Universitatea Politehnica Timișoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

Research Report 2021

Annual Research Report

Politehnica University Timisoara

2021

Research Report 2021

Research Report, 2021

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ISSN 1841-2769
ISSN-L 1841-2769

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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 2021, 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 twenty-six research centres specialized in fields that are capital for the sustainable development of any modern society. Each of these research centres 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 centres 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 twelve 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 twenty-six research centres hosted by the university. The order in which they are presented is given by the research fields. The research centres, 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.

Research Report 2021

The second 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 third and fourth sections include the research projects implemented by the university. The third section includes the projects supported by public funds, both national and international, while the fourth 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 and utility models invented, presented in the fifth section.

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

Sections seven and eight include habilitation theses and Ph.D theses held in 2021 in our University.

Section nine 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 tenth 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. Section eleven presents the most relevant scientific researches that have been published in 2021. 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 twelfth section comprises 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.

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RESEARCH CENTRES

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

In 11 November 2020, the Center for Innovation and Technology Transfer (CITT) Politehnica 2020 received the provisional authorization from the Ministry of National Education, for a 12 month period, in the fields of

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

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

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

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

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

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

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

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

e) Supporting the achievement of the performance indicators of the Politehnica University of Timişoara 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;

CITT
POLITEHNICA 2020

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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SCIENTIFIC EXCELLENCE AWARDS

The UPT Rector, Honorary Professor of the Obuda University of Budapest Assoc. Prof. Dr. Eng. Florin DRĂGAN

The Rector of the Politehnica University Timisoara, Assoc. Prof. Dr. Eng. Florin Drăgan, attended, at the invitation of the management of the Obuda University of Budapest, the festive meeting of the Senate of the Hungarian higher education institution dedicated to the opening of the 2021/2022 academic year. The ceremony was hosted at the Palace of Arts in Budapest on 30 August 2021 and was chaired by Mihály Varga, Minister of Finance in the Hungarian government and also Chairman of the Board of the Rudolf Kalman Foundation, which funds the University of Óbuda, and Prof. Dr. Eng. Levente Kovács, rector of the institution.

At the ceremony, Prof. Dr. Eng. Levente Kovács, rector of the Óbuda University, awarded honorary titles to outstanding professional figures, recognized at international level.
The Rector of the Politehnica University Timisoara, Assoc. Prof. Dr. Eng. **Florin Drăgan**, was rewarded with the title of **Honorary Professor** "for his outstanding achievements in improving and increasing the international quality of education, scientific research and academic activities".

In 2019, the Politehnica University Timisoara and the Obuda University of Budapest signed a 5-year cooperation framework agreement, which provides for the development of collaboration at the educational level, through mutual promotion of bachelor, master and doctorate curricula, mutual recognition of diplomas, exchanges of teachers, organizing competitions at the two universities, organizing dual-system curricula, promoting summer schools, exchanging information and best practices, as well as in the field of research and exchange of students.

The two higher education institutions began their collaboration in the academic year 2001/2002, on the automation and computer line, which is also the field of expertise of the current UPT rector, Assoc. Prof. Dr. Florin Drăgan.

Relations between the two universities have subsequently been extended, in particular in recent years, both on the academic side, through exchanges of teachers and students, and in research, leading to partnership relations in several international projects and to further lines of cooperation.

„Paolo Lazzarin“ 2021 Medal for Prof. Dr. Eng. Liviu MARŞAVINA

The Italian Group of Fracture awarded the **“Paolo Lazzarin“ 2021 Medal** to **Professor Liviu MARSAVINA**, from Politehnica University Timisoara in recognition of the outstanding research work on the cellular polymeric structures and the successful application of Strain Energy Density criterion to those and other novel structures.

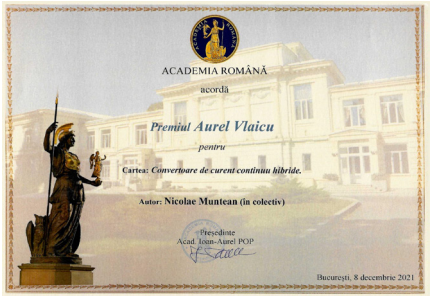
The award ceremony took place during the **26th International Conference on Fracture and Structural Integrity** organised by the **Italian Group of Fracture** from 26 to 31 May 2021 at the Università Politehnico di Torino, Italy.

Dr. Paolo LAZZARIN (1957 - 2014) was a professor at the University of Padua, Italy, with outstanding contributions to the study of the stress and strain field in the vicinity of cracks and notches. He proposed the failure criterion based on mean strain energy with applications to static and fatigue failures. He was editor of the **Wiley journal Fatigue and Fracture of Engineering Materials and Structures**. In his memory, the Italian Group of Fracture instituted the **“Paolo Lazzarin” Medal** in 2019.

Romanian Academy Awards for 2019 - "Aurel Vlaicu" award and Romanian Academy of Scientists Awards for 2019 - "Martin Bercovici" award for the book: "Hybrid DC Converters", authors Octavian CORNEA, Dan HULEA and Nicolae MUNTEAN

The book, published by "Editura POLITEHNICA", refers to a scientific\ research activity of over 10 years, in the field of power electronics, of a team from the POLITEHNICA University Timisoara. The book addresses the topical issue of hybrid DC-DC converter topologies. It is materialized through a systematic study that has as finality the application, which finally validates all the theoretical considerations. That is why the topologies presented in the paper are potential solutions for modern industry, especially in the conversion of renewable energies and automotive systems. There are few publications in the country and abroad that deal with these classes of converters, so the book can be both a course material and a design guide.

Clarity of exposition, specific scientific language, elevated but not hermetic, the rigor, the elegance of the manipulation of the mathematical apparatus, the suppleness and accuracy of the physical interpretation of the experimental data and the graphic presentation are strong points of the paper.The book deals with a field with very few publications in Romanian, and, as such, completes the spectrum of specialized books in this field with a work written from a practical point of view, integrating the most advanced scientific results in the field.
The paper had direct effects: five doctoral theses, papers at international conferences and in high-impact journals, and 3 research contracts (one of them, EEA funds, which triggered the authors' approach to this field of research).



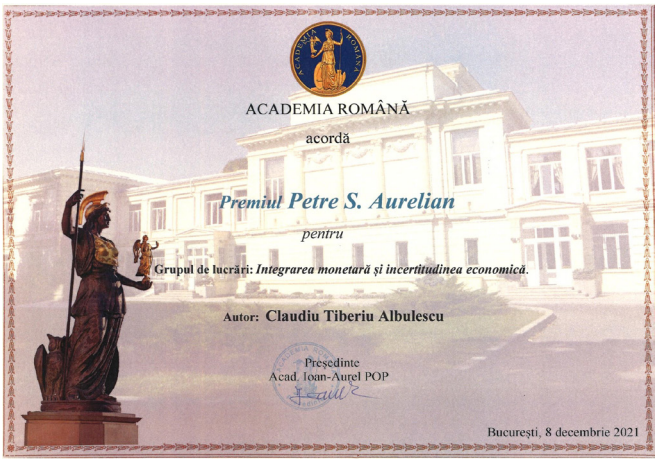
Romanian Academy Award
The „Petre S. Aurelian" Prize awarded in 2021
Prof. Dr. Eng. Claudiu - Tiberiu ALBULESCU

The prize was officially awarded during the special session **"Romanian Academy Awards for the year 2019"** held in Aula of the Romanian Academy, on 8th December 2021.

The first paper **"The micro-foundations of an open economy money demand: An application to central and eastern European countries, Journal of Macroeconomics"** develops a money demand model for the Central and Eastern European Countries.

The second paper **"The money demand and the loss of interest for the euro in Romania, Applied Economics Letters"** applies the theoretical model to the Romanian economy and highlights the dynamics of the money demand.

Finally, the third paper **"Does the U.S. economic policy uncertainty connect financial markets? Evidence from oil and commodity currencies, Energy Economics"** assesses the impact of economic policy induced uncertainty on financial market connection and dynamic spillovers of price shock.



EPE-ECCE/IEEE- Europe International Annual Conference , Ghent, Belgium "2021 Outstanding Achievement Award" to Acad. Ion Boldea for "the entire carrier and contributions to Power Electronics"

European Power Electronics (EPE) is a nongovernmental/professional organization of Companies and individuals/Academia that promoted for decades power electronics as a key enabler technology in electric energy conversion, storage processing and control for ever higher productivity and energy savings (CO_2 reduction) in all industries, from Energy Systems, through industrial motion control, robotics, e-transport and info gadjets.

EPE joined IEEE/ECCE (Energy conversion and exhibition Conference) under the name **"EPE-ECCE-Europe "** as the annual flagship of Conferences on Power Electronics in Europe.

The EPE-ECCE-EUROPE 's "Outstanding Achievement Award" is granted annually to 1(2) person(s) at the Conference for a long term highly visible for their long R&D contribution to Power Electronics for industrial applications.
In September 2021 the "Awards Session " hosted the EPE-Board took place online with a Presentation from the EPE President followed by a short "acceptance speech:" by the Awardee.

''This Award is a great honor for me, but I take it only in humbleness and responsibility for more R&D efforts and results in the years to come", Ion Boldea.

2021 EPE Outstanding Achievement Award

By this document, the EPE Association Executive Council and Power Electronics Community express their gratitude for the lifelong support and inspiring contribution to the EPE Association and field of Power Electronics to:

Ion Boldea

for his contributions in research in the field of linear and rotary electric machines, electric drives, wind generators and magnetic levitation vehicles. He invented linear oscillatory machine and created the first vehicle in the World powered by a magnetic pillow with advanced synchronous linear motors. He published a series of international books on different types of electrical machines and drives, and contributed to many EPE Conferences.

This award was presented in Ghent, on 7 September 2021.

Vladimir Katic
President of the Awards Committee

Leo Lorenz
President of the EPE Association

Alex Van Den Bossche
Conference Chairman

EDEN Senior Fellow Award, Dr. Eng. Diana ANDONE

Dr. Eng. Diana Andone, director of the **e-Learning Centre of the Politehnica University Timisoara** received the **EDEN Senior Fellow Award**, one of the most prestigious annual awards of the EDEN community, as **"recognition of the contribution to the development of open, distance, and e-learning in Europe and for a valuable commitment and support for the evolution and progress of EDEN"**.

The award was presented on June 21, 2021, by EDEN President Sandra Kučina Softić at the Opening Ceremony of the EDEN 2021 Annual Virtual Conference, hosted by UNED - Universidad Nacional de Educación a Distancia, Madrid.

The official announcement of EDEN states: "In the decades of affiliation with EDEN in various roles and capacities, she (Diana Andone) has enriched our conferences with countless papers, workshops, webinars, and courses [. . .] She has been the engine of modernizing the communication of the Association, both in the application of cutting-edge technologies and in the construction of a contemporary system of information flows.

As a host of the EDEN webinar series during COVID and the first annual EDEN virtual conference, through UPT, she helped lay the groundwork for a new culture for EDEN in the organization of online and virtual events."

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. 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.

In the last 12 years, over 100 Fellow and Senior Fellow awards have been given by the decision of the EDEN Executive Committee.

Banat Excellence Gala, in 2021 - "Traian Vuia" award for "Engineering Sciences", Prof. Dr. Eng. Nicolae MUNTEAN

The "Banat Excellence Gala", an event organized in partnership with the Romanian Academy, has 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 2021 having as winner the professor Nicolae Muntean, from the Department of "Electrical Engineering".

Nicolae Muntean has over 40 years of experience in the fields of power electronics, automotive systems, conversion and storage of renewable energy and industrial automation.

He has over 30 years of experience in the management of research, consulting and design activities, being a coordinator or member of over 20 research programs with national and international funding.

He is the author / co-author of over 100 scientific papers, most of them published in journals and proceedings of international conferences with impact.
He is the author / co-author of **six books**, one of them **"Hybrid DC-DC Converters"**, obtaining in 2021 the "Aurel Vlaicu" award of the Romanian Academy.
He holds **17 patents**.

