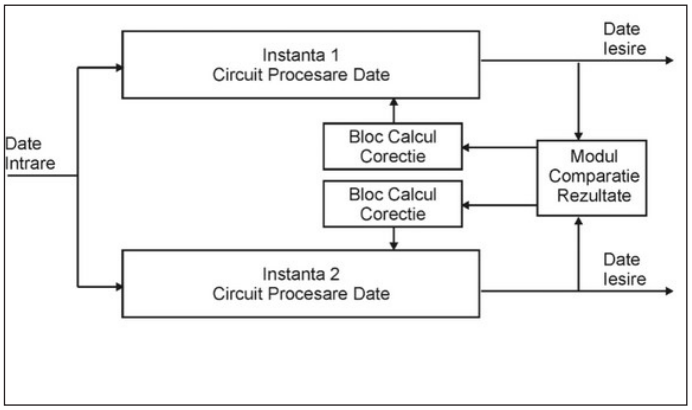

Fig. 1. System architecture

• The main application is digital processing circuits operating in an environment that is prone to errors due to radiation such as space domain, or nuclear domain.
• Hence, the method can be used to mitigate probabilistic errors that occur in implementations of digital integrated circuits in computing systems on data paths that use add, multiply, and accumulate operations. It can also be used only for the purpose of detecting defects, without mitigating them.
• Furthermore, it enables graceful degradation for the overall system, and a clear measurement of the remaining error.

Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

DOCTOR HONORIS CAUSA

DOCTOR HONORIS CAUSA
Professor László T. KÓCZY, Szechenyi Istvan University and Budapest University of Technology and Economics, Hungary

• Professor **László T. KÓCZY,** is currently a Professor with the Department of Information Technology of the Széchenyi István University, Győr, Hungary. He is also a Professor with the Dept. of Telecommunications and Media Informatics of the Budapest University of Technology and Economics, Hungary.

• Professor **László T. KÓCZY** received the **M.Sc. degrees** in electrical engineering (1975) and control engineering (1976), the **Ph.D. degree** (1977) and the Dr. habil. degree (1998) from the Technical University of Budapest, Hungary. He has been a **Doctor** of the Hungarian Academy of Science since 1998.

• He has occupied and occupies **managerial positions** in high-level scientific and professional societies. Since 2006 he has been a member of the board of the International Fuzzy Systems Association (IFSA), and President of IFSA from 2001 to 2003. He is a founding member of the European Society for Fuzzy Logic and Technology (EUSFLAT). From 1990 to 1999 he was founding president of the **Hungarian Fuzzy Association**, from 2005 he became Honorary President. From 2005 to 2010 he was a member of the Board of **IEEE Computational Intelligence Society Administrative Committee**.

• In 2009 and 2010 he was President of the Board for Computer Science and Information Technology of the Hungarian Rectors' Conference. In 2011 and 2012 he was a member of the Board of IEEE Systems Council Administrative Committee. In 2012 and 2013 he was a member of the Steering Committee of the Hungarian Doctoral Council and continued as a member since 2013. In 2017 and 2018 he was a member of the **IEEE Computational Intelligence Society Subcommittee for Outstanding Organization Award**.

• The research results of Prof. Kóczy are appreciated by many citations. The following values of his scientometric indices were highlighted in February 2022: over 802 refereed publications, over 7600 citations in Google Scholar, Hirsch index of 40 in Google Scholar, Hirsch index of 26 in Scopus.

• He received many honors at world and national level. He received the **IEEE Computational Intelligence Society Fuzzy Systems Pioneer Award** in 2020. He has been a Foreign Member of the Polish Academy of Science since 2017. He received the World Class Professor Award of the Indonesian Government in 2019. He has been a Life Fellow of the Russian Society for Fuzzy Systems and Computational Intelligence since 2018. He has been a Life Fellow of the International Society of Management Engineers since 2009. He has been a Fellow of the International Fuzzy Systems Association since 2007. He received the **Order of the Hungarian Republic Commander's Cross** in 2017. He has been a member of St. Stephan Academy of Science since 2016. He received the Order of the Hungarian Republic Officer's Cross in 2011. He received the **Denis Gabor Award** in 2002.

• He supported and supports the organization of the **IEEE International Symposia on Applied Computational Intelligence and Informatics (SACI)**, which take place at the Faculty of Automation and Computers of UPT.

Professor László T. **KÓCZY** has contributed to increasing the visibility of the journal of the Faculty of Automation and Computers of UPT, with the current name **System Theory, Control and Computing Journal**.

DOCTOR HONORIS CAUSA
Professor Levente KOVÁCS, Óbuda University, Hungary

- Professor **Levente KOVÁCS** received the engineering diploma in automation and applied informatics from the Politehnica University Timisoara, as valedictorian (2000) and the post gradual training diploma in automation and applied informatics from the Politehnica University Timisoara in 2001. He obtained the M.Sc. diploma in medical engineering from the Budapest University of Technology and Economics, Hungary (2011), the PhD in electrical engineering from the Budapest University of Technology and Economics (2008) and the habilitation from the Óbuda University, Hungary (2013).
- Since 2016 he has been a Professor with the Óbuda University, Hungary. Since 2019 he has been the Rector of Óbuda University. He was the Vice-rector for education during 2018-2019 and the Vice-dean for education of the John von Neumann Faculty of Informatics of the Óbuda University. During 2005-2008 he was a Teacher Assistant, Senior Lecturer and Associate Professor of the Budapest University of Technology and Economics. During 2001-2007 he was a part time and invited Teacher Assistant and Lecturer of the Politehnica University Timisoara and the Partium Christian University of Oradea.
- He held and currently holds several managerial positions in national and international institutions in education and research. He is a valued member of IEEE Hungary Section, being vice-president between 2013 and 2016 and then Chair of the IEEE Hungary Section. He is a member and founding member in numerous IEEE Chapters and Societies: IEEE Control Systems Society Hungary Chapter Chair, IEEE Systems, Man, and Cybernetics (SMC) Society CyberMedical Systems Technical Committee Chair.
- He is a member of the Hungarian Academy of Sciences, Engineering Sciences Section, and Committee on Information Science, Advisory Board member of the Hungarian Autonomous Systems National Laboratory, Advisory Board member of the Hungarian Artificial Intelligence National Laboratory, member of the European Society for Mathematical and Theoretical Biology, Hungarian National Research, Development and Innovation Office, Informatics and Electrical Engineering professional group and a member of the Hungarian Academy of Engineering.
- He is the founding member and has been the leader of the **Obuda University Physiological Controls Research Center** since 2013. He has been a Hungarian Artificial Pancreas working group leader since 2010.
- He led and currently leads over 30 research and institutional development projects. One of these projects is the prestigious European Research Council Starting Grant "Tamed Cancer" ("Personalized Cancer Therapy by Model-based Optimal Robust Control Algorithm", no. 679681, 2016-2021), of more than 1 million EUR.
- He has received numerous recognitions worldwide and nationally. In 2021, Professor Levente **KOVÁCS** was included in **Stanford's top 2% scientist list**. In 2018 he received the **IFAC PID 2018** best paper award on biosystems. In 2016 he received the **János Bolyai Research Fellowship certificate of merit** for outstanding research from the **Hungarian Academy of Sciences**. In 2016 the Professor was I**EEE SMC 2016 best paper nominee** (the top five out of a total of 1506 papers).
- From his position as Rector of Óbuda University, Budapest, Hungary, Professor **Levente KOVÁCS** carried out and is currently carrying out a continuous cooperation with the Politehnica University Timisoara. He supported and is continuously supporting the cooperation in terms of international programs as students and teaching staff exchanges, and has supported the organization of several scientific conferences.

DOCTOR HONORIS CAUSA
Professor Pavol BAUER, Delft Technical University (UTD), The Netherlands

- Prof. **Pavol BAUER** was born on January 9, 1961 in Košice, Slovakia. He completed his master's degree in Electrical Engineering, specializing in Power Electronics in 1985 at the Technical University of Košice. Between 1986-1990 he practiced at the Technical University of Košice, then from 1990 to 1994 he was a PhD student at Delft Technical University, obtaining his PhD in 1995, with the thesis entitled "Dynamic Analysis of AC Power Converters". The "professor" title was first received from the president of the Czech Republic in 2008 at Brno University of Technology, and then, in 2016, he became "full professor" with Delft University of Technology. Since 2013 he has been Head of DC Systems, Energy Conversion & Storage group in DUT.
- He is a recognized specialist in areas such as: DC microgrids, wind and wave energy, power electronics for charging of electric vehicles, power quality, contactless charging, reliability in power electronics, electrical power management, solar energy or ultrafast charging. His research is materialized in over 600 published papers, of which over 160 papers in journals and over 450 papers in scientific conferences. He published 8 books and 10 international patents, having Web of Science Hirsch index of 36 and Google Scholar Hirsch index of 52.
- Prof. **BAUER** was invited to present his papers in numerous high level conferences, with personalities in the field: invited paper at the IPEC 2005 Niigata conference, invited speaker at the IEEE PES Annual Meeting 2012 Paper Rick van Kessel, Balazs Czech, IEEE PES General Meeting, 22-26 July 2012, San Diego, Keynote speaker at the IEEE Intelec 2011 in Amsterdam, keynote paper Future of EV charging, IEEE Transportation Electrification Conference and Expo (ITEC 2020), Chicago, 2020, keynote paper: Roadmap for DC, The 22th European Conference on Power Electronics and Applications (EPE-ECCE 2020), 2020.
- Prof. BAUER has been participating in **56 research projects** with the industrial economic environment, the most relevant being: TULIP (charging at the Airports), EU KP7 Wavetrain-2 (2008-2012), We@ sea, project leader of the project (offshore wind parks), 2005-2009, North Sea Ring, project leader (multiterminal HVDC connections offshore) (2009-2013), TKI Switch2smartgrid: Electrical Vehicle Supported Smart Grid, TKI Synergies at Sea – Integrated offshore electricity infrastructure 2013-2017, SOPRA (Sustainable off grid power station), 2010-2013.
- Related to innovation in education, Prof. **BAUER** has brought a special contribution concerning Theme practicum, Power electronics practicum, lectures and educational material that were reported at the conferences (IEEE, EPE) and Journal papers such as: **European Journal of Engineering Education** (2 papers) and **International Journal of Engineering Education** (2 papers).
- It was prof. **BAUER** 's initiative to include Politehnica University Timisoara in the Leonardo da Vinci "E-learning Distance Interactive Practical Education", CZ/06/B/F/PP-168022EDIPE (EDIPE). In this project, 12 EU universities were involved and this opened collaboration opportunities with the universities from Nantes, Vienna and Kosice. A distance learning laboratory network called **PEMCWebLAb** was developed, that allowed the students from UPT, especially those enrolled in the distance learning program, to remotely access high standard laboratories in top EU universities.

Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

HABILITATION THESIS

RESEARCH IN THE DOMAIN OF TURBOMACHINES HYDRODYNAMICS

Author: Adrian Ciprian STUPARU

Abstract

The habilitation domain of the current thesis is **Mechanical Engineering**.
The habilitation thesis is structured in two parts: the first part presents an overview of the author's professional, academic and scientific achievements and the second part presents an overview of the author's professional, academic and scientific plans.

Several of my achievements in the academic and professional activity are represented by publishing 3 support books for my courses, 3 support books for the seminars and laboratories and involvement in the activity for modernizing the Laboratory of Fluid Mechanics, the Laboratory of Hydraulic Machines and the Laboratory of Numerical Simulation. I have also coordinated more than 50 bachelor and master thesis, as single coordinator or together with other colleagues. Starting from the year 2011 I am one of the coordinators of the Practice activity of the students from the 3rd year of the domain Mechanical Engineering.

Since I defend my PhD thesis I participated, as a manger or member of the research team, to the implementation of 4 research grants and 9 research contracts with industrial partners. After the progress of this type of research activity I published 23 research papers that were presented at international conferences or were published in international journals, 18 of them being indexed in international data bases ISI and SCOPUS.

My scientific area of research is divided in the following main categories: hydraulic pumps, hydraulic turbines, chemical reactors, flow around heated elements. The most important results obtained in these four research areas are presented in the thesis, with emphasis on my own contribution.

All my future plans are presented in the second part of the thesis and consists in updating and upgrading the laboratories and continuing to attract research funding by applying to the research competitions and I extending my collaboration with the companies that are acting in my domain of research.

The results of my future research will be published in international journals and will be presented at international conferences. All my academic, professional and scientific experience and the research infrastructure that I developed, will be employed in the activity that I will carry out with my PhD students.

The full abstract at:
https://www.upt.ro/img/files/2021-2022/doctorat/abilitare/Stuparu/Rezumat_eng_teza_Stuparu.pdf

Habilitation Commission

Prof. Dr. Eng. Romeo SUSAN - RESIGA
Politehnica University Timisoara, President
Prof. Dr. Eng. Corneliu BĂLAN
Politehnica University Bucharest, Member
Prof. Dr. Eng. Adrian LUNGU
Dunarea de Jos University Galati, Member

BRIDGING THE GAP BETWEEN COMPUTATIONAL NETWORK SCIENCE AND COMPUTER ENGINEERING

Author: Alexandru TOPÎRCEANU

Abstract

This thesis presents research conducted between 2011 and 2021, with the aim of bridging the fields of **Computers & Information Technology and Network Science**. The research introduces the concept of Computational Network Science, which combines computer science and engineering with data-driven approaches to impact various scientific disciplines.

The research at Politehnica University Timisoara began in 2011 and led to the establishment of a School of Network Science within the Romanian academic context. The research encompassed several areas, including social network analysis, computational network analysis, and network medicine. Notable contributions include the study of realistic complex network topologies, growth patterns, and opinion diffusion in evolving networks. The research introduced a genetic algorithm approach to create a highly realistic social network model and proposed the concept of Betweenness preferential attachment for explaining the growth of social networks.

Computer simulations were employed to evaluate and quantify opinion spreading models, considering the complex interplay of agent nodes. The research developed a tolerance-based model for opinion interaction and spreading, incorporating the dynamics of tolerance and intolerance over time. The thesis also introduces a statistical tool for measuring structural similarity between complex networks, examines complex network antifragility under attack, and presents a methodology for benchmarking node centrality measures in a competitive context.

Another significant research track focused on Network Medicine, addressing medical and pharmacological challenges through computer-based solutions. The research involved the prediction of the severity and development of sleep disorders, such as Obstructive sleep apnea (OSA) and Chronic obstructive pulmonary disease (COPD).

A patient phenotype model and scoring system were developed for monitoring these conditions. Additionally, the study explored drug-drug interactions using the Drugbank database and investigated target-based interactions for drug repurposing.

The thesis also highlights interdisciplinary research in the analysis of educational data, particularly data from Romanian learners in MOOCs. A compatibility network was created based on students' motivations, expectations, and perceived difficulties, leading to the identification of student archetypes through clustering techniques. Furthermore, a gamification platform was developed to enhance student motivation, and an exam cheating study was conducted.

Overall, this thesis contributes to the emerging field of Computational Network Science, presenting research findings in social networks analysis, computational network analysis, network medicine, and educational data analysis.

The full abstract at:
https://www.upt.ro/Informatii_teze-de-abilitare-sustinute_285_ro.html

Habilitation Commission

Prof. Dr. Eng. Horia CIOCĂRLIE
Politehnica University Timisoara, President
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Prof. Dr. Eng. Dorian GORGAN
Technical University of Cluj-Napoca, Member

THE PLACE OF ARCHITECTURE IN AN EPHEMERAL WORLD- ARCHITECTURAL, URBAN AND DESIGN PERSPECTIVE IN AN INTERDISCIPLINARY RESEARCH APPROACH

Author: Cristina-Maria POVIAN

Abstract

The habilitation thesis is in the field of **Architecture** and presents the most important research topics and fields covered by the author after completing her doctoral studies in 2015.

The first chapter of this paper is dedicated to the research activities undertaken in the last 6 years and is metaphorically entitled **"Defined variables"**.

This first part presents the results of analyzes and studies carried out in several directions: architecture dedicated to children and the social context, architectural perceptions and the main factors that can determine it, sustainable architecture, geometric perfection between craftsmanship and digital tools, the evolution of architecture and styling in relation to historical context, education, interior architecture, etc. All the determined factors of the researched subject were always followed, thus resulting in interdisciplinary articles.

During this period were published: 1 author's book published by prestigious international publishers, 4 author's books published by prestigious national publishers, 1 article in extenso in BDI indexed scientific journals, 25 extenso publications in works of scientific conferences on architecture, urbanism, landscaping, design, and restoration, as well as related sciences - for transdisciplinary specializations, at international and national level (of which 10 indexed ISI Web of Science). The research results were presented at 23 national and international conferences, colloquia, symposiums.

The second chapter entitled **"B. The construction of ephemeral perceptions"** presents the main professional achievements from the position of architect within his own company **S.C. AIR A RIA DESIGN SRL.** Two implemented projects that are particularly important for the author are presented. They represented the possibility to apply in the real design: the principles, the theories studied and proposed in the diploma, dissertation, and doctoral thesis.

Also, in this chapter are mentioned in general the main projects carried out starting from single-family homes, interior design for: medical offices, law offices, hotels, etc. and the activities undertaken in the field of urbanism (realization of zonal development projects, historical and landscape studies but also urban and architectural studies for the extension of public lighting systems).

Special subchapters in the thesis are assigned to the result of the most important implemented projects.

The third part of the thesis **"C. The Theory of Architectural Variables"** consists in presenting the academic and didactic achievements from the perspective of various experiences of interacting with architecture within the Faculty of Architecture and Urbanism - Politehnica Timisoara.

The last part of the thesis, entitled **"D. Variables of the future"** presents plans for career evolution and development as well as the main research directions proposed by the author to possible candidates for PhD studies in the field of Architecture.