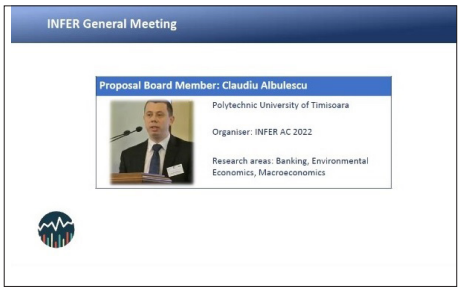
He was Scientific Secretary of the Faculty of Electrical and Power Engineering, Vice Dean, and Interim Dean in 2020.

He set up, based on his own projects, five teaching laboratories: Electronic Equipment, Industrial Automation, Renewable Energy Conversion and Storage, Electric Machines and Programmable Automation Systems.
Since 2011 he has been the director of the research center **"Control of energy conversion and storage".**

Since 2019 he has been working as a scientific researcher at the Timisoara Branch of the Romanian Academy. He is an Honorary Member of the Romanian Academy of Technical Sciences, IEEE Senior Member and Associate Editor of the **Journal of Electrical Engineering**.

International Network for Economic Research, Elected member of the INFER Board, Prof. Dr. Claudiu - Tiberiu ALBULESCU

The International Network for Economic Research (INFER) is an international organization in the field of economic research, established in the 1990s in Germany. The aim of the organization is to facilitate research collaborations in all economic fields, to organize scientific events, to provide opportunities for the dissemination of research results and to become a partner for the promotion of major research projects. Several universities and research centres are institutional members of INFER.



At their annual meeting held in Lisbon on 9th September 2021, the INFER members elected the new board of the organization. **Prof. Dr. Claudiu - Tiberiu ALBULESCU was elected as a Board member in charge with the INFER Annual Conference**.

Claudiu - Tiberiu Albulescu is Full Professor of Economics and Finance at the Politehnica University Timisoara.
He holds a Ph.D. in Economics/Finance from the West University Timisoara and University of Poitiers (double diploma).

Prof. Dr. Albulescu followed a postdoctoral program at the Romanian Academy and in 2014 he received the Habilitation title in Finance, at the West University of Timisoara (WUT). He is also associated researcher at CRIEF, University of Poitiers, and at the Doctoral School of Economics and Business Administration within WUT.

Claudiu Albulescu was visiting professor at University of Poitiers and visiting researcher at University of Orléans.
He published over 80 journal articles, 20 proceeding papers, 4 books and 5 book chapters.

IEEE Education Society "Distinguished Chapter Leadership" reward for Excellence in Educational Leadership, Dr. Eng. Diana ANDONE

The "Distinguished Chapter Leadership Award" reward of the IEEE Education Society was granted in 2021 to the director of the e-Learning Centre of the Politehnica University Timisoara - Dr. Eng. Diana Andone - for successful promotion and implementation of digital learning activities beyond the STEM disciplines and innovative contributions in IEEE Education Romania.
The distinction is awarded annually to recognize a Society member who has, over a sustained period of time, made an exceptional contribution to the Society, which has manifested itself at a local Chapter.
(https://ieee-edusociety.org/awards/distinguished-chapter-leadership-award)

The distinction was awarded based upon the following factors: leadership roles and leadership quality, which have provided an innovative, inventive, and/or important service/contribution to a local Chapter of the IEEE Education Society over a sustained period of time.

As justification for the award, the IEEE Education Society mentioned the series of works and contributions to the development of digital education policies, methods and resources, especially for improving the quality of education in science, technology, engineering, promoting open education and influencing education by tens of thousands of educators and young people in Romania and Europe.

The award is granted by the IEEE Education Society and consists of a Commemorative Plaque, a Certificate, and paid registration to the next fall's Frontiers in Education (FIE) Conference in Uppsala, Sweden, in October 2022, where the Award Ceremony will take place.

IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. IEEE and its members inspire a global community to innovate for a better tomorrow through its more than 400,000 members in more than 160 countries, and its highly cited publications, conferences, technology standards, and professional and educational activities. IEEE is the trusted "voice" for engineering, computing, and technology information around the globe.

Excellence Awards 2021 Gala at the Politehnica University Timisoara: Academician Dan DUBINA, President of the Timisoara Branch of the Romanian Academy, the „Centenary" Award, Prof. Dr. Eng. Larisa-Victoria IVAŞCU, the „Excellence in Research" Award

Ever since the establishment of the Polytechnic School in Timisoara, its first rector, Traian Lalescu, has established a true culture of excellence by bringing highly professional teachers, by an exemplary organization, by a high standard of the educational process, but also of the research. Both teachers and students committed themselves with all their determination to building a school according to the aspirations and spirit of Timisoara, a spirit that would penetrate, as King Ferdinand said, within the walls of the first institution of higher education in the west of the country. This year, in order to reconfirm the fact that Politehnica University Timisoara recognizes true values, supports and rewards the efforts made, the excellence was awarded through an event that honors the entire UPT community - the 2021 UPT Excellence Awards Gala.

The **"Ioan de Sabata" Awards** were presented to teachers who excelled in the educational process and in the tutoring of students, based on an open competition, at the proposal of the commissions established at the level of faculties: Lecturer Dr. Eng. **Oana Sorina Chirilă** and Assist. Prof. Dr. Eng. **Stelian-Nicolae Nicola**, from the Faculty of Automation and Computing; Lecturer Dr. Eng. **Radu-Ovidiu Ardelean**, from the Faculty of Industrial Chemistry and Environmental Engineering; Lecturer Dr. Eng. **Maria-Roberta Jianu** and Lecturer Dr. Eng. **Clara Beatrice Vâlceanu**, from the Faculty of Civil Engineering; Lecturer Dr. Eng. **Ciprian-Ovidiu-Miron Dughir** and Lecturer Dr. Eng. **Constantin Marian Bucos**, from the Faculty of Electronics, Telecommunications and Information Technologies; Lecturer Dr. Eng. **Ana-Adela Popa**, from the Faculty of Electrical and Power Engineering; Assoc. Prof. Dr. Eng. **Sorin-Aurel Raţiu**, from the Faculty of Engineering in Hunedoara; Lecturer Dr. Eng. **Attila Turi,** from the Faculty of Management in Production and Transportation; Lecturer Dr. Eng. **Cristian-Emil Moldovan** and Lecturer Dr. Eng. **Adrian-Eugen Cioablă**, from the Faculty of Mechanical Engineering; Assist. Prof. Dr. Eng. **Andreea-Florina Pele**, from the Faculty of Communication Sciences.

Moreover, the **„Centenary" Award** was presented to **Academician Dan Dubină**, President of the Timisoara Branch of the Romanian Academy, for excellence in academic and research activity.

Also for excellence in the process of education were awarded the **"Ioan de Sabata – Innovation in Education"** Prizes, at the proposal of the Education Commission of the UPT Senate, to the following: Assoc. Prof. Dr. **Răzvan-Virgil Bogdan**, from the Faculty of Automation and Computing and Assoc. Prof. Dr. Arch. **Cristian-Tiberiu Blidariu,** from the Faculty of Architecture. Nevertheless, not just teaching endeavor was awarded, but also research activities. Therefore, the **"Excellence in Research" Awards** were presented to young Master students, doctoral candidates and researchers who had the most published articles in internationally ranked journals: Eng. **Elisei Ștefan Ilieș**, Eng. **Oana Grad**, Prof. Dr. Eng. **Larisa-Victoria Ivașcu**.

The **„Traian Lalescu" Award**, designed for rewarding exceptional results in pre-university activities, was presented to the highschool student **Vlad-Ștefan Oros**, from the Theoretical Highshool „Grigore Moisil", holder of golden medals in the international student competitions in the fields of Physics and Astronomy, a passionate of linguistics, piano and photography. One year-long efforts were also rewarded through the **„Excellence in Digitalization" Award** (Assoc. Prof. Dr. Eng. **Ovidiu Baniaș** and Lecturer Dr. Eng. **Octavian Ștefan**), **„Excellence in Sport"** (Benjamin Bodo), **„UPT Innovation Fellows"** (AIMinded), **„Excellence in Sustainable Development"** (Prof. Dr. Eng. Radu Vasiu).

Prof. Dr. Eng. Corina NAFORNITA elected Humanitarian Activities coordinator of IEEE Romania Section

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.

In Romania, the IEEE Romania Section was founded in July 1990.
In the period 25-31 January 2021, elections were held for choosing the new Section committee.
One of the new roles in the committee was the **Humanitarian Activities Coordinator**.
The Humanitarian Activities coordinator is responsible for promoting humanitarian activities and events at the section level.

IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity. 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.

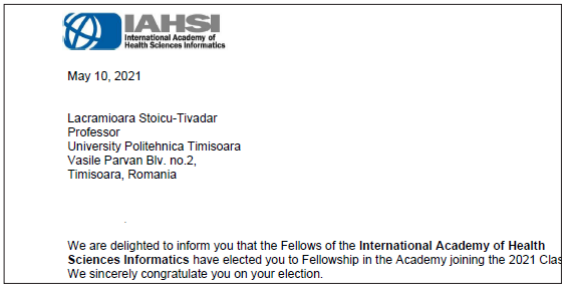
At this election, **Prof. Dr. Eng. Corina Nafornita**, a Senior Member of IEEE with known volunteering activities regarding IEEE Romania Section, was proposed by the IEEE Romania section committee.

The members of the section have expressed their vote and **Prof. Dr. Eng. Corina Nafornita was elected as Humanitarian Activities coordinator for the term 2021-2022.**

The committee member list can be found at the following webpage :
https://romania.ieeer8.org/committee/section-committee

Prof. Dr. Eng. Lăcrămioara STOICU-TIVADAR elected Fellow of the International Academy of Health Sciences Informatics, class 2021

Prof. Dr. Eng. Lăcrămioara Stoicu-Tivadar was elected **Fellow of The International Academy of Health Sciences Informatics (IAHSI), class 2021**. As is customary, each new IAHSI nomination must come from two fellows, and he/she is elected with a majority of member votes.


IAHSI
International Academy of Health Sciences Informatics

May 10, 2021

Lacramioara Stoicu-Tivadar
Professor
University Politehnica Timisoara
Vasile Parvan Blv. no.2,
Timisoara, Romania

We are delighted to inform you that the Fellows of the **International Academy of Health Sciences Informatics** have elected you to Fellowship in the Academy joining the 2021 Clas
We sincerely congratulate you on your election.

IAHSI was founded in 2017 under the aegis of IMIA – The International Medical Informatics Association. The organization brings together specialists from all over the world with globally recognized contributions to medical informatics.

Currently its members are from high profile universities and organizations all over the world. The Academy members offer expert advice to government and non-government organizations and has the purpose to promote knowledge and best practice dissemination, and to encourage global collaboration, resource, and expertise exchange.

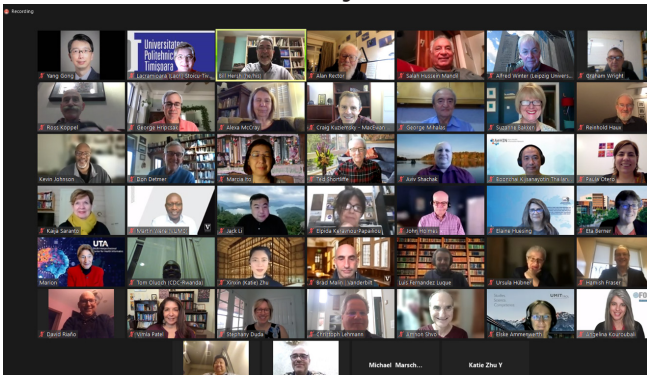
Lăcrămioara Stoicu-Tivadar is professor at the Faculty of Automation and Computers - Politehnica University Timisoara, Romania.
She is Vice president for Europe of the International Medical Informatics Association (2020-2022), IMIA, after acting as the European Federation of Medical Informatics President (elected President, 2018-2020).

Prof. Dr. Eng. Lăcrămioara Stoicu-Tivadar initiated and coordinates since 2009 the Master in Healthcare Informatics, a national premier associated with UPT, and is PhD Coordinator in Computers and Information Technology.

Her current research domains are: Virtual Reality in healthcare education and clinical activity, IoT & AI applied in medicine and Active Aging. She is member of scientific program committees for international digital health conferences and journals and member in consortia of EU projects.

For 2021-2024 she coordinates the EFMI team activity in the 24 partners project HosmartAI - "Hospital Smart development based on AI – that aims to be the most relevant player for the digital transformation of the European healthcare sector, to make the European healthcare system more strong, efficient, sustainable and resilient".