The full abstract at:

http://www.upt.ro/img/files/2021-2022/doctorat/abilitare/Povian/Rezumat_Povian_en.pdf

Habilitation Commission

Prof. Dr. Arch. Iuliana CIOTOIU
"Ion Mincu" University of Architecture and Urban Planning, Bucharest
President

Prof. Dr. Arch. Virgil POP
Technical University of Cluj-Napoca, Member

Prof. Dr. Arch. Ileana KISILEWICZ
Politehnica University Timisoara, Member

METAL FOAMS AND METAL FOAMS-BASED COMPOSITES

Author: Emanoil LINUL

Abstract

The habilitation thesis is in the field of **Mechanical Engineering** and presents the most important research topics and fields covered by the author after completing her doctoral studies in 2011.

The **first part** of the habilitation thesis, **Chapter 1**, mentions the main scientific, academic and professional achievements of the candidate, obtained in the last 11 years from the public presentation of the doctoral thesis. The entire portfolio of scientific achievements, on which this habilitation thesis is based, enjoys a good international visibility. The author's papers have benefited from over 1750 citations identified in the Web of Science database (H-index = 29), respectively over 2080 citations identified in the Scopus database (**H-index = 31**).

The second part of the habilitation thesis is structured on three chapters (Introduction, Metal foams and Metal foams-based composites), and includes the most important results regarding the author's personal scientific contribution.

Chapter 2 is organized into four sections and presents a detailed introduction to the addressed research topic.
Chapter 3 presents the influence of temperature, anisotropy, loading direction, loading speed and density on the mechanical properties of metal foams.
Chapter 4 focuses on the influence of test temperature (range 25-450°C) on the mechanical properties of metal foam-based composites.

The main results (characteristic curves, variation of properties, deformation process of samples, macro- and micro-structural analysis) of empty tubes and foam-filled tubes under axial and radial compression loading are presented. Then, depending on the temperature, the results of the two sample configurations (empty tube and foam-filled tube), respectively of the two types of loads (axial and radial) are compared.

Moreover, according to the test temperature and the configuration of the specimens, some correlations between macrostructure, microstructure and the characteristic curves at quasi-static compression are proposed.
Finally, in-depth discussions are presented on the effect of plastic hinges and the brittle-to-ductile transition, both on the strength properties and energy absorption capacity, as well as on the collapse mechanisms that take place and the foam-tube interaction
The third part of the habilitation thesis, Chapter 5, briefly presents the plan for the evolution and development of the career from a scientific, academic and professional point of view.

The full abstract at:

http://www.upt.ro/img/files/2021-2022/doctorat/abilitare/Linul/Abstract_Emanoil_LINUL_en.pdf

Habilitation Commission

Prof. Dr. Eng. Liviu MARȘAVINA
Politehnica University Timisoara, President
Prof. Dr. Eng. Dan Mihai CONSTANTINESCU
Politehnica University Bucharest, Member
Prof. Dr. Eng. Mircea-Cristian DUDESCU
Technical University of Cluj-Napoca, Member

GEODATA FOR 3D MODELING AND H-BIM DEVELOPMENT IN URBAN PLANNING – CURRENT AND FUTURE PRACTICE

Author: Clara-Beatrice VÎLCEANU

Abstract

The habilitation domain is **Geodetic Engineering**.
The scientific and professional achievements together with the evolution and career development plan, presented during the present habilitation thesis, are structured in four sections, namely:
1. Overview of research conducted during doctoral stage;
2. Scientific, professional and academic achievements in post-doctoral period;
3. Evolution and development of professional, scientific and academic career plan;
4. References.

Given the fact that, in the geodesy field, the advance of technology has an alarming pace, I have always tried to be up-to-date with state-of-the-art and to develop my research in those particular directions, so that the topics covered during the activity professional are based on the evolution of technology, including case studies conducted with LiDAR (Light Detection and Ranging) - terrestrial laser scanning and UAS (Unmanned Aerial Systems) - drones.

The new subjects of research in the post-doctoral period can be synthetized in three distinguish themes, each of them related to the following aspects:

- LiDAR applications in the Geodetic Engineering domain;
- Reverse engineering with a view to creating 3D point clouds / mesh models for H-BIM in the cultural heritage domain;
- E-Learning in higher education system – particular case of Geodetic Engineering domain.

The full abstract at:
http://www.upt.ro/img/files/2021-2022/doctorat/abilitare/Vilceanu/Rezumat_abilitare_Vilceanu_en.pdf

Habilitation Commission

Prof. Dr. Eng. Carmen GRECEA
Politehnica University Timisoara, President
Prof. Dr. Eng. Ana-Cornelia BADEA
Technical University of Civil Engineering Bucharest, member
Prof. Dr. Eng. Ioel Samuel VEREȘ
Technical University of Cluj Napoca, member
Prof. Dr. Eng. Gheorghe BADEA
Technical University of Civil Engineering Bucharest, acting member
Prof. Dr. Eng. Sorin HERBAN
Politehnica University Timisoara, acting member

THE ROLE OF THE ARCHITECT IN THE CONSERVATION PROCESS OF THE AUTHENTICITY OF THE URBAN PATRIMONY

Author: Iasmina ONESCU

Abstract

The habilitation thesis **"The role of the architect in the conservation process of the authenticity of the urban patrimony"** is the fundamental field of Architecture and presents the research fields and the study and work topics covered by the author in recent years, emphasizing the role of the architect in the various stages of research, understanding, design, marking personal contributions and future research directions.

The work begins by addressing the issue of heritage, showing that the protection of built heritage is a complex, multidisciplinary process that requires a holistic approach in a multidisciplinary team of specialists, a team in which the architect has a key role.

The first part of the thesis refers to the definition of perceptions in the protection of heritage on a macro scale
The second part of the thesis focuses on the theme of building perceptions in architecture, on a micro scale.
The third part of the habilitation work deals with the subject of theorizing perceptions.

The architect must have a holistic approach on the profession and pass on in a multidisciplinary way the basics of architectural design, taking into account the principles of sustainable design, the principles of earthquake design, respectively principles of heritage restoration and regeneration.

The full abstract at:

http://www.upt.ro/img/files/2021-2022/doctorat/abilitare/Onescu/Teza_abilitare_Onescu.pdf

Habilitation Commission

Prof. Dr. Arch. Rodica MANON CRIȘAN
''Ion Mincu'' University of Architecture and Urban Planning, President
Prof. Dr. Eng. Marcela PRADA
University of Oradea, Member
Assoc. Prof. Dr. Arch. Ileana KISILEWICZ
Politehnica University Timisoara, Member

Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

PhD THESIS

Architecture

Oana Andreea GRECEA (married BĂNESCU) PhD adviser prof. T. O. GHEORGHIU	*Manifestul înțelegerii. Teorie comparată și particularism vernacular bănățean* (A manifesto of understanding. Compared theory and vernacular particularism in Banat)
Roxana CÂRJAN PhD adviser prof. T. O. GHEORGHIU	*Locuința rurală de tranziție Banat. Câmpia de Vest. De la tradițional local la global contemporan* (Transitional Rural Housing. Banat. West Plain. From Local Traditional to Global Contemporary)

Systems Engineering

Mădălin-Dorin POP PhD adviser prof. O.P. PROȘTEAN	*Model rafinat de urmărire al vehiculului încorporând comportamentul vehiculelor de pe benzile adiacente* (Refined car - following model incorporating the behavior of the vehicles from the adjacent lanes)
Cezara-Liliana RAȚ PhD adviser prof. O. P. PROȘTEAN	*Cercetări privind modelarea, identicarea și conducerea sistemelor de conversie a energiilor regenerabile* (Research on the modeling, identification and operation of renewable energy conversion systems)
Elena-Lorena CONSTANTIN PhD adviser R. E. PRECUP	*Transformarea modelelor bazată pe produs tensorial utilizată în modelarea și proiectarea sistemelor de reglare automată* (Tensor product-based model transformation used in control systems modeling and design)
Paul-Onuț NEGÎRLA PhD adviser I. SILEA	*Cercetări și soluții pentru rețelele de contorizare inteligentă* (Research and solutions for smart metering networks)
Alexandru IOANA PhD adviser I. SILEA	*Soluții Hardware-Software IIOT pentru interoperarea și îmbunătățirea sistemelor din industria automotive în contextul industry 4.0* (Hardware-Software IIoT solutions for interoperating and improving Automotive systems in the context of Industry 4.0)

Computers and Information Technology

Cosmin MARȘAVINA PhD adviser M. MICEA	*Constructe statice: evoluție și impact asupra aspectelor calitative ale sistemelor software* (Static constructs: evolution and impact on software quality aspect)

Constantin-Andrei ZAMFIRA PhD adviser prof. H. CIOCÂRLIE	*Contribuții la dezvoltarea și standardizarea Web-ului Semantic* (Contributions to the development and standardization of the semantic web)

Chemical Engineering

Oana-Alexandra GRAD (married BURIAC) PhD adviser prof. E. M. CIOPEC	*Recuperarea unor metale din grupul platinei prin adsorbție pe materiale cu funcționalitate dirijată* (Recovery of some platinum group metals by adsorption on materials with guided functionality)
Antonie Gabriel KISS PhD adviser prof. F. PETER	*Noi metode de producere a spumelor poliuretanice flexibile, cu impact pozitiv asupra mediului* (New methods to produce flexible polyrethane foams with positive impact towards environment)
Andreea-Floriana ENACHE PhD adviser prof. N. VASZILCSIN	*Materiale cu proprietăți electrocatalitice pentru oxidarea anodică a sulfitului* (Electrocatalytic materials for anodic oxidation of sulphite)
Maria IOSIF (married MIHĂILESCU) PhD adviser prof. A.G. NEGREA	*Materiale structurate cu funcționalitate proiectată pentru recuperearea Au (III) și Pd (II)* *(Structured materials with designed functionality for Au(III) and Pd(II) Recovery)*

Civil Engineering and Building Services

Andrei ARMAȘ PhD adviser prof. T. E. MAN	*Seceta și amenajările hidroameliorative. Studiu de caz județul Timiș (RO) și raionul Strășeni (MD) perioada 1980-2020* (Drought and hydroameliorative arrangements. Case study Timis county (RO) and Strășeni district (MD) period 1980-2020)
Anda Ligia BELC (married ROTUNDU) PhD adviser prof. A. CIUTINA	*Metode sustenabile de îmbunătățire a caracteristicilor reologice ale mixturilor asfaltice* (Sustainable methods for improving the rheological characteristics of asphalt mixtures)
Adrian-Lucian COCOCEANU PhD adviser prof. T. E. MAN	*Monitorizarea forajelor de mare adâncime destinate alimentării cu apă* (Deep water wells monitoring for water supply)
Anda CRISTESCU (married KISS) PhD adviser prof. T. E. MAN	*Optimizarea soluțiilor și tehnologiilor folosite pentru execuția clădirilor înalte în condiții de apă freatică ridicată* (Optimizing the solutions and technologies used for the execution of tall buildings in conditions of high groundwater)

Electronic Engineering Telecommunications and Information Technologies

Georgiana-Alina MAGU PhD adviser prof. A. ISAR	*Aplicații data mining în telecomunicații* (Data Mining Applications in Telecommunications)
Ciprian-Constantin ORHEI PhD adviser prof. R. VASIU	*Detectarea reperelor urbane folosind Vederea Artificială* (Urban Landmark Detection Using Computer Vision)
Shen WENSONG PhD adviser prof. D. LASCU	*Convertoare pentru optimizarea distribuției puterii în vehicule cu celule de combustie* (Converters for Optimizimg Power Distribution in Fuel Cell Vehicles)

Electrical Engineering

Constantin-Gabriel DOBREAN PhD adviser prof. M. BIRIESCU	*Studiul unui prototip de generator sincron trifazat cu magneți permanenți de 5kVA utilizând metoda elementului finit* (Study of a three-phase permanent magnets synchronous generator prototype 5 kVA using the finite element method)

Power Engineering

Luca- Nicolae IACOBICI PhD adviser prof. P. ANDEA	*Implementarea conceptului smart grid în monitorizarea on-line și încarcarea dinamică a liniilor electrice aeriene* (Smart grid concept based on-line monitoring and overhead lines dynamic rating)

Engineering and Management

Maria-Elena BOATCĂ (married BOATCĂ - BARABAȘ) PhD adviser prof. A. DRĂGHICI	*Evaluarea intervenției ergonomiei în sisteme de producție* (Evaluation of ergonomics intervention in production systems)
Gina PRODAN PhD adviser prof. M. MOCAN	*Contribuții privind dezvoltarea managementului relației cu furnizorii în industria automotive* (Contributions regarding the development of supplier relationship management in the automotive industry)
Patricia Simona LUP PhD adviser prof. G. I. PROȘTEAN	*Testarea încrederii consumatorilor în platformele de "E-COMMERCE" - cazul platformelor din România* (Testing consumers trust in "E-COMMERCE" platforms-the case of Romanian platforms)

Mechanical Engineering

Mihai Alexandru SZABO PhD adviser prof. I. BORDEAȘU PhD adviser prof. I. MITELEA	*Cercetări asupra comportării dinamice a protezelor externe de amputație și a straturilor depuse HVOF pe substraturi din titan* (Research on the dynamic behavior of external amputation prostheses and HVOF-deposited layers on titanium substrates)
Ștefania Cerasela PĂTRAȘCU (married DOMOKOS) PhD adviser prof. V. ARGEȘANU	*Monitorizarea activă a posturii în gimnastica de înaltă performanță* (Active posture monitoring in high performance gymnastics)
Dan Florin TEUȘDEA PhD adviser prof. E. C. LOVASZ	*Cercetarea metodelor alternative de realizare a bilelor de deo roll* (Research on alternative methods of manufacturing roll on)
Ana Maria MUNTEANU (married VUTAN) PhD adviser prof. E. C. LOVASZ	*Dezvoltarea unor metode de evaluare a eficienței exercițiilor de kinetoperapie specifice reabilitării scoliozelor* (The development of certain methods for assessing the efficiency of kinetic specific exercises in scoliosis rehabilitation)
Alexandru FALK PhD adviser prof. L. MARȘAVINA PhD adviser prof. I. O. POP	*Determinarea stării de tensiune și deformație în plăcile cu circuite imprimate* (Determination of stress and strain in printed circuit boards)

Sorin Octavian SĂRĂNDAN PhD adviser prof. L. MARȘAVINA	*Contribuții la dezvoltarea structurilor din materiale celulare utilizate în echipamentele sportive* (Contributions regarding the development of cellular structures destined for sports equipment)

Materials Engineering

Ciprian Pavel LUCIAN PhD adviser prof. I. MITELEA	*Particularitățile transformărilor structurale în îmbinări sudate din aliaje deformabile de aluminiu, durificabile prin îmbătrânire* (Particularities of structural transformations in welded joints of deformable aluminium alloys, hardenable by aging)
Dinu SIMIONESCU PhD adviser prof. I. MITELEA	*Contribuții privind procesul de sudare MAG în rost îngust a oțelurilor destinate execuției conductelor magistrale de gaz* (Contributions regarding the narrow gap mag welding process of steel intended to gas pipelines executions)
Petru VĂLEAN V. A. ȘERBAN	*Îmbunătățirea performanței straturilor pulverizate de tip NiCrBSi prin retopire cu ajutorul inducției electromagnetice* (Improvement of NiCrBSi sprayed coatings performance by electromagnetic induction remelting)

Industrial Engineering

Simina-Ștefania MARIȘ PhD adviser prof. T. SLAVICI	*Contribuții la optimizarea proceselor de fabricare a peleților și brichetelor folosind elemente de inteligență artificială, statistica și cercetări operaționale* (Contributions to the optimization of pellets and briquettes manufacturing processes using elements of artificial intelligence, statistics and operational research)
Ștefan Alfred MARIȘ PhD adviser prof. D. ȚUCU	*Optimizarea echipamentului tehnologic robotizat destinat lucrărilor în sere și solarii* (Optimization of the robotic technological equipment designated for working in greenhouses)
Vasile NAGY PhD adviser prof. D. ȚUCU	*Integrarea principiilor de proiectare igienică în procesul de optimizare a sistemului tehnologic de valorificare a membranelor de origine animală* (The integration of hygienic design principles in the optimization process of the technological system for the valorization of membranes of animal origin)
Nicoleta COJOCARIU PhD adviser prof. M. JĂDĂNEANȚ	*Comportarea unor tipuri de clădiri, racordate la sisteme centralizate de încălzire sau cu sisteme locale de încălzire, la debranșarea parțială sau totală a unor apartamente* (Behavior of certain types of buildings, connected to central heating systems or with local heating systems, to the partial or total disconnection of some apartments)

SCIENTIFIC CONFERENCES

Building Services and Ambient Comfort (ICCA 2022)

April 28, 2022, "Victor Vlad" Hall, Civil Engineering Faculty

Organizers: • AIIR - Romanian Association of Building Services; • Politehnica University Timisoara - Department of Civil Engineering and Building Services Engineering

http://www.aiir-timisoara.ro

At the 31st edition of the conference "Building Services and Ambient Comfort", with the motto "Homo sanus in domo pulchra" was given confidence to young specialists (brave nomination?) - students of all (grades) to present, in the form of scientific paper, thoughts / interests / conclusions resulting from specific activities of installers.

The topics addressed, essential and multiple, discuss/things/techniques/ performances at an informative level, providing a starting/continuation basis depending on the specifics/area's of concern of the participants.