IAHSI welcome meeting, class 2021



UPT won gold in the Public Communication section at the prestigious "Romanian PR Award" Gala

Politehnica University Timisoara writes history in the Romanian communication industry. On Thursday, 25 November 2021, at the **"Romanian PR Award" Gala, the Politehnica University Timisoara won the first prize, "Golden Award for Excellence", in the Public Communication section, with the project "The UPT Centenary"**. This is the first time that a Romanian university has won a prize at this prestigious gala, a remarkable success taking into account the strength of agencies and companies with which the project implemented by the UPT Communication and Image Department team competed.

"The success of the UPT centenary project series is proof of the strength of our community. We set out on our way with the desire to show the city and the region the real Politehnica of Timisoara 100 years after its establishment, with the concern to recall the role it has played over the years in the economic and social development of the city and with the conviction that we should set out the directions of collaboration for the coming years", specified Assoc. Prof. Dr. Eng. Florin DRĂGAN, rector of the UPT.

"The excellence in communication is honored with a trophy-work of sculptor Peter Jecza and we are glad to bring home to Timisoara The Genesis of the well-known sculptor," noted Prof. Dr. Eng. Sorin MUSUROI, UPT vicerector in charge with the University's image, communication and socio-economic environment.

"An amazing campaign, that took a year affected by the pandemic, and that covered extremely various areas", explained Ioana Manoiu, Managing Partnet, GMP PR, in the presentation of the winning project. The candidature included the presentation of the most important moments in the series of the anniversary campaign: **Politehnica Timisoara - 100% performance** (11 November 2019), **2020 – The year of the Politehnica in Timisoara** (18 February 2020), **Release of the philatelic program dedicated to the centenary of the Politehnica University in Timisoara** (18 February 2020), **graduation festivities 2020** (20 September 2020), **UPT Centenary and RockIng Concert** (November 11, 2020), the Romanian National Bank's release of a silver coin dedicated to the centenary of Timisoara's Poltehnica, as well as other notable achievements aimed at strengthening the UPT brand.

In its 19th edition, "Romanian PR Award" is the most important national competition to recognize excellence in communication in Romania. The PR Award Gala organizer is the Forum for International Communications, a non-governmental organization that cultivates ethical and performance standards of the public relations profession in the communicators environment.

On 4 November 2021, when the finalists of the XIXth edition of the "Romanian PR Award" Gala were announced, **the Politehnica University Timisoara was the first higher education institution with two final nominations: The winning project - the "UPT Centenary" in the Public Communication section and Spotlight Heritage Timisoara in the Culture and Art section**.

The Politehnica University Timisoara, national first place in the field of Computer Science, Information Technology and Informatics, in the THE ranking

Politehnica University Timişoara ranks first in the country in Computer Science according to the prestigious ranking Times Higher Education (THE) for 2022, released on Wednesday, 6 October 2021, in the United Kingdom.

The UPT is placed within the place range 600 - 800 worldwide, as is the Babes-Bolyai University of Cluj Napoca. In the engineering field, the Politehnica Timisoara ranks 2 in the country and 1 among technical universities, on an equal footing with the Technical University of Cluj Napoca, both of which are in the world place range 801-1000.

The British ranking THE is one of the most prestigious and comprehensive international rankings of universities, with the classification system looking at complex criteria related to teaching, research, socio-economic relationship and internationalization.

Thus, for Computer Science and Engineering, the indicators considered are: teaching - 30%; research (volume, revenue and reputation) - 30%; quotations (the research influence) - 27.5%; international visibility (academic staff, students, research) - 7.5%; revenue from industry (technology transfer) - 5%.

The UPT rector, Assoc. Prof. Dr. Eng. Florin Dragan stated that "this ranking of our university among the top places in the country and in world-leading places is a consequence of the culture of performance, always promoted in the UPT, but also of recent efforts and openness towards research, through projects in cutting-edge technology areas where the Politehnica has sound expertise, such as artificial intelligence, microelectronics, cyber security, multidisciplinary research in collaboration with other universities, as engineering is nowadays the foundation for most applied research projects."

For the assessment of Computer Science or Engineering, in view of the classification, a university shall have a minimum of 500 publications within the five years preceding the collection of data in each field and a certain minimum number of academic staff (for Computer Science, at least 1% but not less than 20 people, and for engineering at least 4% of the total).

Romanian Academic Society of Management Award: SAMRO -2021 Award "The best management book" for the book "Occupational risk management" Authors: Anca DRĂGHICI, Nicoleta CĂRUŢAŞU, Larisa IVAŞCU

Prof. Dr. Eng. Victoria Larisa Ivaşcu has been awarded for **the best management book in 2020** in Romania with the book entitled **"Occupational risk management", developed by Anca Drăghici, Nicoleta Căruțașu and Larisa Ivașcu, Politehnica Press Bucharest, by the Romanian Academic Society of Management.**

This book is dedicated to a field of management for which a thorough scientific publication is missing (at least in Romanian literature). Thus, through the different but complementary experience and skills of the authors, demonstrated by the content of the chapters of the book, this paper demonstrates a high scientific rigor. The 10 chapters are accompanied by a bibliographic list that includes current, relevant titles, and the scientific discourse and argumentation are high, but appropriate to the field and issues addressed.

The contribution to the development of knowledge in the field of management and / or managerial practice is demonstrated by the "gap in the field of management" approached. The topics covered in each chapter are very current and are located at the intersection of several areas of knowledge such as: occupational health and safety management, occupational medicine, ergonomics, the study of labor movements.

The paper is interdisciplinary and is a real collection of knowledge and skills, supported by examples from the practice of organizations. The paper was the basis for research reporting for many master's and doctoral students in various programs related to Engineering and Management. Thus, the book provides a basis for the education of future managers concerned with optimizing occupational risks.

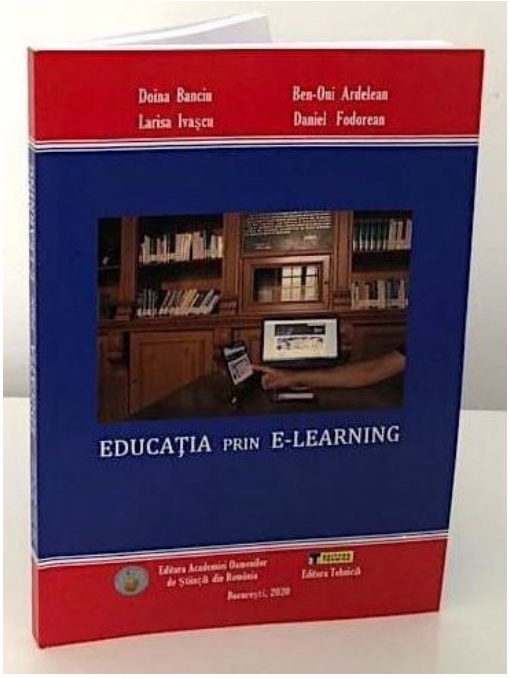

SAMRO

SOCIETATEA ACADEMICĂ DE MANAGEMENT DIN ROMÂNIA
acordă
Premiul SAMRO - 2021
Anca DRĂGHICI, Nicoleta CĂRUTAȘU, Larisa IVAȘCU,
pentru cea mai bună carte de management în anul 2020,
"MANAGEMENTUL RISCURILOR OCUPAȚIONALE",
editura Politehnica Press, București, 2020.
DATA: 02.11.2021
Președinte,
Prof. univ. dr. Ovidiu NICOLESCU

The Romanian Academic Society of Management (RASM) was established at the initiative of the PhD supervisors in the field of Romanian management, as a legal entity, under private law, through the free consent expressed by university scientists, who carry out teaching and research activities in management and related fields.
RASM is an elite, non-governmental, apolitical scientific organization, based on the principles of full democracy, whose mission is, on the one hand, to promote sustainable knowledge-based management, through the cooperation of Romanian academic elites with those of world-renowned management schools, and on the other hand, to promote the managerial experiences of excellence of the managers from Romania and everywhere.

Organized exclusively for non-profit purposes, the Society aims to professionalize Romanian management in the spirit of competence and performance, having as main objectives: amplifying the national and international visibility of the Romanian management; promoting the Romanian management and the experiences (leaders) of excellence in management; the realization of the specialized professional interface between the academic environment and the business environment promoting specialized publications in the field of management; organizing national and international scientific events; promoting new models of managerial thinking – sustainable and knowledge-based – and involvement in continuing education.

Digital Transformation Gala 2021 Award: "The Best Book"
For the book "Education through e-learning"
Authors: Doina BANCIU, Ben-Oni ARDELEAN, Larisa IVAŞCU and Daniel FODOREAN



Prof. Dr. Eng. Victoria Larisa Ivaşcu has been awarded for the best book in 2021 with the work entitled "Education through e-learning", elaborated by Doina Banciu, Ben-Oni Ardelean, Larisa Ivaşcu and Daniel Fodorean, AOSR publishing house and Technical publishing house within the Digital Transformation Gala on December 19, 2021.

Digital Transformation Gala 2021 attracted, both for the Debate and the Awards Ceremony, the high elite of the business leaders, professionals, influential thinkers, decision makers and executives from Romania and SE Europe region. DX GALA rewarded both the individuals and companies with great achievements in developing new and innovative services to improve our lives with DX solutions and projects.

The whole paper is in the form of a guide designed to support the educational process in Romania during this period in which, due to the COVID-19 pandemic, being a support for both teachers and students who must quickly adapt to new conditions teaching - learning and communication.

It is structured in three parts: the first part presents theoretical aspects of the e-learning process, the second part presents a practical example of the implementation of digital education, practiced in different countries, as a result developed in a study conducted in a project international cooperation, and the third part deals with a topic without which the e-learning process cannot take place, namely, the necessary technical resources and digital data collections as a support for information, documentation, training, education. The facilities of some of the most used platforms for e-learning and digital dialogue in Romania are briefly described.

The book entitled **„Education through e-learning"** is extremely topical 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 systematic way, the progress and current state of e-learning education.

UPT, among the top three Romanian universities in the world ranking of the most often quoted authors of Scopus indexed scientific papers

The prestigious Stanford University in the United States has recently released a ranking of the 2% most cited authors of Scopus indexed scientific papers, with the Politehnica University Timisoara having a worthy presence in both the 2020 ranking and the career ranking.

Thus, a publicly available database of more than 190,000 top scientists has been created which provides standardized information on citations, the h-index, the adjusted hm-index for co-author, citations of works in different authoring positions and a composite indicator. Separate data is displayed for the impact throughout the career and for a single year. Values with and without self-citation are given, as well as the ratio between the citations and the work quoted.
Scientists are ranked in 22 scientific fields and 176 sub-domains.

In the first ranking, which refers to the impact of the citations for 2020, the **Politehnica University Timişoara** is present with **14 professors**: **Ion Boldea, Ioan Sârbu, Radu-Emil Precup, Marius Gheju, Codruța O. Ancuți, Liviu Marșavina, Cosmin Ancuți, Emanoil Linul, Dan Dubină, Robert Ianoș, Călin-Adrian Popa, Daniel Belega, Radu Marinescu and Vasile Marinca.**

This ranking includes 191 professors and researchers from all Romanian universities and research institutes. The Polytechnic University of Bucharest comes first with 14 professors and the University of Bucharest is second with 13.

Timisoara is also represented in this top by the University of Medicine and Pharmacy "Victor Babes" with 4 nominations and the West University with one position.

In the second ranking, regarding the impact of citations throughout the career, which includes 134 professors and researchers from universities and research institutes in Romania, the Politehnica University Timisoara is present with the following: **Ion Boldea, Radu-Emil Precup, Ioan Sârbu, Dan Dubină, Robert Ianoș, Liviu Marșavina, Gheorghe-Daniel Andreescu, Daniel Belega, Ladislau Matekovits, Virgil-Florin Duma, Radu Marinescu and Vasile Marinca**. Also 10 nominations are made for the Polytechnic University of Bucharest, while Babeș-Bolyai University in Cluj is present with 11.

"We are pleased with this new confirmation of the results of our university research, especially since, in terms of the number of teachers, the results are the highest in Romania. In addition to the presence in this top of those who have scored throughout their careers, the very good results of our younger colleagues in recent years can also be noted, which carry on the tradition of the Politehnica as the most important research pole in Western Romania", **said UPT's vice-rector Prof. Dr. Eng. Liviu Marsavina – corresponding member of the Romanian Academy.**

13th European Exhibition of Creativity and Innovation "EUROINVENT 2021" Iasi, online edition 20-22 May 2021
Multiple medals for Politehnica University Timisoara

A team from the Politehnica University Timisoara participated in the **EUROINVENT** International Exhibition held in Iasi (online), 13th edition, between the 20th and the 22nd of May 2021. **The UPT has attended with 36 patents, research projects, doctoral theses, educational programs and 5 publications.** The event promotes creativity and innovation in international context. The 2021 edition showed over 500 inventions and projects, being the largest in Eastern Europe. During EUROINVENT, leading inventors, researchers, engineers and scientists present actual research topics in all fields of research. Virtual calalogue: http://www.euroinvent.org/cat/E2021.pdf

Here are some of the awards received by UPT :

1. Politehnica University Timişoara
- Excellence Award and Diploma

2. For outstanding inventions & innovation
- Inventor: Corneliu Birtok-Baneasa
- Diploma of Innovation Ambassador

3. Control method for an automatic capacitive compensator meant to improve the power factor and to load balancing in three-phase four-wire electrical networks
- Inventor: Pană Adrian
- Bronze Medal and Diploma

4. Process for integrating the dry deflection by-product into the density slam recipe for hydraulic transport through pipe systems
- Inventors: Wächter Mihail Reinhold, Ionel Ioana, Negrea Petru
- Silver Medal and Diploma

5. Electrical light installation for dental esthetics
- Inventors: Pavel Ștefan, Krems Cristina, Mocan Marian Liviu, Doboși Ioan Silviu
- Gold Medal and Diploma

6. Installation for the evaluation of the magnetic field exposure effects
- Inventors: Pavel Ștefan, Lupa Lavinia Afrodita, Mocan Marian Liviu, Ungureanu Daniel-Viorel, Doboși Ioan Silviu, Moldovan Aurel, Simina Alina Georgiana, Bînzar Alexandru, Suciu Silviu Cristian
- Gold Medal and Diploma
- Gold Medal of the "Stefan cel Mare" University of Suceava

7. Earthing electrode with corrosion resistant connections
Inventors: Pavel Ștefan, Ungureanu Daniel-Viorel, Mocan Marian Liviu, Doboși Ioan Silviu, Topală Florin-Ionel
- Gold Medal and Diploma

8. Electrical installation for air and surface disinfection from the public transport
Inventors: Pavel Ștefan, Ungureanu Daniel-Viorel, Bînzar Alexandru, Tutelcă Ancuța Letiția, Suciu Silviu Cristian, Popoiu Călin Marius
- Silver Medal and Diploma

Project:

3D Porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system for advanced treatment of cytostatics-containing water (3DSAPECYT)
- Inventors: Manea Florica, Orha Corina, Tudoran Constantin Adrian
- Silver Medal and Diploma

Exhibition Idea-Novelty-Invention IDEA- 2021, Hungary, online edition, 17-18 September 2021
Multiple medals for the Politehnica University Timisoara

The IDEA International Exhibition and fair aims to promote the development of technical-intellectual work, to stimulate the creative spirit, to encourage the implementation and use of innovations and inventions and to promote the social consolidation of the awareness of industrial property rights.
The event "Exhibition Idea-Novelty-Invention IDEA- 2021" took place in Hódmezővásárhely, Hungary, between 17-18 September 2021.
Site: https://otletclub.5mp.eu
The Politehnica University Timisoara received 14 diplomas and medals. Here are some of them:

1. Installation for the evaluation of the magnetic field exposure effects
- Inventors: Pavel Ştefan, Lupa Lavinia Afrodita, Mocan Marian Liviu, Ungureanu Daniel-Viorel, Doboşi Ioan Silviu, Moldovan Aurel, Simina Alina Giorgiana, Bînzar Alexandru, Suciu Silviu Cristian
- The IDEA Award

2. Earthing electrode with corrosion resistant connections
- Inventors: Pavel Ștefan, Ungureanu Daniel-Viorel, Mocan Marian Liviu, Doboși Ioan Silviu, Topală Florin-Ionel
- The IDEA Award

3. Electrical installation for air and surface disinfection from the public transport
- Inventors: Pavel Ştefan, Ungureanu Daniel-Viorel, Bînzar Alexandru, Tutelcă Ancuța Letiția, Suciu Siviu Cristian, Popoiu Călin Marius
- The IDEA Award

4. Installation for remote monitoring of corrosion of the ground constructions coated or not with zinc
- Inventors: Pavel Ştefan, Ungureanu Daniel-Viorel, Bînzar Alexandru, Moldovan Aurel
- The IDEA Award

International Specialized Exhibition "INFOINVENT" XVII - th Edition, Chisinau, Republic of Moldova, online edition, 17-20 November 2021
Multiple medals for the Politehnica University Timisoara

The Politehnica University Timisoara team participated in the International specialized Exhibition "INFOINVENT" 2021 (online), held in Chisinau, Republic of Moldova during 17-20.11.2021, with **34 patents, research projects, doctoral theses, educational programs and student projects**. The specialized international exhibition "INFOINVENT" is a forum of intellectual property, which supports and promotes creativity, attracting investments in innovation and technology transfer activity, carrying out mixed projects on the implementation of inventions, technologies and new materials in the national economy, as well as the development of international technical and scientific cooperation.

Virtual catalogue: **https://infoinvent.md/assets/files/catalog/catalog-2021.pdf**
Here are some of the outstanding awards received:

1. Control method for an automatic capacitive compensator meant to improve the power factor and to load balancing in three-phase four-wire electrical networks
- Inventor: Adrian Pană
- **Gold Medal and Diploma**

2. Installation for the evaluation of the magnetic field exposure effects
- Inventors: Stefan Pavel, Lavinia Afrodita Lupa, Marian Liviu Mocan, Daniel Viorel Ungureanu, Ioan Silviu Dobosi, Aurel Moldovan, Alina Georgiana Simina, Alexandru Binzar, Silviu Cristian Suciu
- **Gold Medal and Diploma**

3. Electrode and method for fast electrochemical detection of arsenic (III) from aqueous solutions
- Inventors: Florica Manea, Aniela Carmen Pop, Anamaria Simona Baciu, Adriana Ileana Remes
- **Gold Medal and Diploma**

4. Earthing electrode with corrosion resistant connections
- Inventors: Stefan Pavel, Daniel-Viorel Ungureanu, Marian Liviu Mocan, Ioan Silviu Dobosi, Florin-Ionel Topala
- **Silver Medal and Diploma**

5.Process for integrating the dry deflection by-product into the density slam recipe for hydraulic transport through pipe systems
- Inventors: Mihail Reinhold Wachter, Ioana Ionel, Petru Negrea
- **Silver Medal and Diploma**

6. Experimental plant for resistance to thermal fatigue
- Inventors: Camelia Pinca-Bretotean
- **Gold Medal and Diploma**

7. Tubular briquette from powdery ferrous wastes
- Inventors: Teodor Heput, Ana Socalici, Erika Ardelean, Marius Ardelean, Nicolae Constantin, Miron Buzduga, Radu Buzduga
- **Gold Medal and Diploma**

8. 3D Porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system for advanced treatment of cytostatics-containing water (3DSAPECYT)
- Inventors: Florica Manea, Corina Orha, Constantin Adrian Tudoran
- **Gold Medal and Diploma**
- **Best Innovation and Technology Transfer Project" Trophy and Diploma**


AGEPI

International Specialized Exhibition
"INFOINVENT"
XVII-th Edition

DIPLOMA

TROPHY
"BEST INNOVATION
AND TECHNOLOGY TRANSFER PROJECT"

is awarded to
Manea Florica, Orha Corina, Tudoran Constantin Adrian,
POLITEHNICA UNIVERSITY TIMISOARA,
INCEMC TIMISOARA, SC BEESPEED SRL, Romania
for
3D Porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system for advanced treatment of cytostatics-containing water (3DSAPECYT)

Eugeniu RUSU,
Chairman of the
Organizing commitee

Svetlana COJOCARU,
Chairman of the Jury

17-20 November 2021,
Chisinau, Republic of Moldova

Second edition of International Exhibition "InventCor" Deva, online edition, 16-18 December 2021
Multiple medals for Politehnica University Timisoara

The Politehnica University Timisoara team participated in the International Exhibition **InventCor 2021** (online), 2nd edition, held between 16-18.12.2021, with **51 patents, research projects, doctoral theses, educational programs and student projects**.
The main objective of the International Exhibition INVENTCOR is the development of the creative and innovative spirit, through the involvement of young people.
Virtual catalogue: https://www.corneliugroup.ro/inventcor.html
Coodinator: Lecturer. Dr. Eng. Corneliu Birtok Băneasă
Here are some of the outstanding awards:

1. Electrode and method for fast electrochemical detection of arsenic (III) from aqueous solutions
- Inventors: Florica Manea, Aniela Carmen Pop, Anamaria Simona Baciu, Adriana Ileana Remes
- **Gold Medal and Diploma**

2. Electrical installation for air and surface disinfection from the public transport
- Inventors: Stefan Pavel, Daniel-Viorel Ungureanu, Alexandru Binzar, Ancuta Letitia Tutelca, Silviu Cristian Suciu, Calin Marius Popoiu
- **Gold Medal and Diploma**

3. Installation for the evaluation of the magnetic field exposure effects
- **Inventors:** Stefan Pavel, Lavinia Afrodita Lupa, Marian Liviu Mocan, Daniel Viorel Ungureanu, Ioan Silviu Dobosi, Aurel Moldovan, Alina Georgiana Simina, Alexandru Binzar, Silviu Cristian Suciu
- **Gold Medal and Diploma**

4.Process for integrating the dry deflection by-product into the density slam recipe for hydraulic transport through pipe systems
- Inventors: Mihail Reinhold Wachter, Ioana Ionel, Petru Negrea
- **Gold Medal and Diploma**

5. Earthing electrode with corrosion resistant connections
- Inventors: Stefan Pavel, Daniel-Viorel Ungureanu, Marian Liviu Mocan, Ioan Silviu Dobosi, Florin-Ionel Topala
- **Silver Medal and Diploma**

6. Electrical light installation for dental esthetics
- Inventors: Pavel Stefan, Cristina Krems, Marian Liviu Mocan, Ioan Silviu Dobosi
- **Silver Medal and Diploma**

Project:

3D Porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system for advanced treatment of cytostatics-containing water (3DSAPECYT)
- Inventors: Florica Manea, Corina Orha, Constantin Adrian Tudoran
- **Gold Medal and Diploma**

The 25th International Exhibition of Inventics "Inventica 2021" Iasi, online edition, 23-25 June 2021
Multiple medals for Politehnica University Timisoara

A team from the Politehnica University Timisoara attended the 25th (online) edition of the International Inventics Exhibition – INVENTICA IASI 2021 – during 23-25 June 2021. The participation consisted of 34 patents, research projects, doctoral theses and educational programs. The INVENTICA 2021 event was a creative festival of inventors and of the beneficiaries of their inventions. The purpose of the event is to create an academic forum for the development of scientific innovation, with guests from Romania, Moldova, Malaysia, Croatia, Taiwan, Sweden and Poland, with over 340 patents, patent requests, research projects and scientific papers registered.