Publication of papers:
Conference Proceedings, Publishing House Matrix Rom, Bucharest, 2022, ISSN 1842-9491
Conference series "Building Services and Environmental Comfort"

The 10th International Conference on Behaviour of Steel Structures in Seismic Areas (STESSA 2022)

25-27 May 2022, UPT Conference Center, Timisoara, Romania (hybrid set-up, with online attendance through Zoom platform)

Organizers: • Politehnica University Timisoara, Romania,
• Romanian Academy, Timisoara Branch, Romania and
• University of Naples "Federico II", Italy.

https://www.ct.upt.ro/stessa2021/

The international series of specialty conferences on **Behaviour of Steel Structures in Seismic Areas (STESSA)** was initiated with the aim of filling the gap between the results of scientific research, design codification, and application. Its main mission is to provide an international forum for researchers and engineers to share with their peers the latest developments in the field of seismic behaviour of steel structures. The 10th anniversary edition of the STESSA conference returned to Timisoara, the city where it started, as a tribute to Victor Gioncu, who came with the idea of initiating the series of conferences dedicated to the behaviour of steel structures in seismic areas. The conference program was organised in the following topics:

- Behaviour of structural members
- Behaviour of connections
- Performance of structural systems
- Mixed and composite structures
- Energy dissipation systems
- Self-centring and low-damage systems
- Assessment and retrofitting
- Codes and standards
- Light-gauge systems

Proceedings of the STESSA2022 Conference have been published by **Springer** and indexed in Scopus:
Proceedings of the 10th International Conference on Behaviour of Steel Structures in Seismic Areas, ISSN 2366-2557
https://link.springer.com/book/10.1007/978-3-031-03811-2
Conference proceedings are in the process of indexation in Web of Science.

SACI 2022

IEEE 16th International Symposium on Applied Computational Intelligence and Informatics (SACI 2022)

May 25 - 28, 2022, Timisoara, Romania

Organizers: • Óbuda University, Budapest, Hungary, Politehnica University Timisoara,
• IEEE Chapter of Systems, Many, and Cybernetics Society, Romania

http://conf.uni-obuda.hu/saci2022/

SACI 2022 has featured several kinds of presentations, including invited talks, contributed papers and posters. The outcome of SACI 2022 is a better understanding of some leading research areas, as already **Computational Intelligence and Informatics** have demonstrated.

SACI 2022 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/9919431/proceeding

International Conference on Applied Sciences ICAS2022

May 25-28, 2022, Banja Luka, Bosnia and Herzegovina (face-to-face and on-line)

Organizers: • Politehnica University Timisoara and University of Banja Luka in cooperation with: Ministry for Scientific and Technological Development, Higher Education and Information Society of the Republika Srpska, Academy of Romanian Scientists, Academy of Sciences and Arts of the Republika Srpska, Academy of Technical Sciences of Romania - Timisoara Branch, General Association of Romanian Engineers - Hunedoara Branch and Association Universitaria Hunedoara

http://icas.science/

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 ICAS2022 has been submitted to be considered for publication in a forthcoming volume of the **Journal of Physics: Conference Series**.

24th Infer Annual Conference

8 – 10 June 2022, Timisoara

Organizers: • International Network for Economic Research (INFER) and Politehnica University Timisoara (UPT)

https://sites.google.com/view/infer2022/home?pli=1

The **INFER Annual Conference** is the main annual event of the International Network for Economic Research, providing a great opportunity for members and non-members of INFER alike, to exchange ideas and to discuss results from recent economic research. The papers submitted for presentation are related to the following topics:

- Agricultural and Agri-tech economics
- Banking and Finance
- Circular Economy
- Commodities and Financial Markets
- Development Economics
- Emerging Market Economies and Globalization
- Energy Economics and Policy
- Entrepreneurship
- Environmental Economics
- Financial and Debt Crisis
- Financial Economics and Asset Pricing
- Fiscal Policy and Public Finance
- Growth and Business Cycles
- Health and Public Policy
- Industrial Economics and Innovation
- International Economics and Trade
- Labour Economics
- Macroeconomics and Monetary Policy
- Urban and Regional Economics

Publication of papers:

- **Journal of International Development** (Indexed in: Scopus, Clarivate Analytics);
- **Journal of International Trade & Economic Development** (Indexed in: Scopus, Clarivate Analytics)
- **Economic Modelling** (Indexed in: Scopus, Clarivate Analytics)

9th International Conference "Advanced Materials and Structures" - AMS 2022

16-18 June, 2022, Timisoara, hybrid presentation

Organizers: • Department of Materials Engineering and Manufacturing and Department of Mechanics and Strength of Materials in collaboration with the Politehnica Foundation.

ams.upt.ro

The conference has the aim to cover by its topics the broad domain of advanced materials, with all important aspects: fabrication technology, property characterization, advanced materials applications, simulation and mathematical modelling.

The conference 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 conference AMS'22 (oral presentations) were subjected to a final review process and the accepted publications were published in the Journal **Materials Today: Proceedings**

https://www.sciencedirect.com/journal/materials-today-proceedings/vol/78/part/P2

ErgoWork 2020 International Conference on Ergonomics and Workplace Management
16-18 June 2022, Timisoara, Romania (hybrid)
Organizers: Romanian Society on Ergonomics and Workplace Management (ErgoWork), Politehnica University Timisoara, Green Forest Ltd., Technical University of Cluj-Napoca, I.N.C.D.P.M. "Alexandru Darabont" Bucharest, Federation of European Ergonomics Societies, Romanian Association of Workplace and Facility Management, Hungarian Ergonomics Society (HES), Bulgarian Association of Ergonomics and Human Factors (BAEHF), Serbia Ergonomics Society of Serbia (SESS), Croatian Ergonomics Society (CES)
http://www.mpt.upt.ro/cercetare/conferinte/ergowork.html

ErgoWork 2022 International Biennial Conference event is designed to encourage sharing and dissemination of the interdisciplinary developments and achievements in the fields of ergonomics and workplace management. Papers and presentations support discussion, knowledge exchange and dissemination activities related to the following topics: Ergonomics; Ergonomics for Smart Products, Process and Systems; Workplace Aesthetics and Ergonomic Design; Biomechanics and Modelling in Ergonomics; Cognitive Ergonomics in Teleworking and Online Education; Special Application of Ergonomics, Assistive Technologies and Ergonomics for an Inclusive Society; Occupational Health and Safety Management; Ergonomics for Sustainable Workplaces, Green Workplaces and Green Mobility; Social Responsibility and Ergonomics for a New Normal; Education and Training Programs in Ergonomics, Workplace Management and Occupational Health and Safety; New Approaches for Managing People etc.

Publication of papers: • 52 papers published in special issue of ACTA TECHNICA NAPOCENSIS SERIES-APPLIED MATHEMATICS, MECHANICS AND ENGINEERING journal • 10 papers published in Draghici A., Repanivici A., P.K. Ng (Guest Editors of special issue) "Digital Challenges to Empower Universities' Implication in the Community" of HUMAN SYSTEMS MANAGEMENT journal

The XII International Conference "Industrial Engineering and Environmental Protection" (IIZS2022)
October 6- 7, 2022, Zrenjanin, SERBIA
Organizers: University of Novi Sad, Technical Faculty "Mihajlo Pupin", Zrenjanin, SERBIA, in cooperation with partners: Politehnica University 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
http://www.tfzr.uns.ac.rs/iizs/

IIZS2022 has welcomed papers on the following 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** (12 ; 2022 ; Zrenjanin), ISBN 978-86-7672-360-7, published by University of Novi Sad, Technical Faculty "Mihajlo Pupin", Zrenjanin, SERBIA (http://www.tfzr.uns.ac.rs/iizs/files/IIZS%202021%20Proceedings.pdf)
- 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/

26th International Conference on System Theory, Control and Computing (ICSTCC 2022)

October 19 - 21, 2022, Sinaia, Romania

Organizers: Faculty of Control Systems, Computers, Electrical and Electronics Engineering of "Dunarea de Jos" University of Galati; Faculty of Automation and Computers, Department of Automation and Applied Informatics and Department of Computers and Information Technology of Politehnica University Timisoara; 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

https://icstcc.ugal.ro/2022/

ICSTCC 2022 has featured several kinds of presentations, including invited talks, contributed papers and special sessions. The outcome of ICSTCC 2022 has been a better understanding of some leading research areas, as already **System Theory, Control and Computing** have demonstrated. ICSTCC 2022 has welcomed papers on the following topics:

- **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:
IEEE Xplore Digital Library, please visit: https://ieeexplore.ieee.org/xpl/conhome/9931693/proceeding

International Conference "Noise and Vibration "

October 19-21, 2022, Niš, Serbia

Organizers: University of Niš, Faculty of Occupational Safety, Noise and Vibration Laboratory; Politehnica University Timisoara, Faculty of Mechanics, Noise and Vibration Laboratory

https://www.znrfak.ni.ac.rs/NOISE2022/index.html

Scientists and engineers from university research centers and industries, working in all fields of noise and vibration presented their contributions in the form of oral communications or posters. The main objective of this Conference was to provide international forum with advance scientific knowledge about the noise and vibration.

The main topics of the conference were:

- Vibration control;
- Effects of noise and vibrations;
- Analysis of noise and vibration;
- Legal aspects of noise and vibration management

The Proceedings of the conference is available at:
https://www.znrfak.ni.ac.rs/NOISE2022/Proceedings.html

European Automotive Congress - Motor Vehicles and Transportation (EAEC - MVT 2022)
26 – 28.10.2022, Timisoara, UPT Conference Center
Organizers: EAEC (European Automobile Engineers Cooperation), SIAR (Society of Automotive Engineers of Romanian), UPT (Politehnica University Timișoara)
http://siarcongress.eu/index.php/mvt/2022

The EAEC-MVT 2022 Congress was the meeting place for universities members and reserchers of the automotive domain and also for the young students (SIAR junior's members) in their International Congress and Professional Contest on Automotive Engineering "Professor eng. Constantin Ghiulai" on the Vehicle Dynamics (the 8th edition) and Automotive CAD -CATIA (the 5th edition) sections.

The main topics of the Congress were: Advanced Powertrain and Propulsion, Automotive Design and Testing, Terrain Vehicles, Advanced Engineering Methods, Materials, Automotive Technology and Maintenance, Road Safety, Mobility of Things. There were more than 175 participants from Romania, Moldova, USA, Italy, North Macedonia, Hungary, Austria, with important keynote speakers from academia and industry, like Ioan Boldea (UPT/Romania), Cornel Stan (West Saxon University of Zwickau/Germany), Corina Sandu (Virginia Tech/USA), Alexander Simionescu (Renault Technology Roumanie), Stefan Kanya (AVL Graz/Austria), Gunther Horsak (ZF/Germany) and Florin Cotofan (Robert Bosch Romania).

Publication of papers: The selected papers, based on the peer review recommendation of the Scientific Committee, will be published in a dedicated IOP Proceedings, with open access policy, with future ISI indexation. Not selected papers for IOP publication will be published in Acta Technica Corviniensis – Bulletin of Engineering in UPT.

ISETC 2022

15th International Symposium on Electronics and Telecommunications (ISETC) 2022
November 10 – 11, 2022
Timișoara, UPT on-line and onsite
Organizers: • Faculty of Electronics, Telecommunications and Information Technologies, • Politehnica University Timisoara, • Association of Electronics and Telecommunication Engineering from Timisoara in associatior with IEEE Romania, Romania Communication Chapter, • Romania Joint Chapter Communications/IEEE Informatior Theory/Signal Processing Societies, • ASTR - Romanian Academy of Technical Sciences
http://conference.etc.upt.ro/isetc2022/

Since 1994, when the first edition of the International Symposium on Electronics and Telecommunications took place, the scientific event has grown from a national happening to an important international event, organized every two years. If in the beginning the papers were published in the Scientific Bulletin of the Politehnica University Timisoara, since 2010 the Symposium has become independent and the papers are published in a dedicated proceeding. Moreover, since 2010 papers were included in IEEE eXplore and Clarivate Analytics Web of Sciences databases. We are proud that throughout these 28 years we faced a continuous increase both in quantity and in quality of the papers. During the conference 85 papers, written by 198 authors from 5 countries, were presented.

Topics of the conference covers following fields:
• Artificial Intelligence and Computer Vision; • Instrumentation and Measurement;• Open Education; • Open Science and • Emerging Technologies; • Power Electronics; •Signal Processing; • Telecommunications •Industry Workshop • Special session - Open Science for PhD Students in Electronics

Publication of papers:
• Proceedings of ISETC'2022 were published in IEEE eXplore databases: https://ieeexplore.ieee.org/xpl/conhome/10009907/proceeding also
Selected papers from conference will be published on Special Issue "Selected Papers from International Symposium on Electronics and Telecommunications ISETC 2022"
https://www.mdpi.com/journal/sensors/special_issues/IXBLIF57OV and Web of Science

Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

SCIENTIFIC JOURNALS

Transactions on Modern Languages
Volume 21, Issue 1, 2022

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

Journal of Electrical Engineering
Volume 22, Issue 1, 2022

www.jee.ro/

- JEE continues the prestigious "Scientific Bulletin" of the Politehnica University Timişoara, Electrotehnical section, but in electronic form.
- It also aims to become a fully international archival journal.
- Its scope includes all issues of widespread generic interest to engineers who work in the field of electrical engineering.
- The **Journal of Electrical Engineering** is indexed by Scopus and IEE INSPEC.

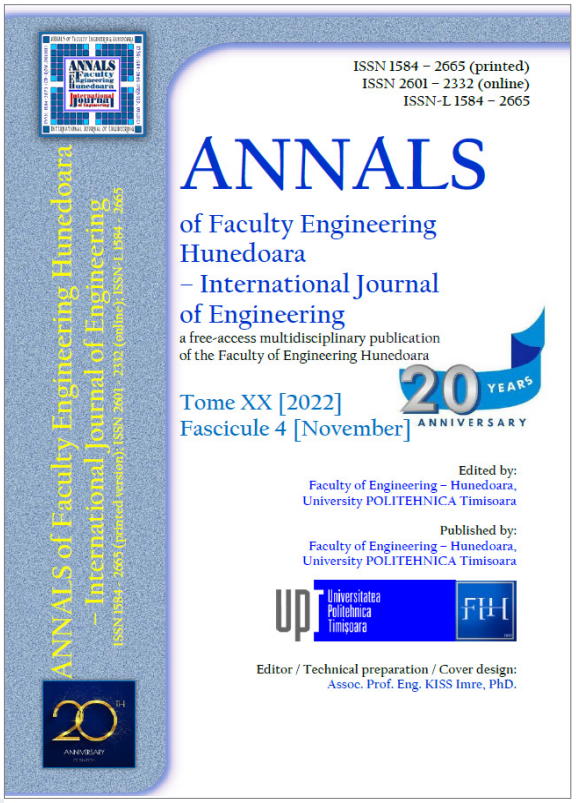
ACTA TECHNICA CORVINIENSIS - Bulletin of Engineering

http://acta.fih.upt.ro/

Volume XV (Tome XV), Year 2022

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 XX (Tome XX), Year 2022

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 XXVI, Issue 1, Issue 2 , Issue 3, Issue 4 , 2022

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 20, Issue 1, Issue 2, Issue 3, Issue 4 , 2022

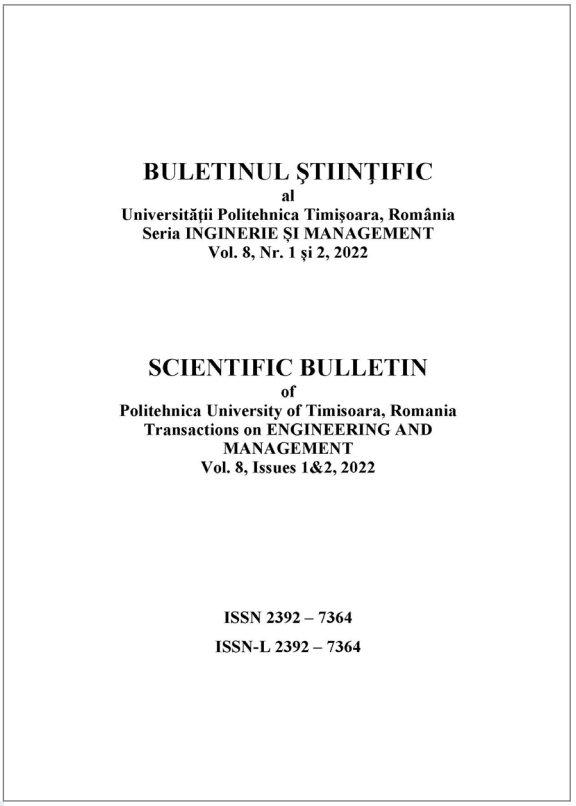
https://www.ajme.ro

- 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 Hydrotechnics
Volume 67 (81), Issue 1, 2022

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



Transactions on Engineering and Management
Volume 8, Issue 1, Issue 2, 2022

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).

Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN 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.

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: 243

Hot Paper

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: 170

Hot Paper

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: 112

Hot Paper

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: 80

Hot Paper

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: 79

Hot Paper

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: 73

Hot Paper

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: 58

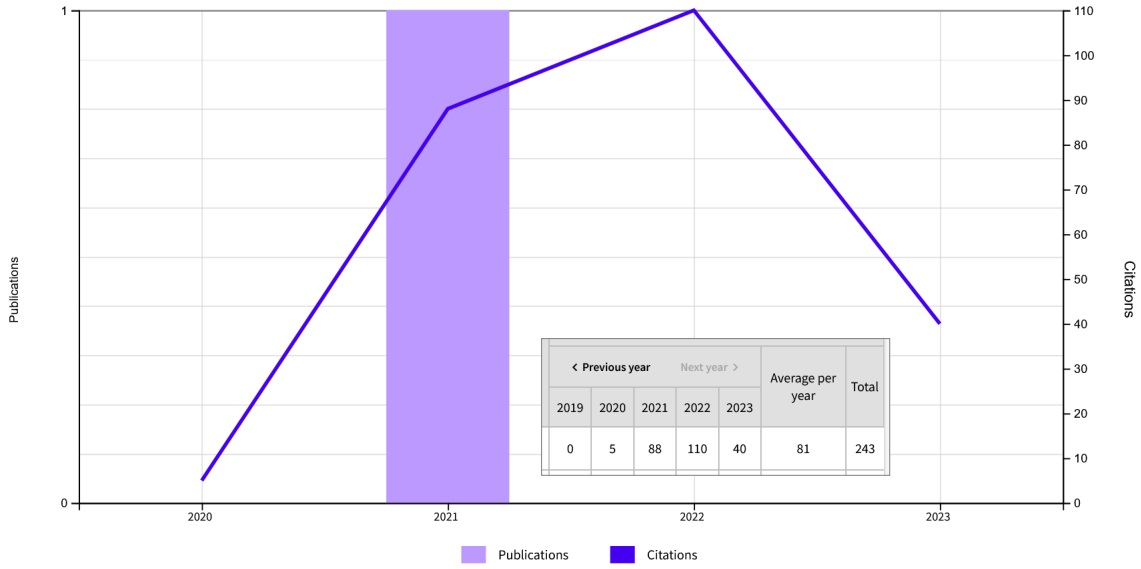
Hot Paper

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 25 July 2023

Web of Science - Clarivate Analytics Hot Paper

This hot paper was published in the past two years and received enough citations in January/February 2022 to place it in the top 0.1% of papers in the academic field of **Economics & Business**.