Virtual catalogue: https://ini.tuiasi.ro/exhibition/wp-content/uploads/sites/5/2021/06/Volum%20INVENTICA%202021.pdf

Here are some of the outstanding awards received by the Politehnica University Timisoara :

1.In recognition of their highly scientific contribution and loyalty to the XXV-th International Exhibition of Inventics - Inventica 2021
- Inventors: The group of students coordinated by Lecturer Dr. Eng. Corneliu Birtok-Baneasa
- **Junior Inventor Award**

2. Control method for an automatic capacitive compensator designed to improve the power factor and to load balancing in three-phase four-wire electrical networks
- Inventor: Adrian Pană
- **Diploma of Honor and Gold Medal**

3. Process for integrating the dry deflection by-product into the density slam recipe for hydraulic transport through pipe systems
- Inventors: Mihail Reinhold Wächter, Ioana Ionel, Petru Negrea
- **Diploma of Honor and Gold Medal**

4. Electrical light installation for dental esthetics
- Inventors: Ștefan Pavel, Cristina Krems, Marian Liviu Mocan, Ioan Silviu Doboși
- **Diploma of Achievement and Bronze Medal**

5. Installation for the evaluation of the magnetic field exposure effects
- Inventors: Ștefan Pavel, Lavinia Afrodita Lupa, Marian Liviu Mocan, Daniel-Viorel Ungureanu, Ioan Silviu Doboși, Aurel, Alina Georgiana Simina, Alexandru Bînzar, Silviu Cristian Suciu
- **Diploma of Excellence and Silver Medal**

6. Earthing electrode with corrosion resistant connections
- Inventors: Ștefan Pavel, Daniel-Viorel Ungureanu, Marian Liviu Mocan, Ioan Silviu Doboși, Florin-Ionel Topală
- **Diploma of Excellence and Silver Medal**

7. Electrical installation for air and surface disinfection from the public transport
- Inventors: Ștefan Pavel, Daniel-Viorel Ungureanu, Alexandru Bînzar, Ancuța Letiția Tutelcă, Silviu Cristian Suciu, Călin Marius Popoiu
- **Diploma of Excellence and Silver Medal**

8. Installation for remote monitoring of corrosion of the ground constructions coated or not with zinc
- Inventors: Ștefan Pavel, Daniel-Viorel Ungureanu, Alexandru Bînzar, Aurel Moldovan
- **Diploma of Excellence and Silver Medal**

The International Exhibition of Scientific Research, Innovation and Invention "Pro Invent 2021" Cluj Napoca, 19th edition, online, 20-22 October 2021

A UPT team attended the Exhibition of Scientific Research, Innovations and Inventics PROINVENT Cluj 2021 (online), 19th edition, between 20-22.10.2021, with **34 patents, research projects, doctoral theses, and educational programs**. The PROINVENT Exhibition is a distinguished meeting place for inventors and entrepreneurs interested in putting into practice the results of research, innovation and human creativity.
Virtual catalogue: https://proinvent.utcluj.ro/en/img/catalogs/2021.pdf.
Here are some of the outstanding awards:

1. Installation for the evaluation of the magnetic field exposure effects
- Inventors: Stefan Pavel, Lavinia Afrodita Lupa, Marian Liviu Mocan, Daniel Viorel Ungureanu, Ioan Silviu Dobosi, Aurel Moldovan, Alina Georgiana Simina, Alexandru Binzar, Silviu Cristian Suciu
- Diploma of Excellence and Gold Medal

2.Control method for an automatic capacitive compensator meant to improve the power factor and to load balancing in three-phase four wire electrical networks
- Inventor: Adrian Pana
- Diploma of Excellence and Gold Medal

3.Earthing electrode with corrosion resistant connections
- Inventors: Stefan Pavel, Daniel-Viorel Ungureanu, Marian Liviu Mocan, Ioan Silviu Dobosi, Florin-Ionel Topala
- Diploma of Excellence and Gold Medal

4.Electrical installation for air and surface uv disinfection from the public transport
- Inventors: Stefan Pavel, Daniel-Viorel Ungureanu, Alexandru Binzar, Ancuta Letitia Tutelca, Silviu Cristian Suciu, Calin Marius Popoiu
- Diploma of Excellence and Gold Medal

5. Process for integrating the dry deflection by-product into the density slam recipe for hydraulic transport through pipe systems
- Inventors: Mihail Reinhold Wachter, Ioana Ionel, Petru Negrea
- Diploma of Excellence Gold Medal

PRO INVENT 2021 - EDIȚIA XIX, CLUJ-NAPOCA

PRO INVENT 2021

SALONUL INTERNAȚIONAL AL CERCETĂRII ȘTIINȚIFICE, INOVĂRII ȘI INVENTICII
ediția XIX

6. Electrical light installation for dental esthetics
- Inventors: Stefan Pavel, Cristina Krems, Marian Liviu Mocan, Ioan Silviu Dobosi
- Diploma of Excellence Silver Medal

7. Electrode and method for fast electrochemical detection of arsenic (III) from aqueous solutions
- Inventors: Florica Manea, Aniela Carmen Pop, Anamaria Simona Baciu, Adriana Ileana Remes
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8. Installation for remote monitoring of corrosion of the ground constructions coated or not with zinc
- Inventors: Stefan Pavel, Daniel-Viorel Ungureanu, Alexandru Bînzar, Aurel Moldovan
- Diploma of Excellence and Silver Medal

9. 3D Porous dimensionally stable anode–integrated particulate electrode-electrochemical filtering system for advanced treatment of cytostatics-containing water (3DSAPECYT)
- Inventors: Florica Manea, Corina Orha, Constantin Adrian Tudoran
- Diploma of Excellence

The International Exhibition of Inventions and Innovations "Traian Vuia" Timisoara, 7th edition, online 06-08 October 2021
Multiple medals for the Politehnica University Timisoara

Within the International Exhibition of Inventions and Innovations "TRAIAN VUIA 2021" Timisoara, 350 inventions divided into 14 categories were showcased. The categories were medicine, agriculture, environment, food sciences, electronics and power engineering, technical sciences, mechanical sciences, paramedical sciences and so on. There were inventors from 6 countries, namely Hungary, Serbia, Germany, Syria, Romania and Moldova. The UPT team attended the exhibition with **34 patents, research projects, doctoral theses and educational programs**.

Here are some of the outstanding awards:

1. For devoted research activity:
- Liviu Marsavina; Viorel Ungureanu
- **Diploma of Excellence**

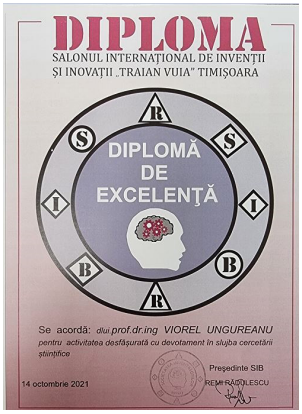
2. For their entire activity dedicated to science and inventics:
- Ion Boldea
- **Diploma of Excellence**

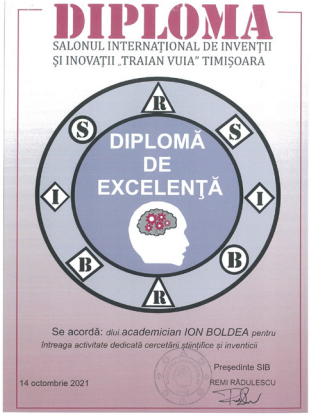
3. Control method for an automatic capacitive compensator meant to improve the power factor and to load balancing in three-phase four-wire electrical networks
- Inventor: Adrian Pană
- **Gold Medal and Diploma**

4. Process for integrating the dry deflection by-product into the density slam recipe for hydraulic transport through pipe systems
- Inventors: Mihail Reinhold Wächter, Ioana Ionel, Petru Negrea
- **Gold Medal and Diploma**

5. Electrical light installation for dental esthetics
- Inventors: Pavel Ștefan, Krems Cristina, Mocan Marian Liviu, Doboși Ioan Silviu
- **Gold Medal and Diploma**

6.Installation for the evaluation of the magnetic field exposure effects
- Inventors: Ștefan Pavel, Lavinia Afrodita Lupa, Marian Liviu Mocan, Daniel-Viorel Ungureanu, Ioan Silviu Doboși, Aurel Moldovan, Alina Georgiana Simina, Alexandru Bînzar, Silviu Cristian Suciu
- **Gold Medal and Diploma**





EXECUTIVE UNIT FOR FINANCING HIGHER EDUCATION, RESEARCH, DEVELOPMENT AND INNOVATION - UEFISCDI AWARDS - ARTICLES

Through these awards UEFISCDI aims to increase quality, impact and international visibility of Romanian research by recognizing and rewarding significant results published in prestigious journals from international senior scientific stream.
Within this competition can participate the researchers affiliated to institutions in Romania, authors of scientific articles published in journals indexed by Clarivate Analytics Science Citation Index Expanded ("Science"), Social Sciences Citation Index ("Social Sciences") or Arts & Humanities Citation Index ("Arts & Humanities").
More information at http://uefiscdi.gov.ro/Public/cat/471/Premierea-rezultatelor-cercetarii.html

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PROJECTS SUPPORTED BY PUBLIC FUNDS

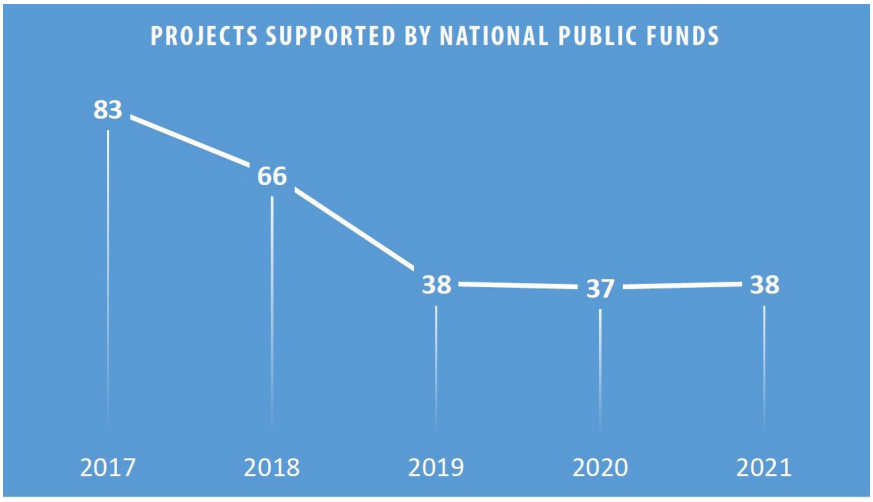
Universitatea Politehnica Timişoara
2020
PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

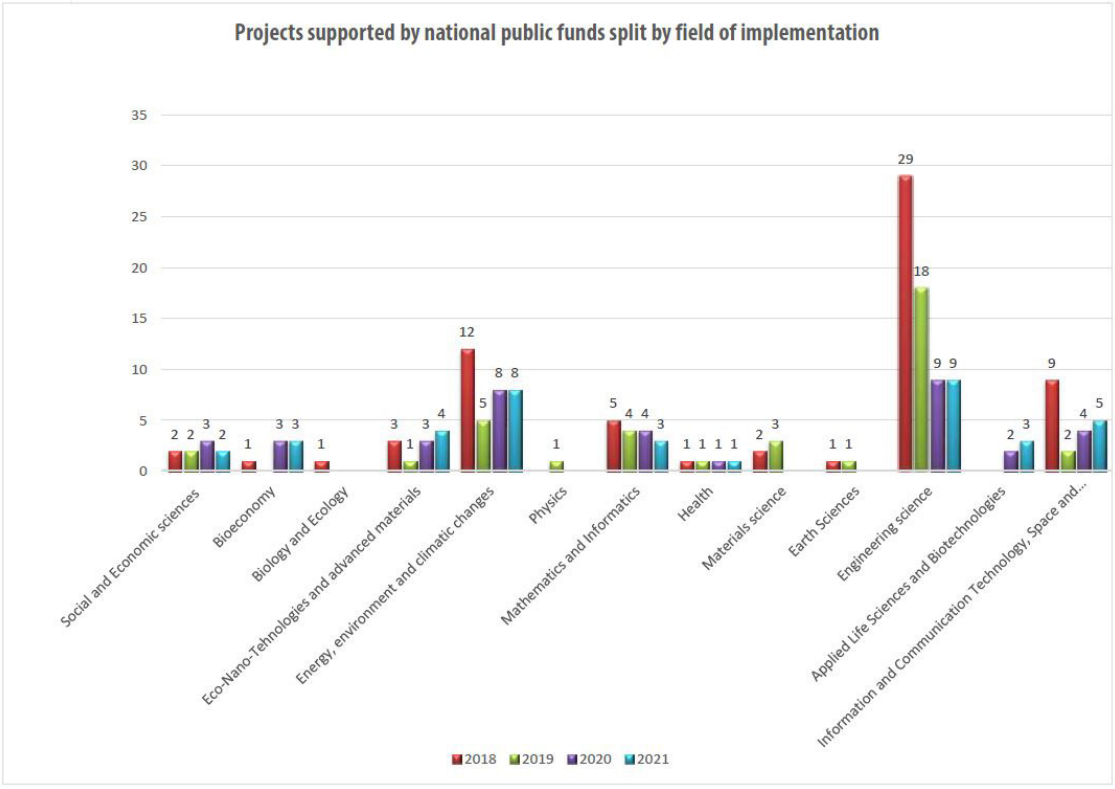
National Research Projects

PROJECTS SUPPORTED BY NATIONAL PUBLIC FUNDS IMPLEMENTED BY UPT 2021

Fields	Total number of projects	Number of projects presented
Social and Economic sciences	2	1
Eco-Nano-Tehnologies and advanced materials	4	3
Energy, environment and climatic changes	8	8
Mathematics and Informatics	3	1
Health	1	1
Bioeconomy	3	3
Applied Life Sciences and Biotechnologies	3	3
Engineering science	9	7
Information and Communication Technology, Space and Security	5	3
Total	38	30

EVOLUTION OF PROJECTS SUPPORTED BY NATIONAL PUBLIC FUNDS IMPLEMENTED BY UPT 2017 - 2021





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 behavior 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] T. Lala and M.-B. Radac, "Learning to extrapolate an optimal tracking control behavior towards new tracking tasks in a hierarchical primitive-based framework," in 2021 29th Mediterranean Conference on Control and Automation, MED 2021, Bari, Italy, Jun. 2021, pp. 421–427.