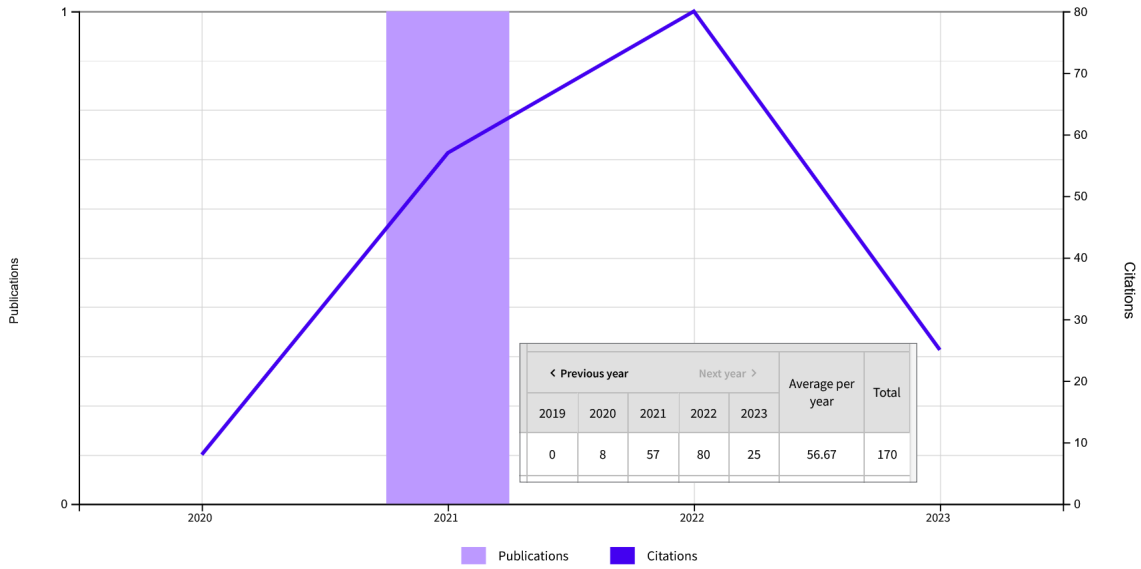
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	5	88	110	40	81	243

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: 243

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 Hot Paper

This hot paper was published in the past two years and received enough citations in July/August 2022 to place it in the top 0.1% of papers in the academic field of **Engineering**.

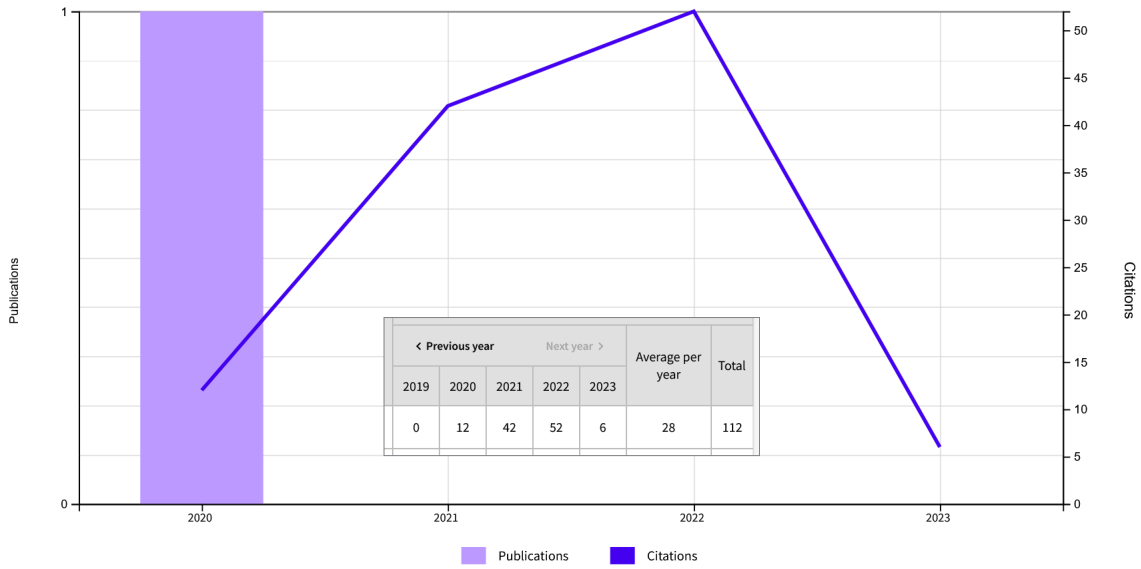


Roman, R.C., Precup, R.E., Petriu, E.M. Hybrid data-driven fuzzy active disturbance rejection control for tower crane systems, EUROPEAN JOURNAL OF CONTROL, Volume: 58, Pages: 373-387, ISSN: 0947-3580, eISSN: 1435-5671, 2021;
Times Cited in Web of Science Core Collection: 170

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
Hot Paper

This hot paper was published in the past two years and received enough citations in January/February 2022 to place it in the top 0.1% of papers in the academic field of **Engineering**.

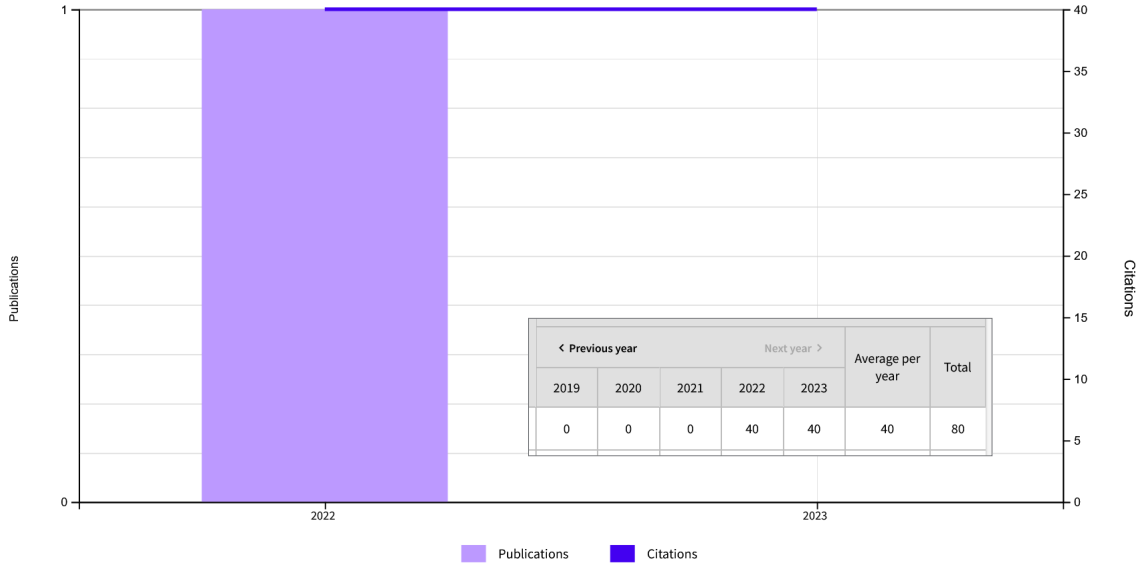


Precup, R.E., Teban, T.A., Albu, A., Borlea, A.B., Zamfirache, I.A., Petriu, E.M. Evolving Fuzzy Models for Prosthetic Hand Myoelectric-Based Control, IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, Volume: 69, Issue: 7, Pages: 4625-4636, ISSN: 0018-9456, eISSN: 1557-9662, 2020;
Times Cited in Web of Science Core Collection: 112

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 Hot Paper

This hot paper was published in the past two years and received enough citations in September/December 2022 to place it in the top 0.1% of papers in the academic field of **Engineering**.



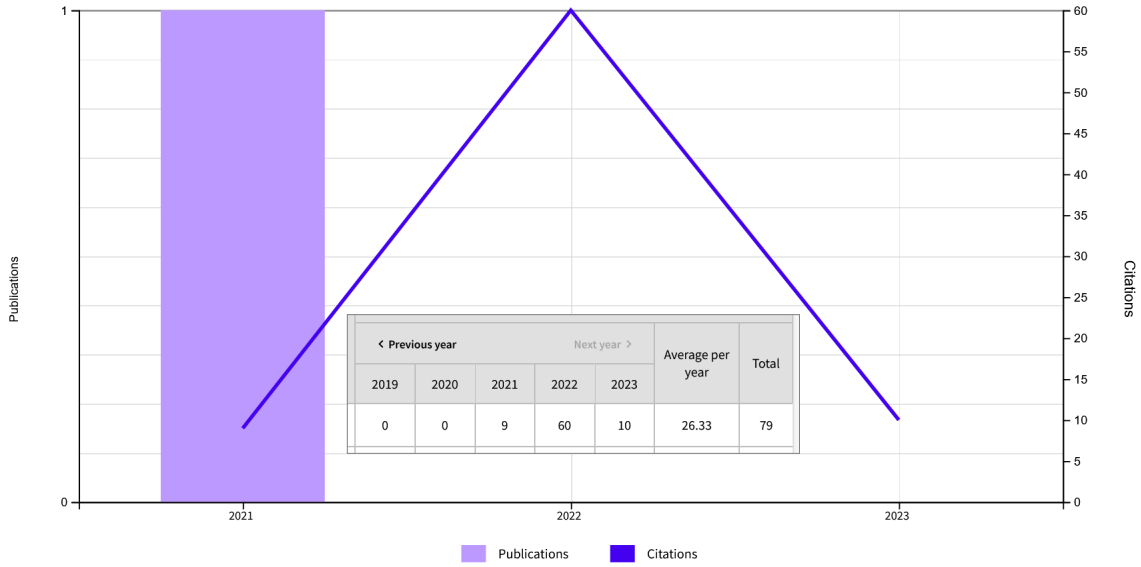
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	0	0	40	40	40	80

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: 80

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 Hot Paper

This hot paper was published in the past two years and received enough citations in March/April 2022 to place it in the top 0.1% of papers in the academic field of **Engineering**.



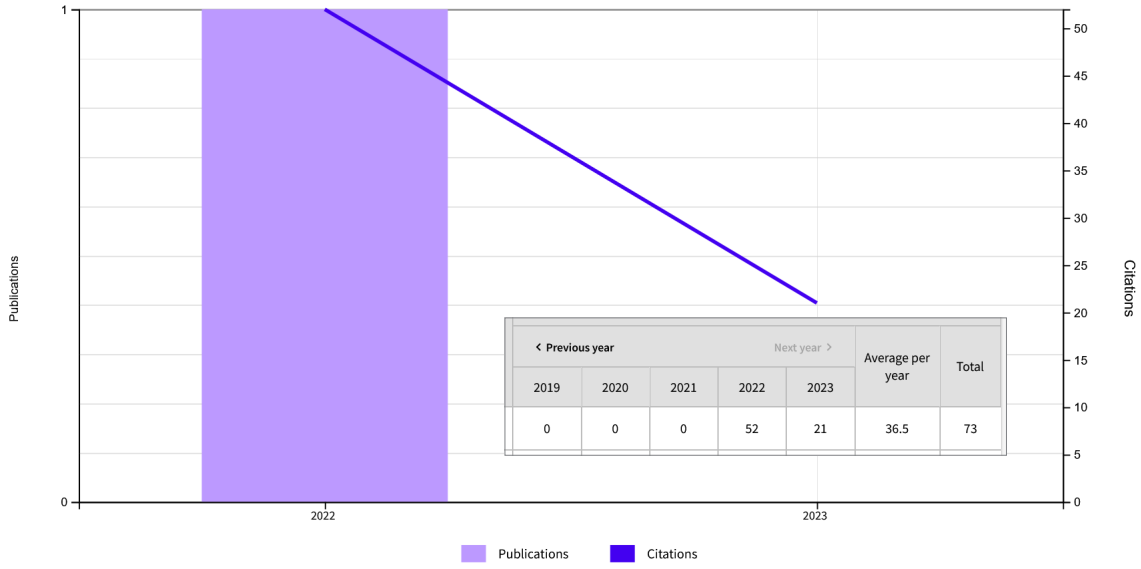
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	0	9	60	10	26.33	79

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: 79

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 Hot Paper

This hot paper was published in the past two years and received enough citations in March/October 2022 to place it in the top 0.1% of papers in the academic field of **Psychiatry/Psychology**.

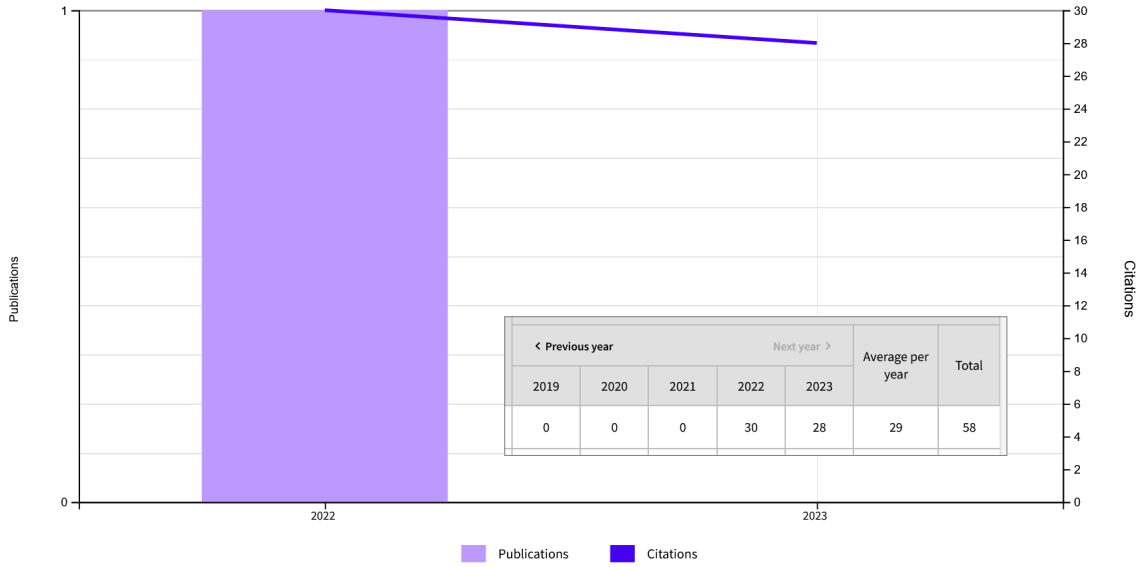


Zhou, Y.Y., Draghici, A., Abbas, J., Mubeen, R., Boatca, M.E., Salam, M.A. Social Media Efficacy in Crisis Management: Effectiveness of Non-pharmaceutical Interventions to Manage COVID-19 Challenges, FRONTIERS IN PSYCHIATRY, Volume: 12, Article Number: 626134, PubMed ID: 35197870, ISSN: 1664-0640, 2022;
Times Cited in Web of Science Core Collection: 73

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.
. . .

Web of Science - Clarivate Analytics Hot Paper

This hot paper was published in the past two years and received enough citations in July/December 2022 to place it in the top 0.1% of papers in the academic field of **Psychiatry/Psychology**.



< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	0	0	30	28	29	58

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: 58

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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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: 522

Highly Cited Paper

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;
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Highly Cited Paper

Sarbu, I., Sebarchievici, C. A Comprehensive Review of Thermal Energy Storage, SUSTAINABILITY, Volume: 10, Issue: 1, Article Number: 191, ISSN: 2071-1050, 2018;
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Times Cited in Web of Science Core Collection: 372

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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: 243

Highly Cited Paper

Precup, R.E., David, R.C., Petriu, E.M. Grey Wolf Optimizer Algorithm-Based Tuning of Fuzzy Control Systems With Reduced Parametric Sensitivity, IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, Volume: 64, Issue: 1, Pages: 527-534, ISSN: 0278-0046, eISSN: 1557-9948, 2017;
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Highly Cited Paper

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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: 179

Highly Cited Paper

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: 170

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Gheju, M., Balcu, I., Mosoarca, G. Removal of Cr(VI) from aqueous solutions by adsorption on MnO2, JOURNAL OF HAZARDOUS MATERIALS, Volume: 310, Pages: 270-277, PubMed ID: 26947189, ISSN: 0304-3894, eISSN: 1873-3336, 2016;
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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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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;
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* The data was obtained from Web of Science - Clarivate Analytics in 25 July 2023

Web of Science - Clarivate Analytics Highly Cited Papers

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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: 89

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Times Cited in Web of Science Core Collection: 80

Highly Cited Paper

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: 79

Highly Cited Paper

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: 73

Highly Cited Paper

Precup, R.E., David, R.C., Roman, R.C., Petriu, E.M., Szedlak-Stinean, A.I. Slime Mould Algorithm-Based Tuning of Cost-Effective Fuzzy Controllers for Servo Systems, INTERNATIONAL JOURNAL OF COMPUTATIONAL INTELLIGENCE SYSTEMS, Volume: 14, Issue: 1, Pages: 1042-1052, ISSN: 1875-6891, eISSN: 1875-6883, 2021;
Times Cited in Web of Science Core Collection: 63

Highly Cited Paper

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;
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Web of Science - Clarivate Analytics Highly Cited Papers

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Mohsin, M., Zhu, Q., Naseem, S., Sarfraz, M., Ivascu, L. Mining Industry Impact on Environmental Sustainability, Economic Growth, Social Interaction, and Public Health: An Application of Semi-Quantitative Mathematical Approach, PROCESSES, Volume: 9, Issue: 6, Article Number: 972, eISSN: 2227-9717, 2021;
Times Cited in Web of Science Core Collection: 40

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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: 33

Highly Cited Paper

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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Sarfraz, M., Hafeez, H., Abdullah, M.I., Ivascu, L., Ozturk, I. The effects of the COVID-19 pandemic on healthcare workers' psychological and mental health: The moderating role of felt obligation, WORK-A JOURNAL OF PREVENTION ASSESSMENT & REHABILITATION, Volume: 71, Issue: 3, Pages: 539-550, PubMed ID: 35253715, ISSN: 1051-9815, eISSN: 1875-9270, 2022;
Times Cited in Web of Science Core Collection: 14

Highly Cited Paper

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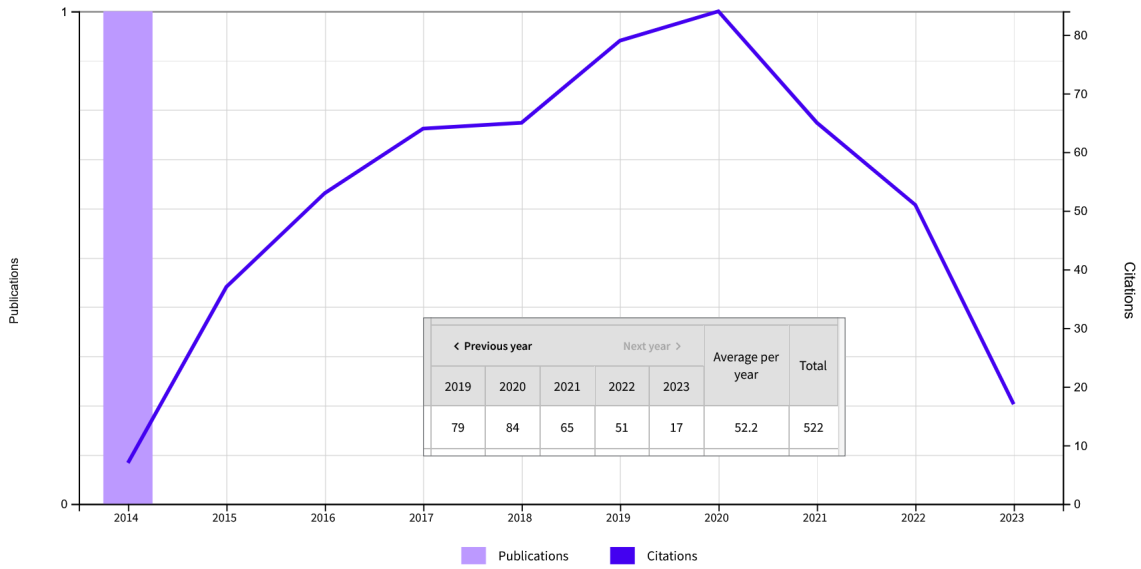
As of January/December 2022, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Engineering** based on a highly cited threshold for the field and publication year.



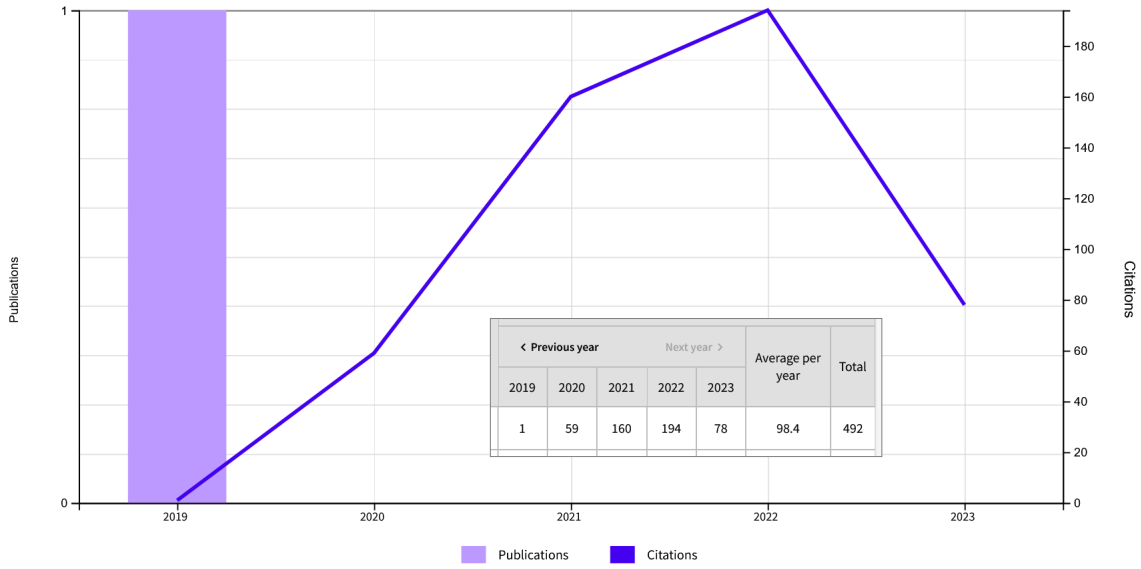
< Previous year					Next year >	
2019	2020	2021	2022	2023	Average per year	Total
79	84	65	51	17	52.2	522

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: 522

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 2022, 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.

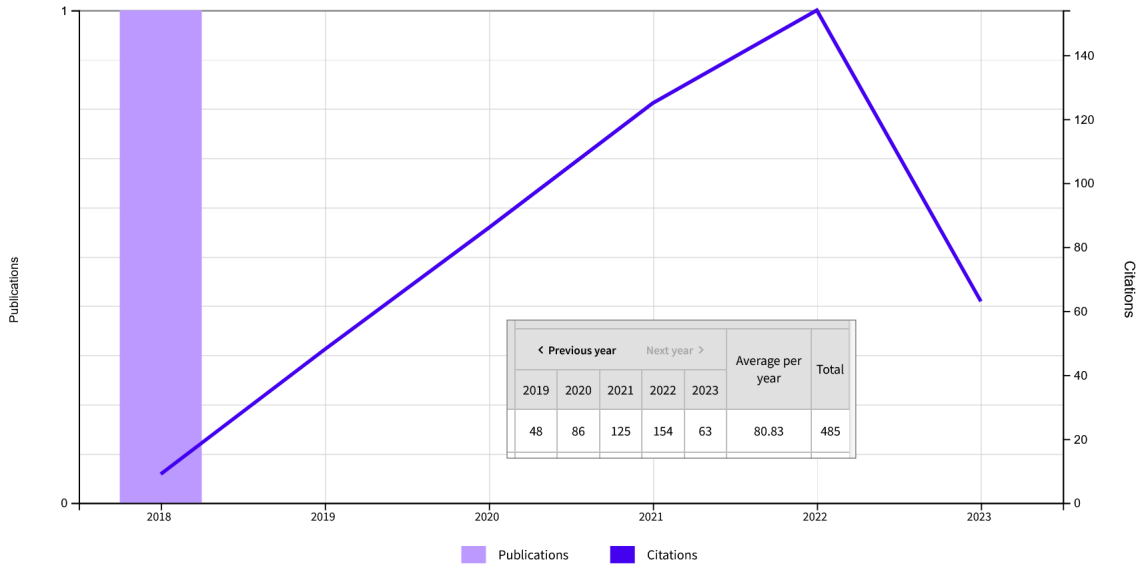


Rajak, D.K., Pagar, D.D., Menezes, P.L., Linul, E. Fiber-Reinforced Polymer Composites: Manufacturing, Properties, and Applications, POLYMERS, Volume: 11, Issue: 10, Article Number: 1667, PubMed ID: 31614875, eISSN: 2073-4360, 2019;
Times Cited in Web of Science Core Collection: 492

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 2022, 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.

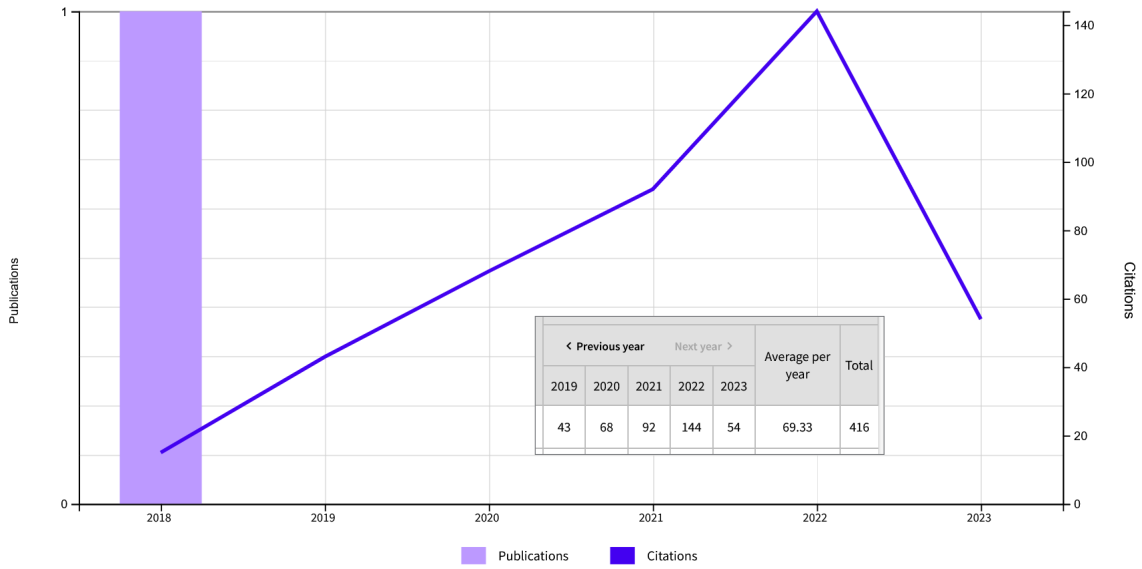


Sarbu, I., Sebarchievici, C. A Comprehensive Review of Thermal Energy Storage, SUSTAINABILITY, Volume: 10, Issue: 1, Article Number: 191, ISSN: 2071-1050, 2018;
Times Cited in Web of Science Core Collection: 485

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 2022, 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
2019	2020	2021	2022	2023		
43	68	92	144	54	69.33	416

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: 416

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

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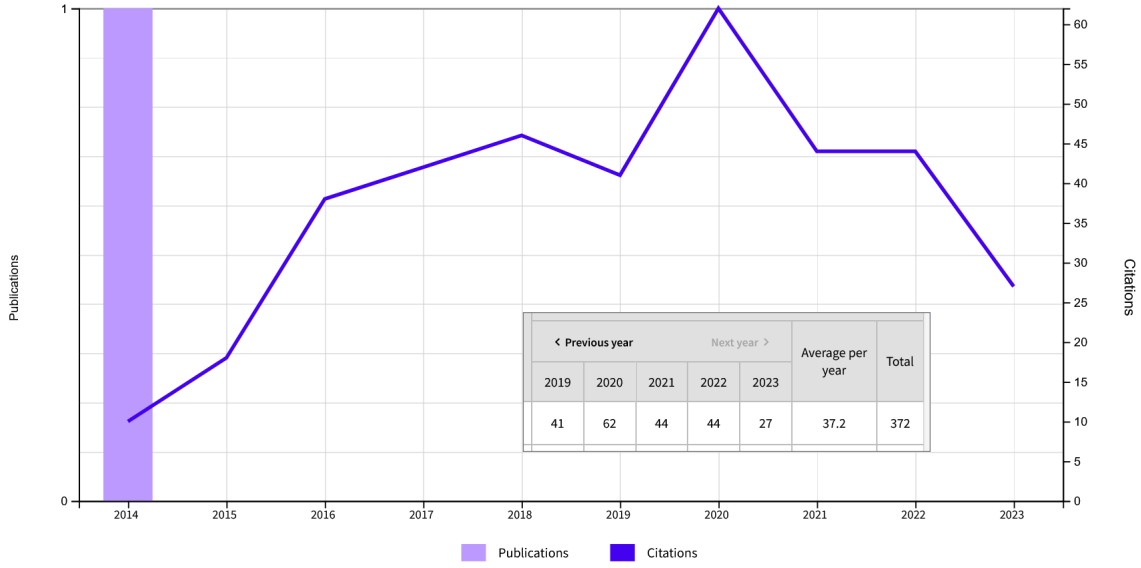

< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
41	62	44	44	27	37.2	372

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: 372

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

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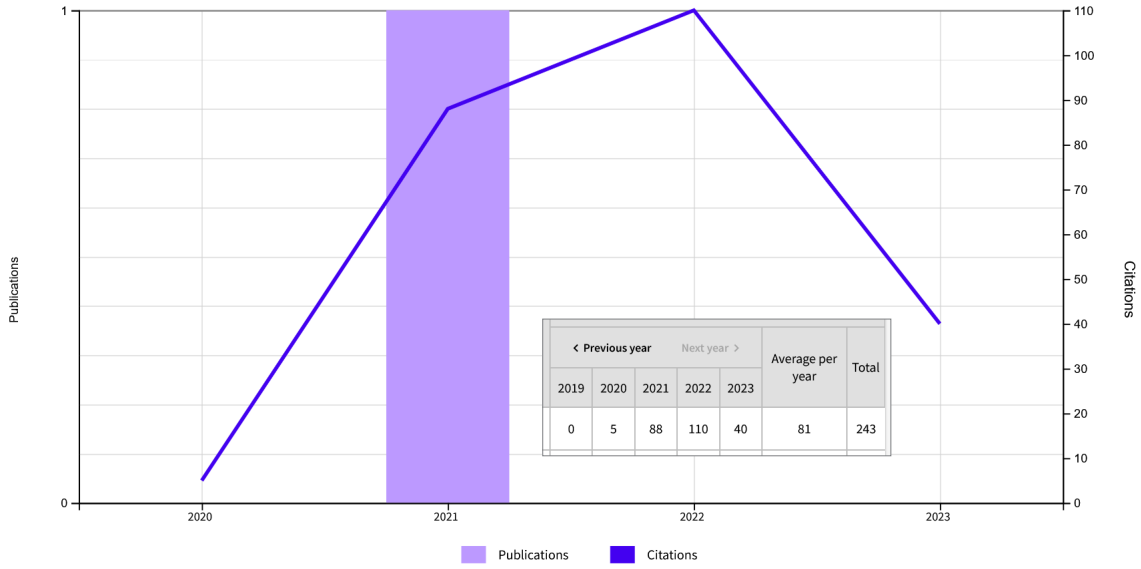

< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	5	88	110	40	81	243

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: 243

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

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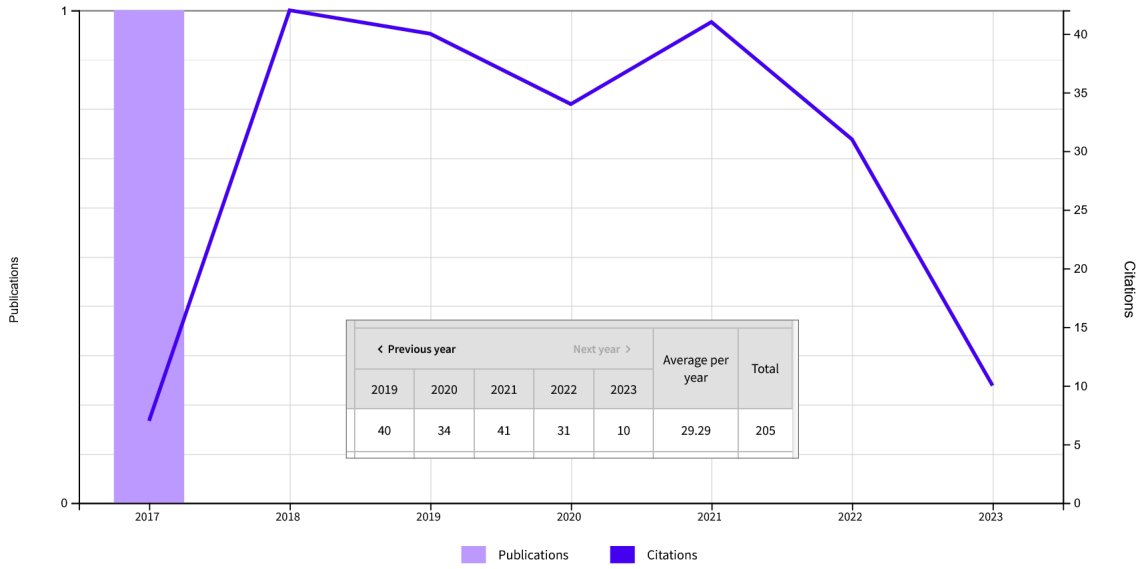

< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
40	34	41	31	10	29.29	205

Precup, R.E., David, R.C., Petriu, E.M. Grey Wolf Optimizer Algorithm-Based Tuning of Fuzzy Control Systems With Reduced Parametric Sensitivity, IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, Volume: 64, Issue: 1, Pages: 527-534, ISSN: 0278-0046, eISSN: 1557-9948, 2017;
Times Cited in Web of Science Core Collection: 205

Abstract: This paper proposes an innovative tuning approach for fuzzy control systems (CSs) with a reduced parametric sensitivity using the Grey Wolf Optimizer (GWO) algorithm. The CSs consist of servo system processes controlled by Takagi-Sugeno-Kang proportional-integral fuzzy controllers (TSK PI-FCs). The process models have second-order dynamics with an integral component, variable parameters, a saturation, and dead-zone static nonlinearity. The sensitivity analysis employs output sensitivity functions of the sensitivity models defined with respect to the parametric variations of the processes. The GWO algorithm is used in solving the optimization problems, where the objective functions include the output sensitivity functions. GWO's motivation is based on its low-computational cost. The tuning approach is validated in an experimental case study of a position control for a laboratory nonlinear servo system, and TSK PI-FCs with a reduced process small time constant sensitivity are offered.

Web of Science - Clarivate Analytics Highly Cited Paper

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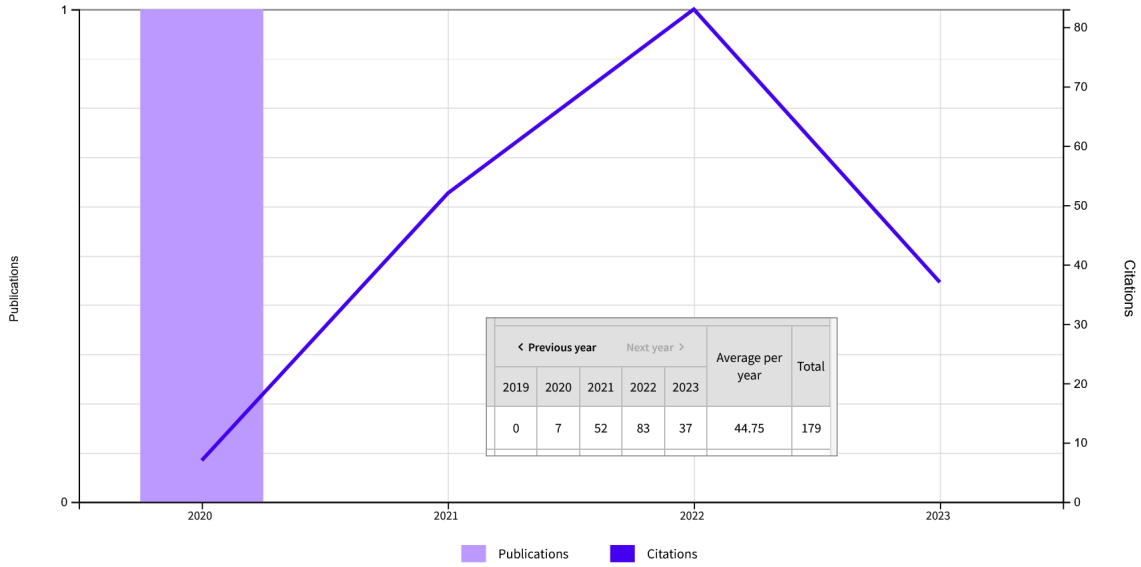

< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	7	52	83	37	44.75	179

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: 179

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.

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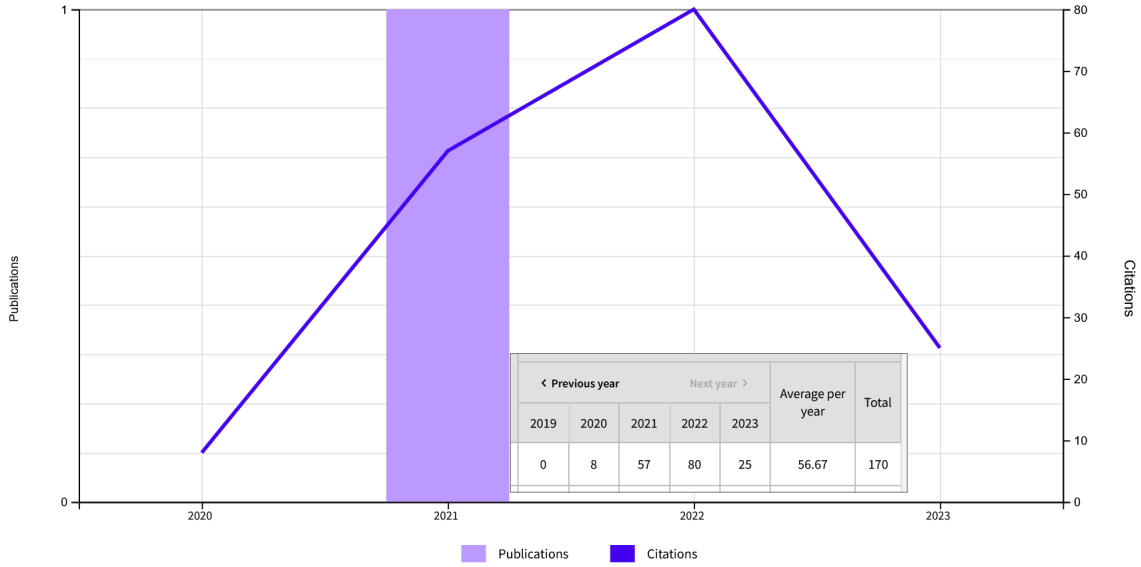


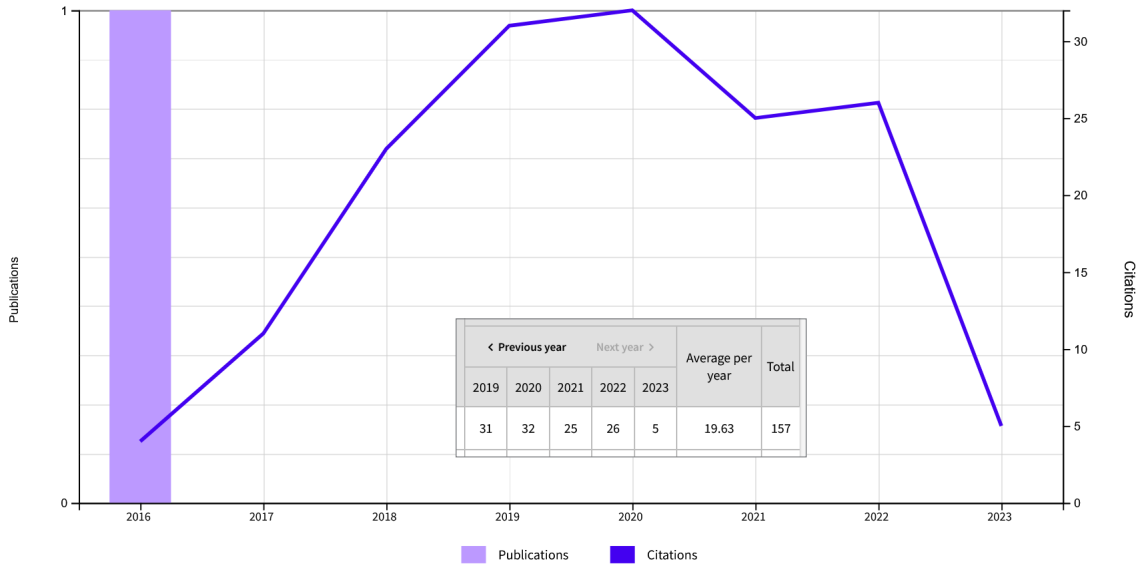
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	8	57	80	25	56.67	170

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: 170

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 2022, 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.



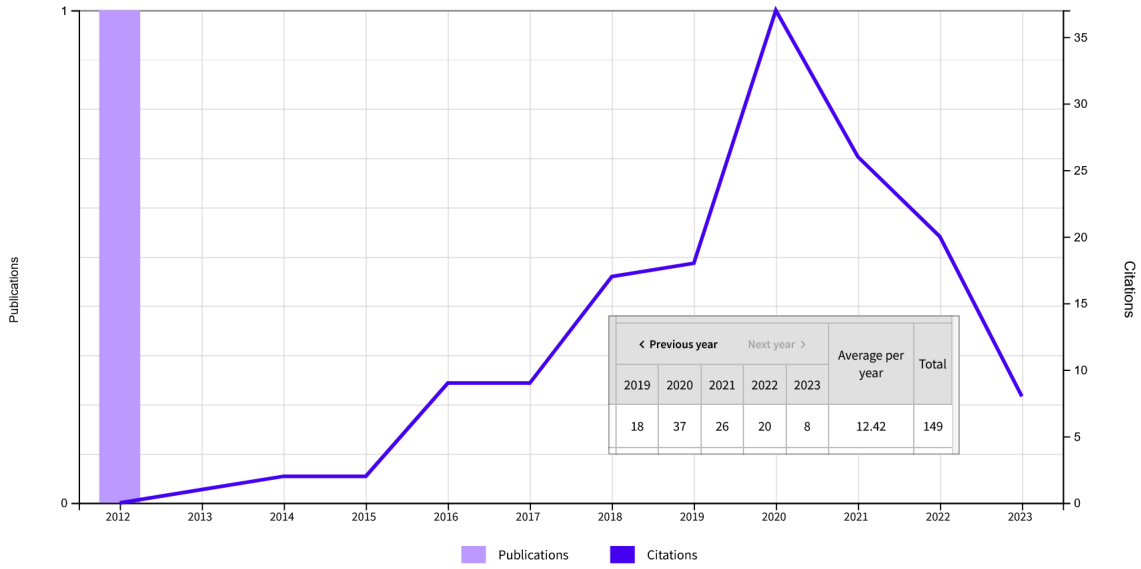
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
31	32	25	26	5	19.63	157

Gheju, M., Balcu, I., Mosoarca, G. Removal of Cr(VI) from aqueous solutions by adsorption on MnO2, JOURNAL OF HAZARDOUS MATERIALS, Volume: 310, Pages: 270-277, PubMed ID: 26947189, ISSN: 0304-3894, eISSN: 1873-3336, 2016;
Times Cited in Web of Science Core Collection: 157

Abstract: Adsorption of Cr(VI) on MnO2 was investigated with respect to effect of pH, temperature, ionic strength, initial Cr(VI) concentration, co-presence of different anions (HCO3-, SO42-, H2PO4-, NO3- and Cl-) and of low molecular weight natural organic materials (LMWNOM) (acetate, oxalate and citrate). The process was rapid during the first 3-5 min, reaching equilibrium after one hour. Adsorption decreased with increasing pH, temperature and Cr(VI) initial concentration, and increased with increasing ionic strength. Co-presence of phosphate, sulfate, bicarbonate, citrate and oxalate hindered Cr(VI) adsorption, whereas nitrate, chloride and acetate did not exert any notable influence. The overall order of Cr(VI) adsorption suppression due to co-presence of anions and LMWNOM was H2PO4 > HCO3- > SO42-, and oxalate > citrate, respectively. Highest experimental equilibrium sorption capacity (0.83 mg g(-1)) was obtained at 20 degrees C and pH 5.9, while lowest (0.18 mg g(-1)) was noticed in the co-presence of H2PO4-, at 20 degrees C and pH 6.9. Adsorption kinetics was successfully fitted by pseudo-second-order model. Mechanisms for both specific and non-specific adsorption are likely to be involved, while rate-controlling step involved both intra-particle and film diffusion processes. Cr(VI) was strongly bound to MnO2, which makes risks of its subsequent liberation into the environment to be low.

Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2022, 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.

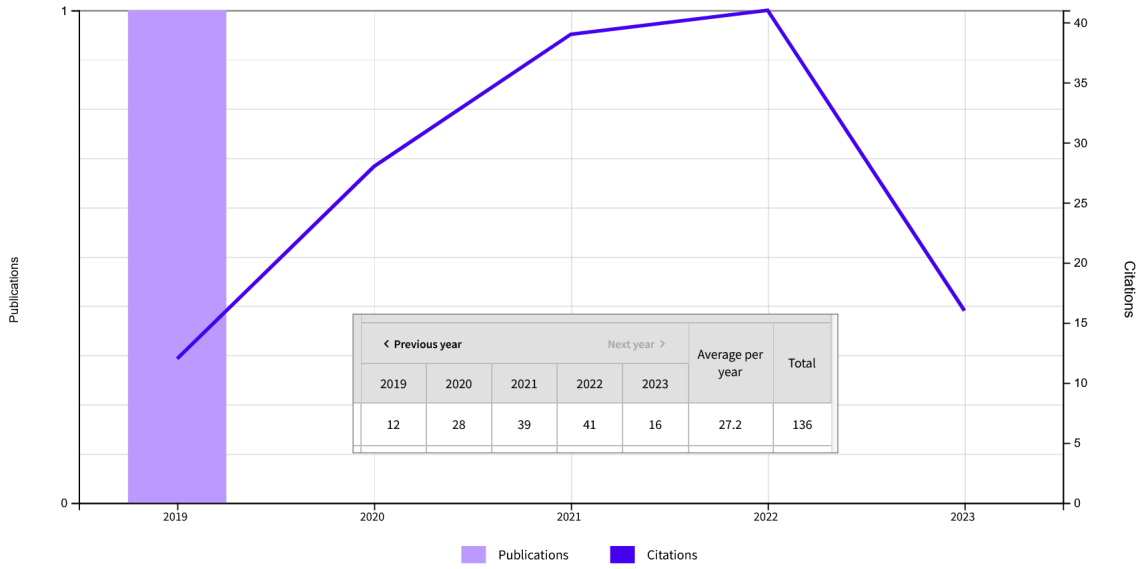


Gavruta, L. Frames for operators, APPLIED AND COMPUTATIONAL HARMONIC ANALYSIS, Volume: 32, Issue: 1, Pages: 139-144, ISSN: 1063-5203, 2012;
Times Cited in Web of Science Core Collection: 149

Abstract: Frames in Hilbert spaces are a redundant set of vectors which yield a representation for each vector in the space. In the present paper, we give a generalization of frames, which allows, in a stable way, to reconstruct elements from the range of a linear and bounded operator in a Hilbert space.

Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2022, 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.

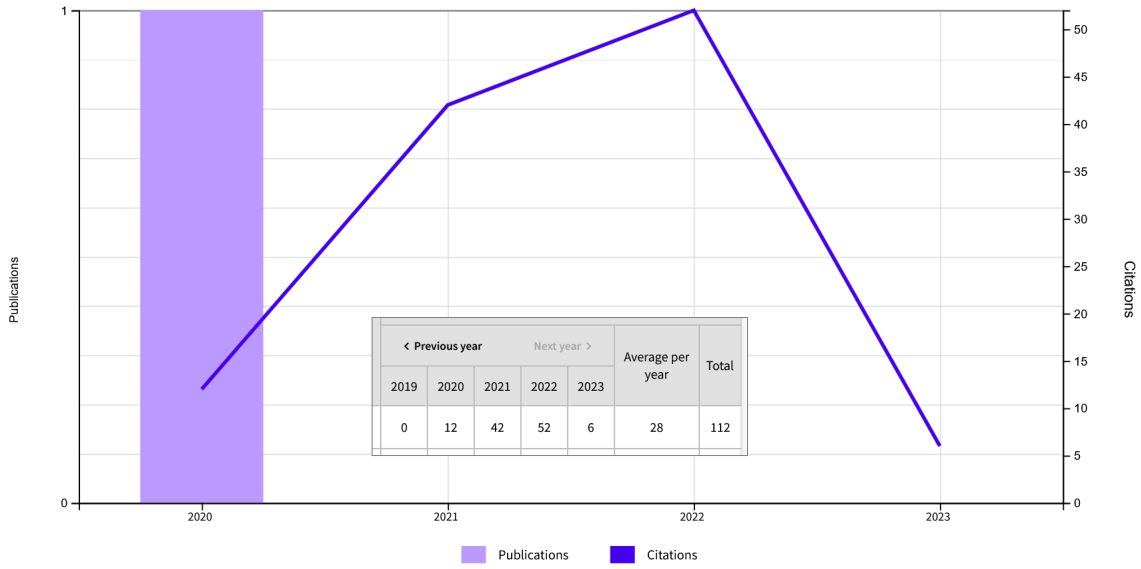


Sarbu, I., Dorca, A. Review on heat transfer analysis in thermal energy storage using latent heat storage systems and phase change materials, INTERNATIONAL JOURNAL OF ENERGY RESEARCH, Volume: 43, Issue: 1, Pages: 29-64, ISSN: 0363-907X, eISSN: 1099-114X, 2019;
Times Cited in Web of Science Core Collection: 136

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 2022, 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.



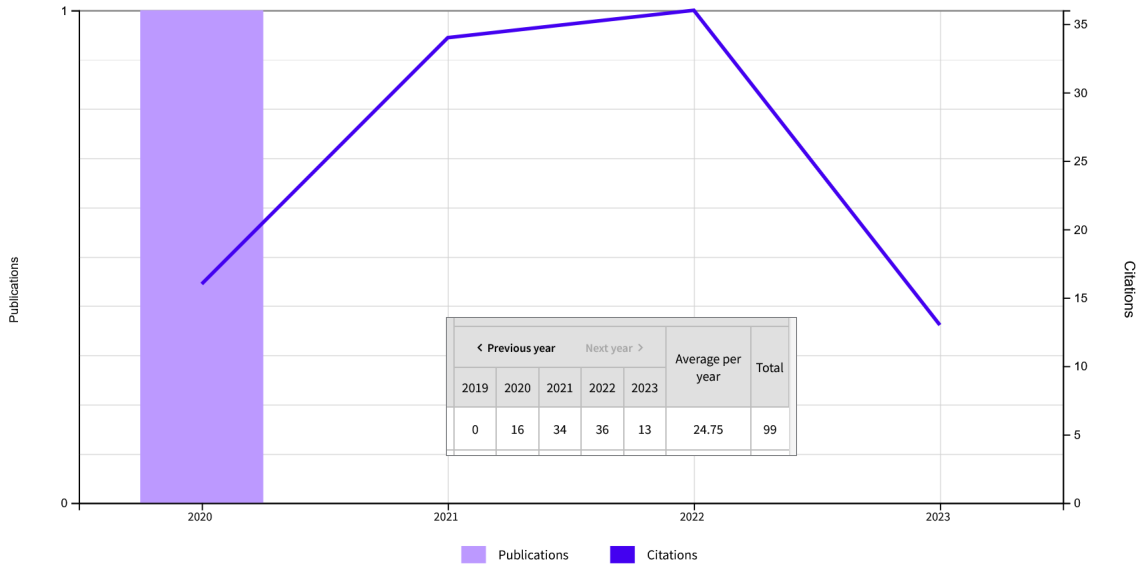
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	12	42	52	6	28	112

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: 112

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 2022 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.