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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
- MSc student Eng. Alexandra-Bianca BORLEA
- Eng. Timotei LALA

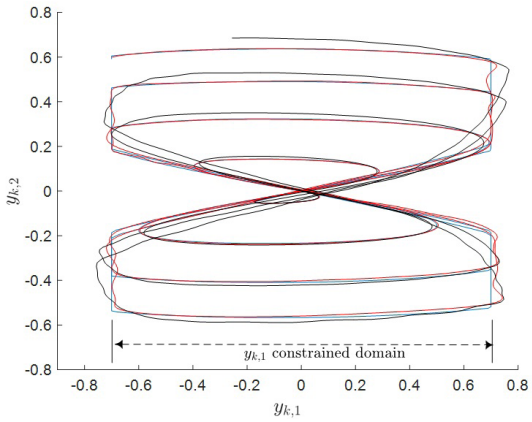

Fig. 1. The recomposed tracking result on the longer desired trajectory

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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 equipments 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 equipments related to Shape Memory Alloys (SMA), and other various laboratory equipment with SMA as actuators..

Project implemented by

Lecturer 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.
Assist. Prof. Dr. Eng. Raul-Cristian Roman - carries out activities that involve hardware and software implementations and solve numerical problems.
MSc student 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 2021 **three journal papers** indexed in Clarivate Analytics Web of Science (WoS, with one of the previous names ISI Web of Knowledge) (https://univagora.ro/jour/index.php/ijccc/article/view/4076, https://www.romjist.ro/full-texts/paper698.pdf and https://s3-us-west 2.amazonaws.com/ieeeshutpages/xplore/xplore-ie-notice.html?).
The research team published in 2021 **one conference paper** in Clarivate Analytics Web of Science (WoS, with one of the previous names ISI Web of Knowledge) (https://www.sciencedirect.com/science/article/pii/S2405896321014348).
The research team published in 2021 two conference papers in the international data bases Elsevier and IEEExplore (https://www.sciencedirect.com/science/article/pii/S1877050922000205 and https://s3-us-west-2.amazonaws.com/ieeeshutpages/xplore/xplore-ie-notice.html?).
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 Centre

Research Centre for Automatic Systems Engineering

Research team

- Lecturer Dr. Eng. Claudia-Adrina BOJAN-DRAGOȘ - Project Leader
- Prof. Dr. Eng Stefan PREITL - Member
- Lecturer Dr. Eng. Alexandra-Iulia SZEDLAK-STINEAN - Member
- Assist. Prof. 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 Centre 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: 2 papers published in Clarivate Analytics Web of Science (formerly ISI Web of Knowledge) journals with impact factors, cumulated impact factor according to 2020 Journal Citation Reports (JCR) released by Clarivate Analytics in 2021 = 5.022, 1 paper published in conference proceedings indexed in Clarivate Analytics Web of Science (formerly ISI Web of Knowledge or ISI Proceedings), 2 papers published in conference proceedings indexed in international databases (IEEE Xplore, INSPEC, Scopus, DBLP), 1 book chapter published in Springer book.

Specific:

1. One research report.

2. A. Topîrceanu and R.-E. Precup, A novel geo-hierarchical population mobility model for spatial spreading of resurgent epidemics, Scientific Reports (Nature), vol. 11, paper 14341, pp. 1-12, 2021, impact factor (IF) = 4.379, IF according to 2020 Journal Citation Reports (JCR) released by Clarivate Analytics in 2021 = 4.379.

3. R.-E. Precup, C.-A. Bojan-Dragoş, E.-L. Hedrea, R.-C. Roman and E. M. Petriu, Evolving Fuzzy Models of Shape Memory Alloy Wire Actuators, Romanian Journal of Information Science and Technology (Romanian Academy, Section for Information Science and Technology), vol. 24, no. 4, pp. 353-365, 2021, impact factor (IF) = 0.643, IF according to 2020 Journal Citation Reports (JCR) released by Clarivate Analytics in 2021 = 0.643.

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5. C.-A. Bojan-Dragoş, R.-E. Precup, S. Preitl, R.-C. Roman, E.-L. Hedrea and A.-I. Szedlak-Stînean, GWO-Based Optimal Tuning of Type-1 and Type-2 Fuzzy Controllers for Electromagnetic Actuated Clutch Systems, Proceedings of 4th IFAC Conference on Embedded Systems, Computational Intelligence and Telematics in Control CESCIT 2021,Valenciennes, France, 2021, IFAC-PapersOnLine, vol. 54, no. 4, pp. 189-194, 2021, indexed in Scopus.

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7. R.-E. Precup, E.-I. Voişan, R.-C. David, E.-L. Hedrea, E. M. Petriu, R.-C. Roman and A.-I. Szedlak-Stînean, Nature-inspired optimization algorithms for path planning and fuzzy tracking control of mobile robots, in: Applied Optimization and Swarm Intelligence, E. Osaba and X.-S. Yang, Eds., Springer Tracts in Nature-Inspired Computing, Springer, Singapore, pp. 129-148, 2021.

Applicability and transferability of the results

The controllers are ready to implement in industry.

Financed through/by

UEFISCDI

Research Centre

Research Centre 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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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.
MSc 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 1a,b).
Consequently, we enhance opinion dynamics prediction using temporal attenuation (TA) previously introduced in (Topirceanu et al., Social Netw. Analys. Mining, 2020) (see Figure 1c-e).

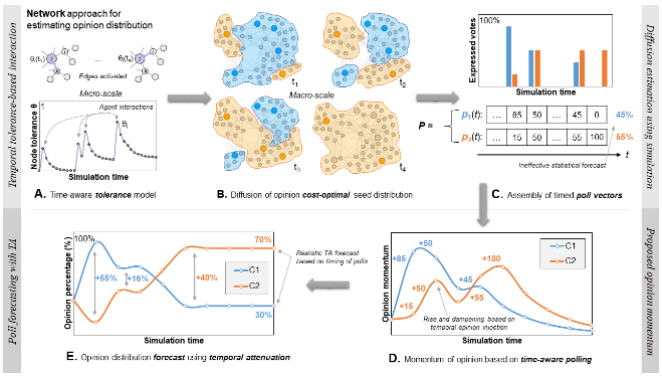
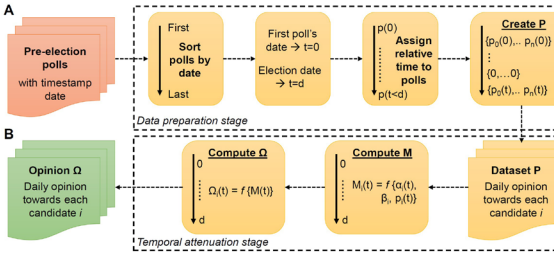


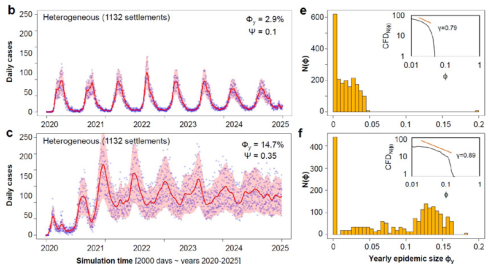
Fig. 1 - Overview of the main objectives for creating a dynamic agent-based opinion injection simulation model which can better forecast opinion distribution in a large social network. Agents react to individual interactions in their vicinity by increasing their immediate tolerance threshold; poll vectors are further processed using temporal attenuation, and opinion momentum is computed based on the timing of polls in the network. The opinion distribution is computed based on its momentum, highlighting that forecasts using TA.

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.



Currently two journal/WoS Q1 papers:

- Topîrceanu, A. (2021). Electoral forecasting using a novel temporal attenuation model: Predicting the US presidential elections. Expert Systems with Applications, 182, 115289. IF=6.95.

- Topîrceanu, A., & Precup, R. E. (2021). A novel geo-hierarchical population mobility model for spatial spreading of resurgent epidemics. Scientific Reports, 11(1), 1-12. IF=4.38

And two conference proceedings:

- Topîrceanu, A., & Udrescu, M. (2021, November). Fast colonization algorithm for seed selection in complex networks based on community detection. In Proceedings of the 2021 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (pp. 214-218).

- Topîrceanu, A. (2021). Immunization using a heterogeneous geo-spatial population model: A qualitative perspective on COVID-19 vaccination strategies. Procedia Computer Science, 192, 2095-2104.

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 centre

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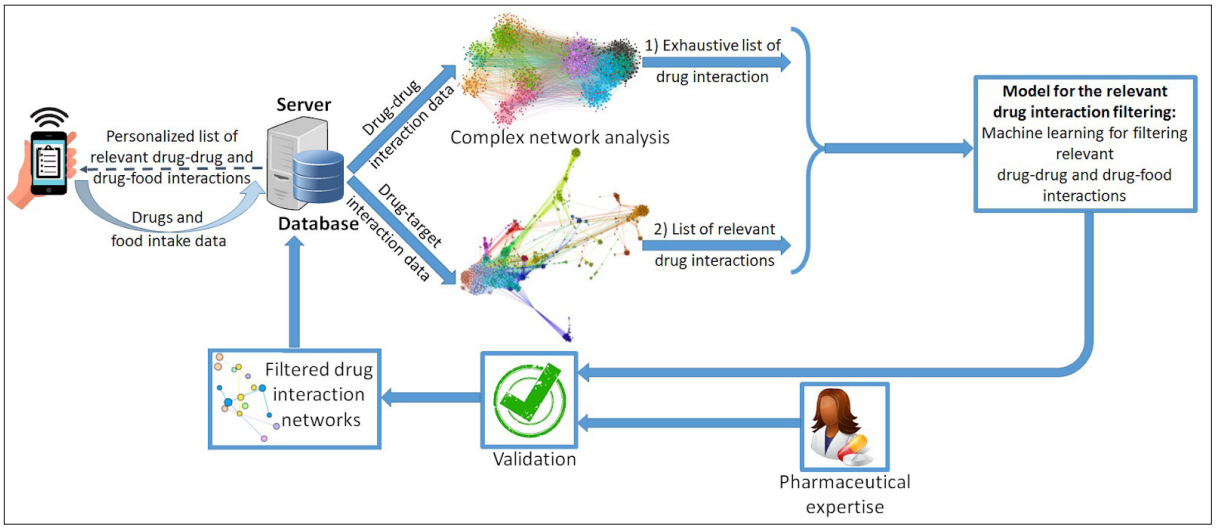
COMPLEXITY SCIENCE FOR PRECISION PHARMACY: PREDICTING RELEVANT DRUG INTERACTIONS USING COMPLEX NETWORK ANALYSIS (HYPERION)

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.

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 centre

Research Center for Computer and Information Technology (CCCTI)

Research team

- Prof. Dr. Eng. Mihai UDRESCU
- Assoc. Prof. Dr. Eng. Alexandru TOPÎRCEANU
- Assist. Prof. Dr. Eng. Alexandru IOVANOVICI
- Ph.D. student Eng. Sebastian-Mihai ARDELEAN

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INTEGRATED AND SUSTAINABLE PROCESSES FOR ENVIRONMENTAL CLEAN-UP, WASTEWATER REUSE AND WASTE VALORIZATION – SUSTENVPRO

Goal of the project

The goal of complex project SUSTENVPRO is to increase the institutional performance in the ENVIRONMENT field of a consortium of 5 public research organizations with recognized research performances and one R&D National Institute under consolidation, through an integrative approach which supports/develop the existent research competencies of each partner and transfer capacities of results with applicative and innovative potential envisaging the elimination of priority pollutants from water using innovative advanced water/ wastewater treatment processes and waste recovery.

Short description of the project

The complex project SUSTENVPRO consisted of 5 research component projects (PC) :

PC 1. Complex evaluations of priority pollutants present in various water matrixes and risk identification on the ecosystems and human health;

PC 2. Water treatment processes optimization and development of innovative materials for the priority pollutants removal;

PC 3. Valorization of biomass resources for the development of innovative processes for wastewater treatment and priority pollutants removal;

PC 4. Metallic waste valorization for innovative wastewater treatment process development and removal of priority pollutants;

PC 5. Sustainability assessments of water/ wastewater treatment and waste valorization processes based on life cycle assessment.

Project implemented by

The project is implemented by 4 universities and two national R&D institutes:

• Coordinator: "Gheorghe Asachi" Tehnical University of Iasi;

• Partners: Politehnica University of Bucharest; "Alexandru Ioan Cuza" University of Iasi; Politehnica University Timisoara; "Petru Poni" Institute of Macromolecular Chemistry Iasi; National Research and Development Institute for Environmental Protection, Bucharest.

Implementation period

2018 - 2021

Main activities

- Developing and validating an innovative approach oriented to analysis, preventing and correcting the environmental risks associated with the presence of priority pollutants in various matrices of water use;
- Development of efficient innovative water treatment and advanced wastewater treatment processes in order to eliminate priority organic and inorganic pollutants in the anthropic water cycle;
- Development of new innovative materials (polymeric or composite materials) with properties designed according to the characteristics of the priority pollutants;
- Utilization of materials from organic (biomass) and inorganic waste (metallic waste) in innovative wastewater treatment processes for removing priority pollutants and recirculating / reusing water;
- Sustainability assessment of processes and products through Life Cycle Assessment tool.

Results

- Research workplaces;
- New/significantly improved technologies /procedures;
- New/significantly improved research services;
- New research and technology consultancy services (uploaded on the ERRIS platform);
- Knowledge transfer to water operator through C voucher;

- Research services by sharing the research infrastructure among project partners (A1 and A2 research vouchers);
- Research papers published in ISI-ranked journals;
- Communications at national and international scientific events (conferences, exhibitions);
- Dissemination and technology transfer workshops;
- (Initiation /Intermediary /Final) Project workshops;
- RDI common program (in agreement with the institutional development plan of every partner).

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.); knowledge transfer to regional water operator through C voucher within the project framework tested at pilot scale as treatability study for concrete applications in drinking water treatment;
- Good practice guide for circular economy in water field for sustainability consulting company, non-profit organization, environmental agencies.

Financed through/by

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

Research Centre

Research Centre in Environmental Science and Engineering

Research Team

- UPT Project Responsible: Prof. Dr. Eng. Florica MANEA
- Scientific Researcher, level I : Rodica PODE
- Scientific Researcher, level III: Laura COCHECI
- Scientific Researcher, level III: Aniela POP
- Scientific Researcher, level III: Raluca VODA
- Scientific Researcher, level III: Anamaria BACIU
- Development Engineer: Lacrima-Crysty IGHIAN
- Development Engineer: Claudia DELCIOIU

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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

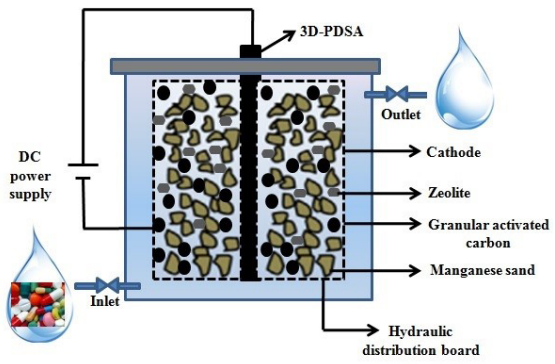
2020-2022

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 centre

Research Centre 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

National Institute for Research and Development in Electrochemistry and Condensed Matter Timisoara (INCEMC) - Partner 1
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- Dr. Carmen LAZAU
- Dr. Eng. Cornelia BANDAS
- Ph.D student Eng. Mina Ionela POPESCU
- Ph.D student Eng. Mircea Daniel NICOLAESCU

SC. BeeSpeed Automatizari SRL - Partner 2
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- Assoc. Prof. Dr. Eng. Alexandru HEDES
- Assoc. Prof. Dr. Eng. Valentin CIUPE
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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

Polytehnica 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 centre

Research Centre 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 centre

- Research Centre 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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NOVEL MODULAR STACK DESIGN FOR HIGH PRESSURE PEM WATER ELECTROLYZER TECHNOLOGY WITH WIDE OPERATION RANGE AND REDUCED COST (PRETZEL)

Goal of the project

This project represents an awarding of institutional prizes for participation in Horizon 2020 competition. The primary goal of this awarding program was to increase the institutional capacity of research organizations in Romania that implement projects funded by the Framework Program of the European Union - Horizon 2020, but also to stimulate further participation of research organizations to this program.
The main objective of the project refers to the identification of the current research directions in the field of hydrogen production through water electrolysis, in order to participate in new research projects in competitions launched at EU level. From the scientific point of view, the project aims to develop and test some bipolar plates (BPPs) made of copper, covered with a corrosion-resistant layer. For this purpose, the magnetron-sputtering method will be used for the application of a corrosion-resistant alloy.
The strategies developed worldwide, especially in the EU countries, provide for an increase in the share of hydrogen obtained by electrolysis of water. In order to stimulate the production of electrolytic hydrogen, the following concepts are taken into account: the reduction of capital expenditures (CAPEX) and of the operating costs (OPEX) of water electrolysis installations, as well as the use for electrolysis of excess electricity coming from renewable sources. The combination of these two concepts may ultimately lead to a significant decrease in the cost of electrolytic hydrogen.
Thus, the research funded by the HORIZON 2020 program, by Fuel Cells and Hydrogen 2 Joint Undertaking, on action FCH-02-1-2017: Game changer Water Electrolyzers (research and innovation actions) aimed at the development of proton exchange membrane (PEM) electrolyzers, with the potential to exceed key performance indicators in terms of cost, efficiency, service life and operability, having the direct effect of reducing CAPEX and OPEX.

Short description of the project

BPPs, together with current collectors, contribute 60% to the total costs of a PEM water electrolysis system, because these components are made of titanium, which has an advanced corrosion resistance under operating conditions, especially on the anodic side. By replacing titanium with other less expensive metals, the costs of BPPs can be appreciably reduced. However, in order for these metals to withstand the high potentials and temperatures, in an acidic environment, saturated in oxygen, it is necessary to cover them with layers that confer advanced resistance to corrosion, but at the same time also present electrical conductivity. In this project, copper BPPs will be made, coated with a protective layers of corrosion-resistant alloy deposited by magnetron-sputtering (MS).

Project implemented by

Politehnica University Timisoara
Faculty of Industrial Chemistry and Environmental Engineering
Department of Applied Chemistry and Engineering of Inorganic Compounds and Environment

Implementation period

01.01.2021 – 30.06.2021

Main activities

1. Analysis of the "Hydrogen Economy" strategies developed at European level.
2. Development of anticorrosion coatings for copper BPPs, deposited by MS.
3. Corrosion resistance testing of coated copper BPPs
4. Implementation of coated copper BPPs in a small scale PEMWE.
5. Dissemination activities

Results

1. Only hydrogen obtained by electrolysis of water can be considered "green", since the only products of the process are hydrogen and oxygen. However, the share of electrolytic hydrogen in the world's production does not exceed 4% due to high costs associated with high electricity consumption. The development of PEMWE is thus of capital importance.
2. Corrosion resistance coatings based on TiNi and TiNb were deposited on a copper substrate by magnetron sputtering.
3. Corrosion resistance testing of TiNi and TiNb coatings on copper revealed poorer resistance than Ti, due to poor adherence, thus further improvements are still needed.
4. Small scale PEMWE prototype

5. Participation in the workshop "New opportunities for research funding within Horizon Europe and successful experiences" - 09.04.2021 organized by the Politehnica University Timisoara in collaboration with the Ministry of Research, Innovation and Digitalization

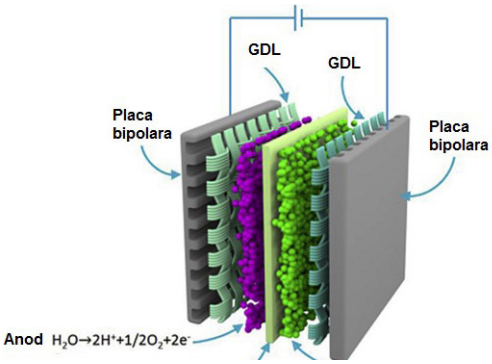

Fig. 1. PEMWE components

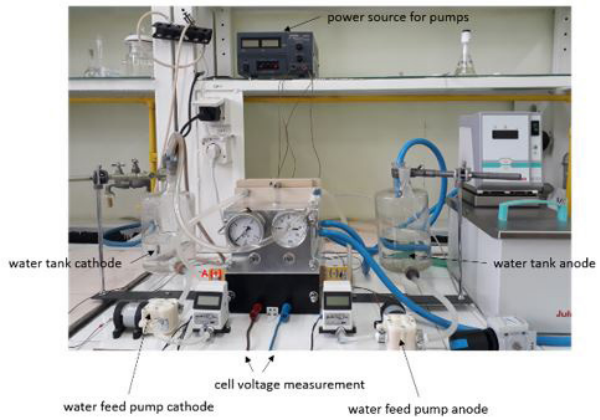

Fig. 2. PEMWE prototype

Applicability and transferability of the results

The research on coated copper BPPs opens a new perspective on the use of alternative, less expensive materials than titanium for the manufacture of BPP used in water electrolyzers.

Financed through/by

This work was supported by a grant of the Ministry of Education and Research, CNCS/CCCDI - UEFISCDI, project number PN-III-P3-3.6-H2020-2020-0049 / contract number 17/01.01.2021

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Research Centre for Inorganic Materials and Alternative Energies

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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 Centre

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- Research Institute for Renewable Energy

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BIOCATALYTIC SYNTHESIS OF NEW POLYESTERAMIDES AS NANOCARRIERS FOR BIOACTIVE COMPOUNDS

Goal of the project

The 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

The main objective is to develop the biobased synthetic route for biocatalytic synthesis of new polyesteramides, starting from amino acids and ε-caprolactone, or hydroxy acids and ε-caprolactam, using green solvents. The stabilization of the employed enzymes will be performed by substrate-directed immobilization, including covalent binding onto magnetic particles and magnetic sol-gel entrapment. The selectivity of different lipases, proteases and esterases will be evaluated in terms of catalytic efficiency, to increase the productivity of the process. Several amino acids and hydroxy acids will be tested as co-monomers, and the optimal reactions conditions will be determined by experimental design. The reaction engineering will target the effect of different process parameters on the structure and properties of the synthesized polyesteramides. The structural analysis and assessment of the physico-chemical properties of the reaction products will be accomplished by advanced analytical techniques. The synthesized oligoesters will be used as starting materials for novel nanoparticles effective as bioactive compounds carriers.

Project implemented by

Politehnica University Timisoara

Implementation period

03.08.2020-31.07.2022

Main activities

Stage 2 (2021) - Optimization of polyesteramide synthesis by immobilized enzymes and study of their enzymatic and microbial biodegradation.