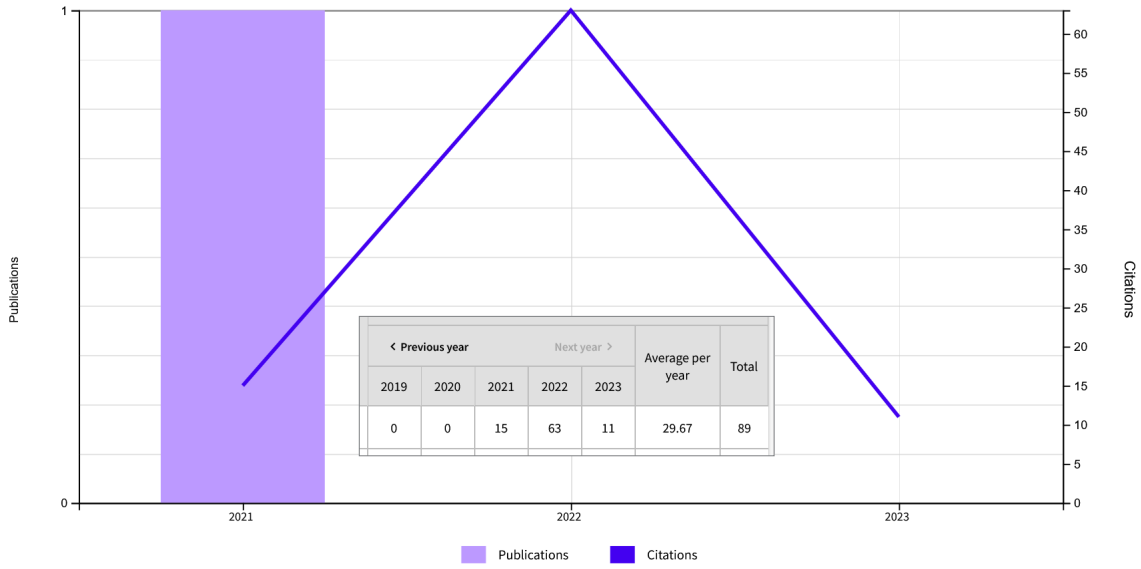


Tmusic, G., Manfreda, S., Aasen, H., James, M.R., Goncalves, G., Ben-Dor, E., Brook, A., Polinova, M., Arranz, J.J., Meszaros, J., Zhuang, R.D., Johansen, K., Malbeteau, Y., de Lima, I.P., Davids, C., Herban, S., McCabe, M.F. Current Practices in UAS-based Environmental Monitoring, REMOTE SENSING, Volume: 12, Issue: 6, Article Number: 1001, eISSN: 2072-4292, 2020;
Times Cited in Web of Science Core Collection: 99

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 May/December 2022, 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.



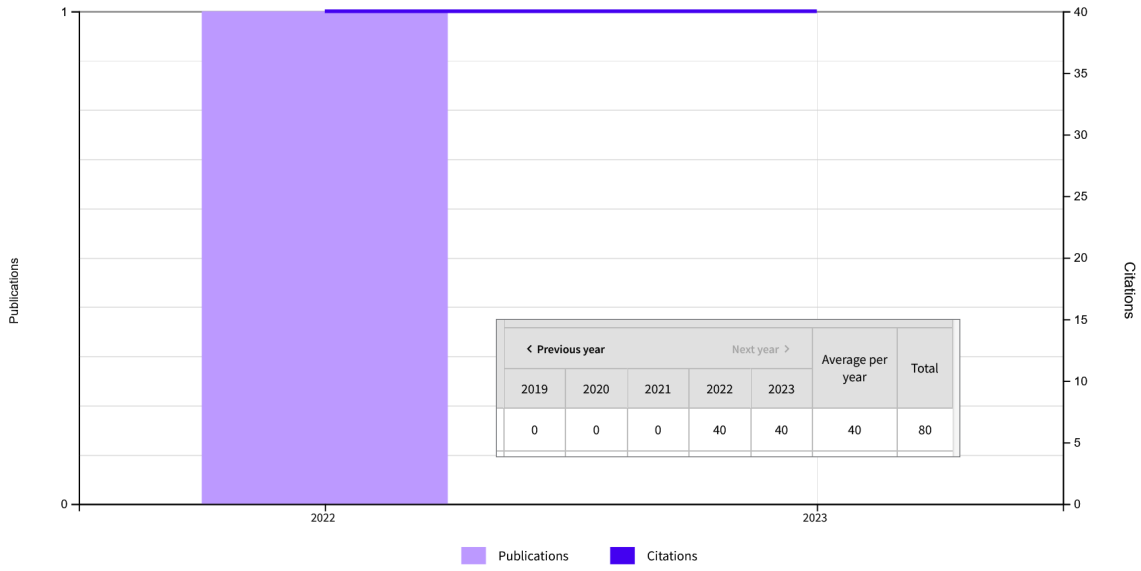
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	0	15	63	11	29.67	89

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: 89

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 September/December 2022, 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.

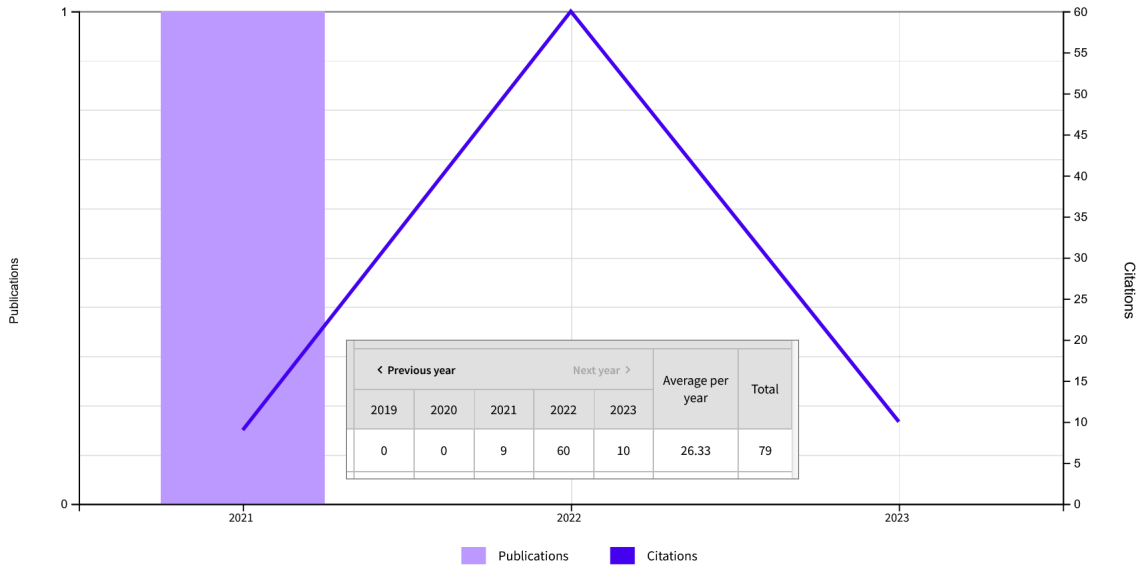


Pozna, C., Precup, R.E., Horvath, E., Petriu, E.M. Hybrid Particle Filter-Particle Swarm Optimization Algorithm and Application to Fuzzy Controlled Servo Systems, IEEE TRANSACTIONS ON FUZZY SYSTEMS, Volume: 30, Issue: 10, Pages: 4286-4297, ISSN: 1063-6706, eISSN: 1941-0034, 2022; Times Cited in Web of Science Core Collection: 80

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 March/December 2022, 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.



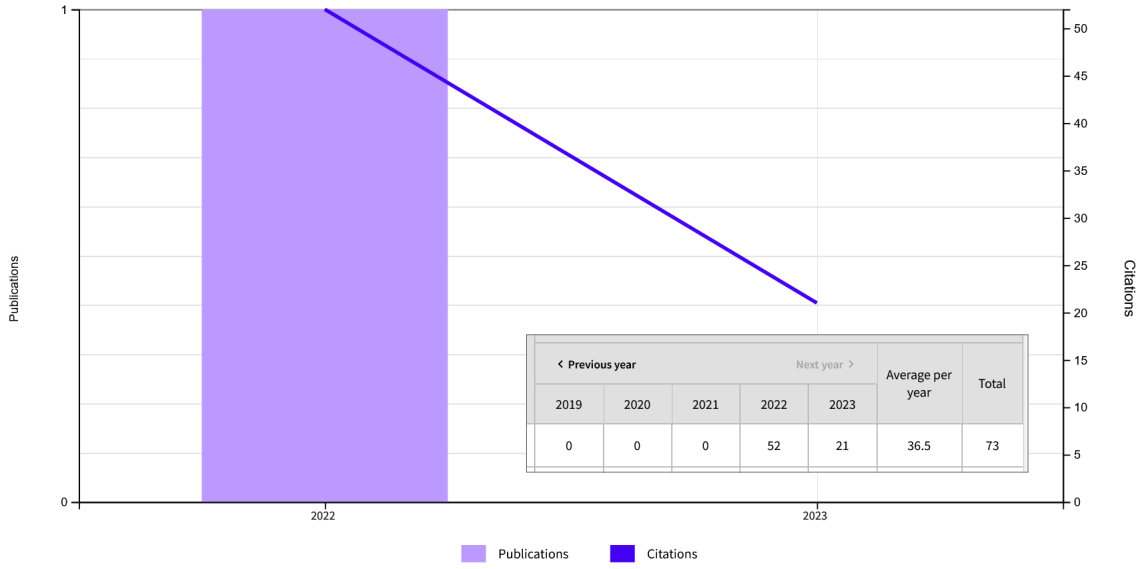
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	0	9	60	10	26.33	79

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: 79

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 March/December 2022, 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
2019	2020	2021	2022	2023		
0	0	0	52	21	36.5	73

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: 73

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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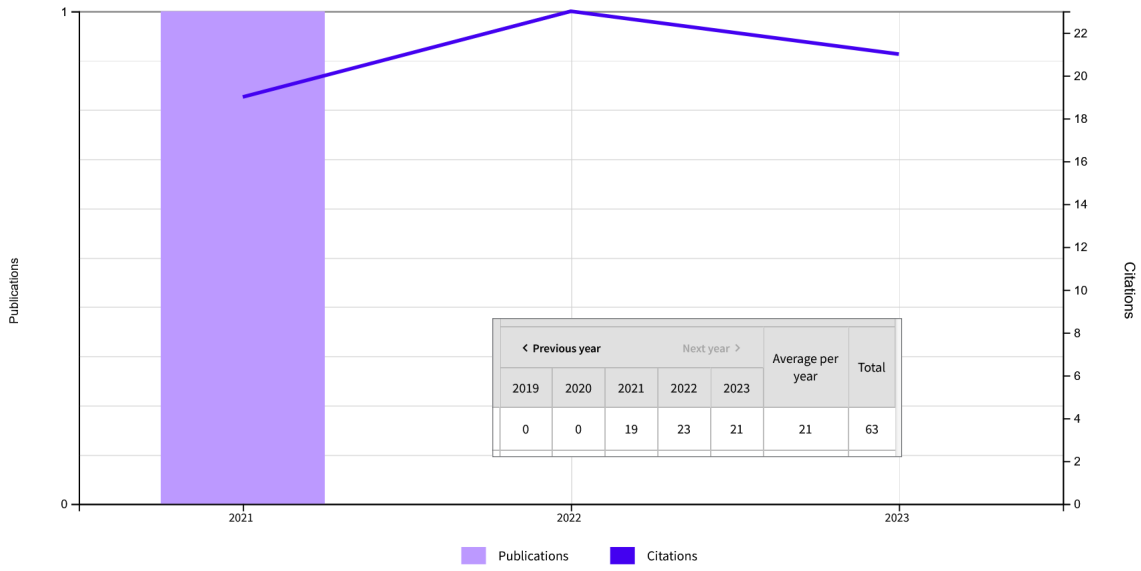
Web of Science - Clarivate Analytics Highly Cited Paper

As of January/April 2022, 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.



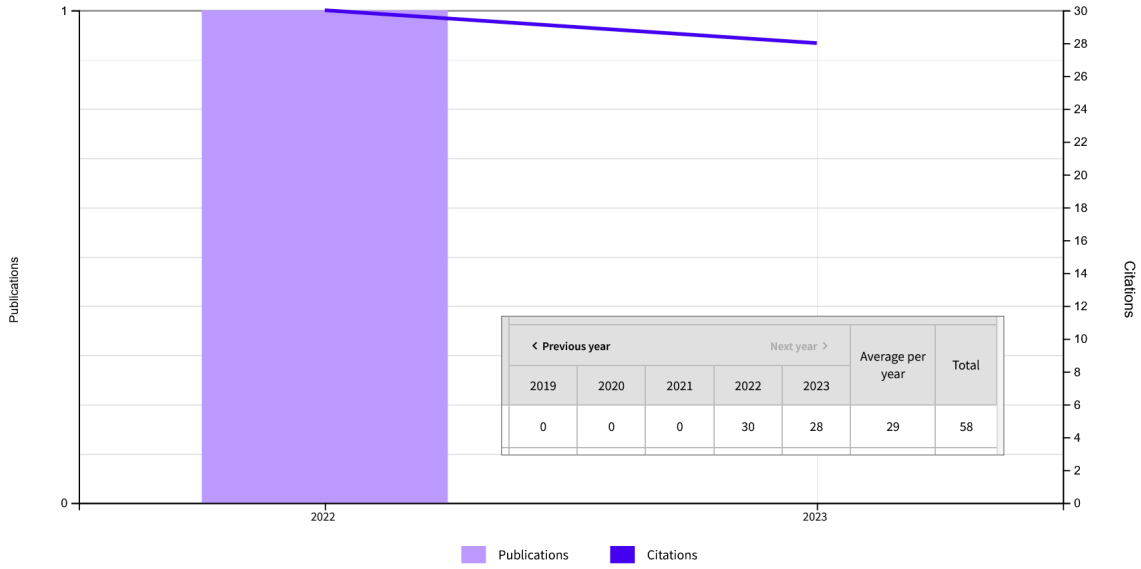
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	0	19	23	21	21	63

Precup, R.E., David, R.C., Roman, R.C., Petriu, E.M., Szedlak-Stinean, A.I. Slime Mould Algorithm-Based Tuning of Cost-Effective Fuzzy Controllers for Servo Systems, INTERNATIONAL JOURNAL OF COMPUTATIONAL INTELLIGENCE SYSTEMS, Volume: 14, Issue: 1, Pages: 1042-1052, ISSN: 1875-6891, eISSN: 1875-6883, 2021;
Times Cited in Web of Science Core Collection: 63

Abstract: This paper suggests five new contributions with respect to the state-of-the-art. First, the optimal tuning of cost-effective fuzzy controllers represented by Takagi-Sugeno-Kang proportional-integral fuzzy controllers (TSK PI-FCs) is carried out using a fresh metaheuristic algorithm, namely the Slime Mould Algorithm (SMA), and a fuzzy controller tuning approach is offered. Second, a relatively easily understandable formulation of SMA is offered. Third, a real-world application of SMA is given, focusing on the optimal tuning of TSK PI-FCs for nonlinear servo systems in terms of optimization problems that target the minimization of discrete-time cost functions defined as the sum of time multiplied by squared control error. Fourth, using the concept of improving the performance of metaheuristic algorithms with information feedback models, proposed by Wang and Tan, Improving metaheuristic algorithms with information feedback models, IEEE Trans. Cybern. 49 (2019), 542-555, Gu and Wang, Improving NSGA-III algorithms with information feedback models for large-scale many-objective optimization, Fut. Gen. Comput. Syst. 107 (2020), 49-69, and Zhang et al., Enhancing MOEA/D with information feedback models for large-scale many-objective optimization, Inf. Sci. 522 (2020), 1-16, new metaheuristic algorithms are introduced in terms of inserting the model F1 in SMA and other representative algorithms, namely Gravitational Search Algorithm (GSA), Charged System Search (CSS), Grey Wolf Optimizer (GWO) and Whale Optimization Algorithm (WOA). Fifth, the real-time validation of the cost-effective fuzzy controllers and their tuning approach is performed in the framework of angular position control of laboratory servo system. The comparison with other metaheuristic algorithms that solve the same optimization problem for optimal parameter tuning of cost-effective fuzzy controllers suggestively highlights the superiority of SMA. Experimental results are included.

Web of Science - Clarivate Analytics Highly Cited Paper

As of July/December 2022, 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
2019	2020	2021	2022	2023		
0	0	0	30	28	29	58

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: 58

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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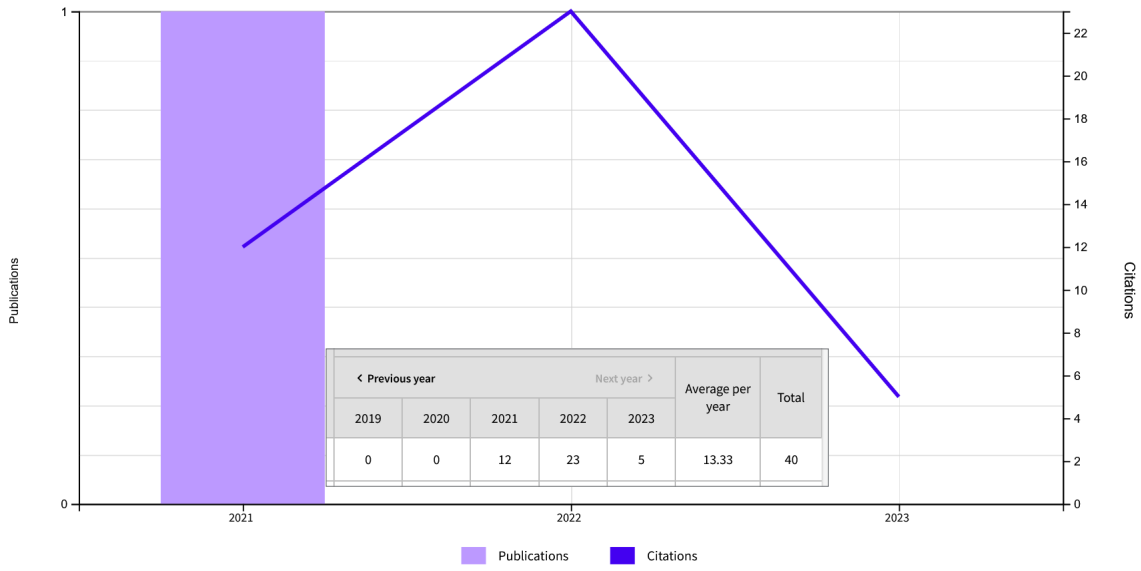
Web of Science - Clarivate Analytics Highly Cited Paper

As of January/August 2022, 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.



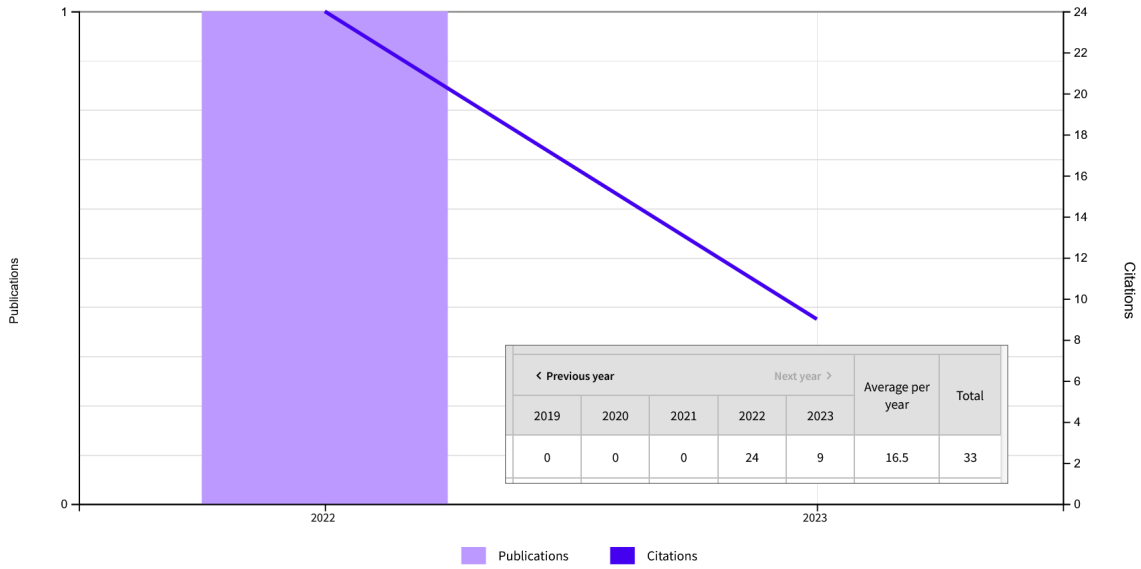
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	0	12	23	5	13.33	40

Mohsin, M., Zhu, Q., Naseem, S., Sarfraz, M., Ivascu, L. Mining Industry Impact on Environmental Sustainability, Economic Growth, Social Interaction, and Public Health: An Application of Semi-Quantitative Mathematical Approach, PROCESSES, Volume: 9, Issue: 6, Article Number: 972, eISSN: 2227-9717, 2021;
Times Cited in Web of Science Core Collection: 40

Abstract: The mining industry plays a significant role in economic growth and development. Coal is a viable renewable energy source with 185.175 billion deposits in Thar, which has not been deeply explored. Although coal is an energy source and contributes to economic development, it puts pressure on environmental sustainability. The current study investigates Sindh Engro coal mining's impact on environmental sustainability and human needs and interest. The Folchi and Phillips Environmental Sustainability Mathematics models are employed to measure environmental sustainability. The research findings demonstrated that Sindh Engro coal mining is potentially unsustainable for the environment. The toxic gases (methane, carbon dioxide, sulfur, etc.) are released during operational activities. The four significant environment spheres (atmosphere, hydrosphere, biosphere, and lithosphere) are negatively influenced by Thar coal mining. The second part of the analysis results shows that human needs and interests have a positive and significant relationship except for human health and safety with Sindh Engro coal mining. Environmental pollution can be controlled by utilizing environmentally friendly coal mining operations and technologies. Plantation and ecological normalization can protect the species, flora, and fauna of the Thar Desert. The government of Pakistan and the provincial government of Sind should strictly check the adaptation of environmental standards. Furthermore, the researchers should explore the environmental issues and solutions so that coal mining becomes a cost-efficient and environmental-friendly energy source in Pakistan.

Web of Science - Clarivate Analytics Highly Cited Paper

As of March/December 2022, 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.



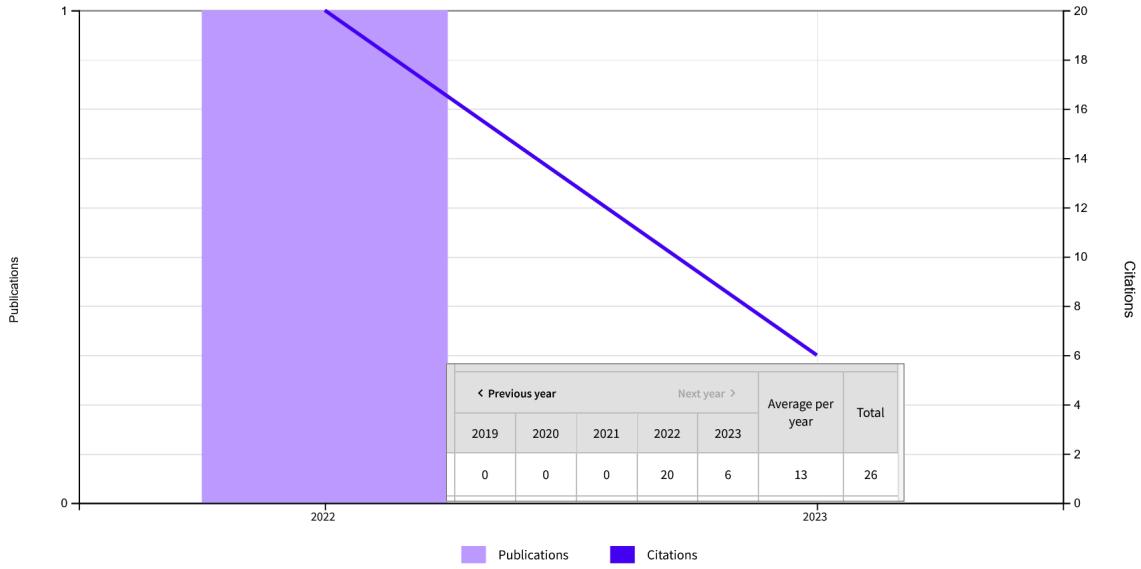
< Previous year				Next year >	Average per year	Total
2019	2020	2021	2022	2023		
0	0	0	24	9	16.5	33

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: 33

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 May/December 2022, 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.

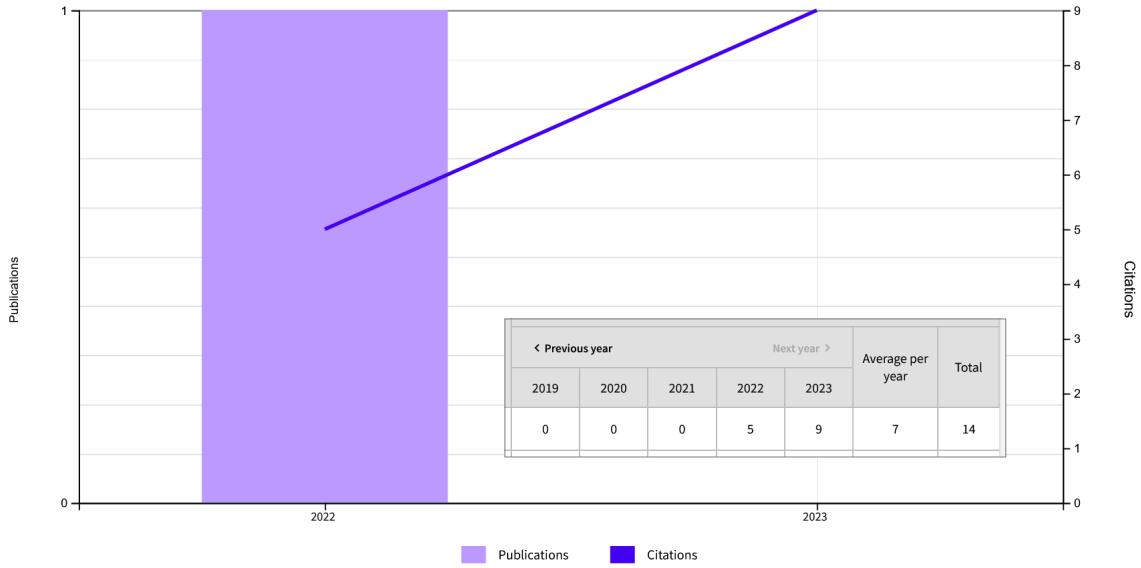


Mohsin, M., Jamil, K., Naseem, S., Sarfraz, M., Ivascu, L. Elongating Nexus Between Workplace Factors and Knowledge Hiding Behavior: Mediating Role of Job Anxiety, PSYCHOLOGY RESEARCH AND BEHAVIOR MANAGEMENT, Volume: 15, Pages: 441-457, PubMed ID: 35250318, ISSN: 1179-1578, 2022;
Times Cited in Web of Science Core Collection: 26

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/August 2022, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Social Sciences, general** based on a highly cited threshold for the field and publication year.



Sarfraz, M., Hafeez, H., Abdullah, M.I., Ivascu, L., Ozturk, I. The effects of the COVID-19 pandemic on healthcare workers' psychological and mental health: The moderating role of felt obligation, WORK-A JOURNAL OF PREVENTION ASSESSMENT & REHABILITATION, Volume: 71, Issue: 3, Pages: 539-550, PubMed ID: 35253715, ISSN: 1051-9815, eISSN: 1875-9270, 2022;
Times Cited in Web of Science Core Collection: 14

Abstract: BACKGROUND: The ravages of COVID-19 have created a worldwide emergency in healthcare units. Under these circumstances, the perception of an infection threat is primarily affecting the employees' performance in reducing contagion effects.
OBJECTIVE: The purpose of this study is to develop substantial measures of support for healthcare employees to maintain adequacy in job performance.
METHODS: Data were collected from state-owned hospitals in Pakistan to test the current study's proposed model. We applied structural equation modeling through a partial least square regression in addition to the blindfolding approach in Smart-PLS. Confirmatory factor analysis was also employed to measure the study's validity.
RESULTS: The current study's findings show that the perception of a threat from COVID-19 and the inadequate protective measures have influenced frontline healthcare workers' performance levels. The mediating path of depression symptoms indicated the threat of COVID-19 and the absence of protective measures as potential determinants of poor performance. However, an employee's ability to feel obligated toward their job duties reduces the effect of depression on employee performance.
CONCLUSION: The current model highlights an individual's feelings of obligation to maintain their performance level by minimizing the effect of depression and professional anxiety. The present study extensively described the psychological constraints healthcare workers are facing during the current pandemic. Current research addressing healthcare employees' mental health is vital for better prevention and control during pandemic circumstances. The current study's findings extend the emerging understanding of employee psychology in such circumstances.

No.	2022 UPT Awards	2021 Impact Factor / Quartile in Category
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* The data was obtained from Web of Science - Clarivate Analytics in 14 June 2023

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* The data was obtained from Web of Science - Clarivate Analytics in 13 July 2023

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Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

BOOKS IN HIGHLIGHT

SUSTAINABILITY AND INNOVATION IN MANUFACTURING ENTERPRISES. INDICATORS, MODELS AND ASSESSMENT FOR INDUSTRY 5.0. SERIES TITLE: ADVANCES IN SUSTAINABILITY SCIENCE AND TECHNOLOGY

Anca DRAGHICI & Larisa IVASCU

Published by: Springer,
Singapore, 2022,
Pages: XIV, 306,
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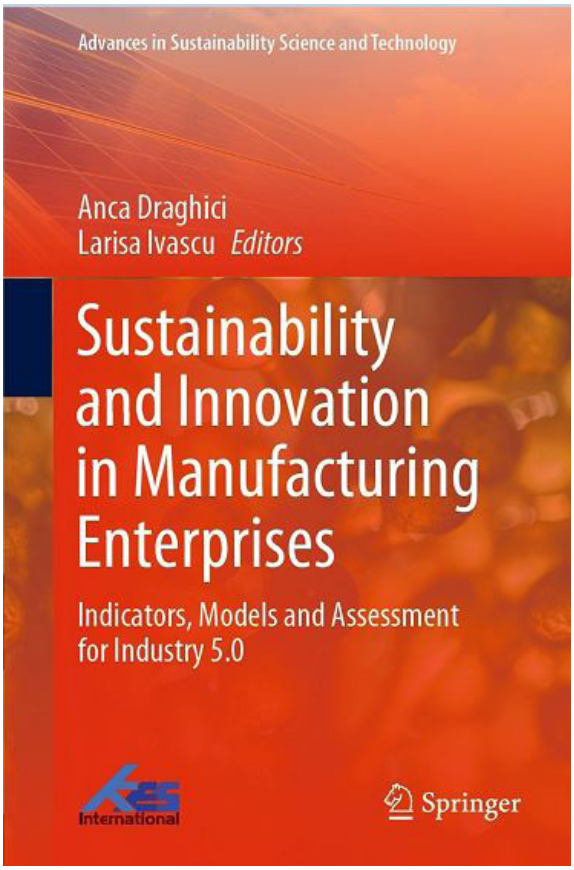

Short description of the context

This book informs and educates readers about sustainable development management, approaches and applications in manufacturing processes and presents the trends to the next economic and social paradigm: the **Industry 5.0** and **Society 5.0**. Educational aspects, case studies from various companies, together with the analysis and synthesis of the literature and empirical experiences, define the content of the eleven chapters.

Purpose and Motivation of the book

The current economic conditions and the business environment dynamics have contributed to the development of a new production paradigm: **Industry 5.0**.
Thus, this book could be considered as a starting point and foundation for researchers and practitioners interested in the present state and the evolution of the manufacturing systems.
The book offers various points of view regarding the actual digital transformation of the manufacturing system.

Summary

The book contains the following chapters:

1. Green Manufacturing in the Context of Circular Economy;
2. Industry 5.0 Challenges and Perspectives for Manufacturing Systems in the **Society 5.0**;
3. Smart Manufacturing Systems Management;
4. Manufacturing Processes Automation and Their Intelligent Monitoring;
5. Arguments for Emerging Technologies Applications to Improve Manufacturing Warehouse Ergonomics;
6. New Approaches to Product Development in the Current Industrial and Economic Context;
7. Managing Complexity in Manufacturing Service Processes. The Case of Large Business Environments;
8. From **Industry 4.0** to **Industry 5.0** - An Overview of European Union Enterprises;
9. Assessment of Economic Impact Generated by Industry 5.0, from a Readiness Index Approach Perspective. A Cross-Country Empirical Analysis;
10. Trends in Teaching Artificial Intelligence for **Industry 5.0**;
11. Trends for Manufacturing Industry: A Strategic Roadmap Toward **Industry 5.0**.

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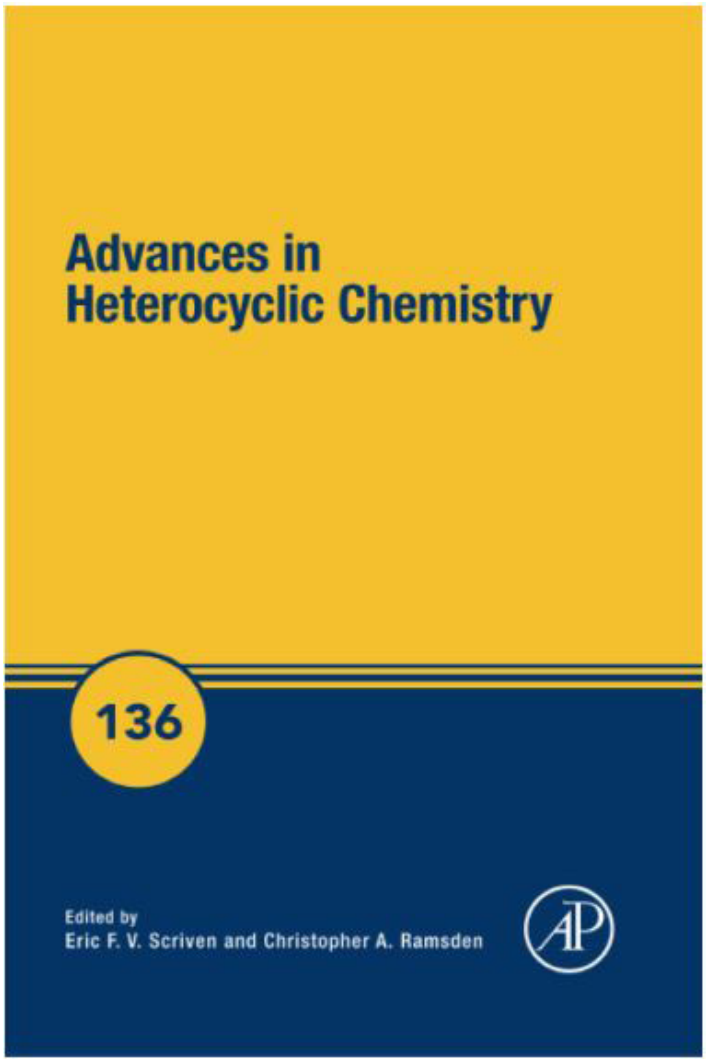

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