Activity 2.1. Investigation of lipases and proteases from various microbial sources as biocatalysts for polyesteramide synthesis

Activity 2.2. The effect of process parameters on the composition of the reaction product

Activity 2.3. Characterization of reaction products by MALDI-TOF MS, NMR, FT-IR

Activity 2.4. Tailor-made immobilization of lipases, esterases and proteases to obtain active biocatalysts in polymerization reactions

Activity 2.5. Characterization of the immobilized lipases and reaction engineering

Activity 2.6. Comparative study of reutilization of the own immobilized enzyme and a commercial one;

Activity 2.7. Optimization of polyester-amide synthesis by experimental design;

Activity 2.8. Evaluation of biodegradability of polyesteramides by lipases;

Activity 2.9. Evaluation of biodegradability of polyesteramides by microorganisms form natural sources;

Activity 2.10. Nanoparticles obtained from polyesteramides.

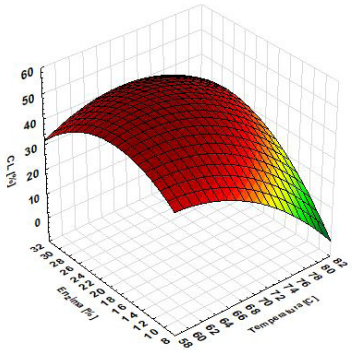

Fig. 1. Combined effect of enzyme amount and temperature on the copolymer content of the reaction product of ε-caprolactam and 5-hydroxymethyl-2-furoic acid

Results

Main scientific achievements of Stage 2:
- investigation of five reaction systems for the enzymatic synthesis of polyester-amides;
- optimization of the synthesis considering temperature, enzyme/monomer ratio and molar ratio of the monomers as main parameters;
- experimental confirmation of bio-degradability (up to 40% in 20 days) of the new polyesteramides;
- synthesis of nanoparticles based on the copolymer of ε-caprolactam and 12-hydroxystearic acid using the emulsion-evaporation method.

Publications:

1. 1. D. Dreavă, I.C. Benea, I. Bitcan, A. Todea, E. Sisu, M. Puiu, F. Peter, Biocatalytic approach for novel functional oligoesters of ε-caprolactone and malic acid, **Processes** 2021, 9(2), 232.
2. A. Todea, D.M. Dreavă, I.C. Benea, I. Bîtcan, F. Peter, C.G. Boeriu, Achievements and trends in biocatalytic synthesis of specialty polymers from biomass-derived monomers using lipases, **Processes** 2021, 9 (4), 646.
3. I.C. Benea, D.M. Dreavă, A. Todea, L. Nagy, S. Kéki, Francisc Péter, A green alternative for the synthesis of polyesteramides from ε-caprolactam and hydroxy acids, **The 11th edition of the International Forum on Industrial Biotechnology and Bioeconomy** (IFIB), 30 Sept.-1 Oct. 2021 Trento, Italy.

Visit also:
http://chim.upt.ro/ro/cercetare/proiecte-de cercetare/286-pn-iii-p2-2-1-ped-2019-2638

Financed through/by

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

Research centre

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

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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 color 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

Politehnica University Timisoara

Implementation period

01.11.2020 – 31.10.2022

Main activities

Stage 2– Synthesis and characterization of proposed flavylium dyes

Activity 2.1. – Synthesis and purification of proposed dyes

Activity 2.2. – Physicochemical characterization of the synthesized dyes

Activity 2.3. – Evaluation of the pH-dependent photochromic properties

Activity 2.4. – Evaluation of the antioxidant properties of the synthesized dyes

Activity 2.5. – Evaluation of the toxicity of the synthesized dyes

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

Activity 3.1. – Preparation and characterization of unblended biopolymer (single biopolymer: chitosan, polyvinyl alcohol, polylactic acid, cellulose, starch) pH indicator films and the synthesized dyes

Activity 3.2. – Preparation and characterization of blended pH indicator films based on biopolymers (mixtures of two biopolymers chitosan, polyvinyl alcohol, polylactic acid, cellulose, starch) and the synthesized dyes.

Activity 3.3. – Material properties evaluation of the indicator films.

Results

The results of the second stage:

- Synthesis, purification, and physicochemical characterization of 8 dyes by FT-IR, ^{1}H-RMN și ^{13}C-RMN, 2D RMN and UV-Vis spectroscopy methods, as well as themogravimetric analysis, TG

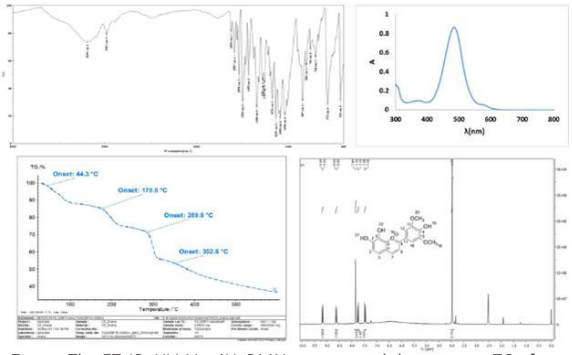

Fig. 1. The FT-IR, UV-Vis, ^{1}H-RMN spectra and themogram TG of one of the synthesized dyes

- The antioxidant, pH-dependent photochromic properties and the toxicity of the synthesized dyes were evaluated.

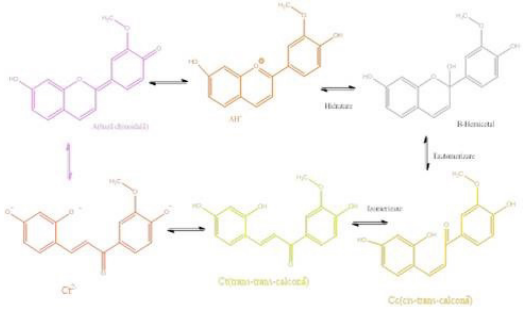

Fig. 2. The network of chemical reversible reactions of one of the dyes species upon pH changes

- 4 types of single biopolymer and 12 blended biopolymer films with 4 of the synthesized dyes incorporated were prepared and characterized by FT-IR and UV-Vis spectroscopy methods, as well as themogravimetric analysis, TG
- For 6 of the polymeric films material properties, such as water content, solubility and swelling, were evaluated

Table 1. Material properties for 6 polymeric films

Film	Water content %	Solubility %	Swelling %
CHIT-PVA-S1_3	7,02	5,71	225,54
CHIT-PVA-S1_4	5,97	7,21	241,03
CHIT-PVA-S2_3	7,34	9,74	219,32
CHIT-AMI-S1_4	7,50	17,29	110,69
CHIT-AMI-S1_10	10,04	15,32	534,57
CHIT-S1_4	10,25	18,82	442,51

- a scientific paper sent for publication

Financed through/by

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

Research centre

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

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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.

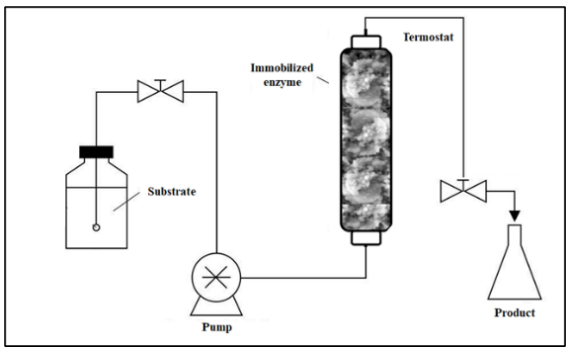

Fig 1. The proposed continuous flow system using packed-bed column bioreactor

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 centre

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

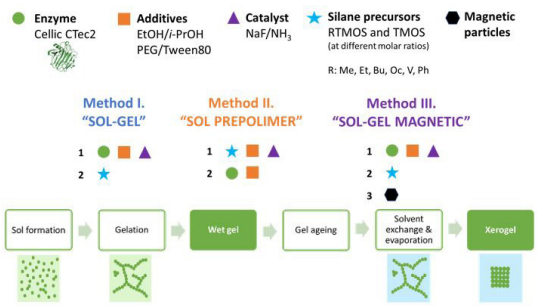

Fig.1. Cellulase immobilization by sol-gel entrapment methods

Project implemented by

Politehnica University Timisoara

Implementation period

15.09.2020-14.09.2022

Main activities

Stage 2 (2021): Immobilization of cellulases using new sol-gel entrapment techniques and structural and operational characterization of the obtained biocatalysts.

Activity 2.1. Obtaining immobilized cellulases using simple and combined sol-gel entrapment methods.

Activity 2.2. Optimization of the parameters that influence immobilization.

Activity 2.3. Structural characterization of immobilized cellulases.

Activity. 2.4. Operational stability study of immobilized cellulases.

Results

The main results of the stage 2 were:

- the preparation of immobilized cellulases using simple and combined sol-gel entrapment methods (sol-gel magnetic method)
- optimization of the parameters that influence immobilization (nature of silane precursors, molar ratio of silane precursors, nature of additives used, and optimum ratio of enzyme/sol-gel matrix)
- the structural characterization of immobilized cellulases with the best biocatalytic results using highly complex instrumental methods, like Scanning Electron Microscopy (SEM), Fluorescence Microscopy (FM), Fourier Transform Infrared Spectroscopy (FT-IR) and Thermal Analysis (TGA/DTA).
- a study of the operational stability (temperature and pH stability, and also biosolvent resistance) of sol-gel immobilized cellulases.

A research paper submitted for publication in journal with impact factor:
- C. Vasilescu, C. Paul, S. Marc, I. Hulka, F. Péter, Sustainable development of a sol-gel entrapped biocatalyst for flavor ester synthesis, Journal of Cleaner Production, 2021, submitted.

Scientific presentations published in abstracts at international conferences:
1. C. Vasilescu, S. Marc, S. Liga, C. Paul, Comparative study and optimization of lignocellulosic biomass pretreatment methods, 15th International Symposium on Biocatalysis and Biotransformations (Biotrans 2021 - Online), 19-22 July 2021, Graz, Austria.

2. C. Vasilescu, C. Paul, F. Péter, Tailoring the sol-gel entrapment method of enzymes by design of experiments for solvent-free ester synthesis, 15th International Symposium on Biocatalysis and Biotransformations (Biotrans 2021 - Online), 19-22 July 2021, Graz, Austria.

3. C. Vasilescu, S. Marc, G. Scheuleac, C. Paul, Sol-gel entrapment of cellulases for the enzymatic hydrolysis of lignocellulosic biomass to fermentable sugars, 13th European Congress of Chemical Engineering and 6th European Congress of Applied Biotechnology (ECCE&ECAB 2021, virtual event), 20-23 September 2021, Berlin, Germany.

4. I. Miloș, M. Gheorghe, C. Vasilescu, F. Péter, C. Paul, Batch and continuous flow aroma ester synthesis by sol-gel entrapped Candida antarctica lipase B, The 13th online edition, New trends and strategies in the chemistry of advanced materials with relevance in biological systems, technique and environmental protection, 7-8 October 2021, Timisoara, Romania.

Also visit project website:
https://chim.upt.ro/ro/cercetare/proiecte-de-cercetare/248-pn-iii-p1-1-1-te-2019-1179

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 centre

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

Research team

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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 2 (2021): Biotransformation of triricinolein from castor oil and furan derivatives oligoesters using immobilized laccase and lipase in "one-pot" system

Activity 2.1. Screening of commercially available immobilized lipases for hydrolysis and esterification reactions

Activity 2.2. Testing of hydroxy acids with furan units for the synthesis of oligoesters

Activity 2.3. Characterization of reaction products by spectroscopic methods.

Activity 2.4. Optimization of oligoester synthesis in a "one-pot" system by developing design of experiments

Activity 2.5. Study of the biodegradability of oligoesters using lipases.

Results

The results of the first stage:

- the possibility to control the copolymer / homopolymer ratio by the appropriate choice of the native biocatalyst and controlling of water was demonstrated
- optimization of the oligoester synthesis by studying the effect of temperature, enzyme/ monomer ratio and molar ratio of the monomers as main parameters
- the biodegradability of oligoesters in the presence of porcine pancreatic lipase was demonstrated
- preparation of organogels using the obtained furand-based oligoesters

Publications:

1. D. Dreavă, I.-C. Benea, I. Bitcan, A. Todea, E. Sisu, M. Puiu, F. Peter, Biocatalytic Approach for Novel Functional Oligoesters of ε-Caprolactone and Malic Acid, Processes 2021, 9(2), 232.

Conferences:

1. I. Bîtcan, A. Petrovici, A.Todea, D. Aparaschivei, I. Păușescu, F. Peter, Green Route Synthesis of Oligoesters from 5-Hydroxymethyl-2-Furan Carboxylic Acid and Ricinoleic Acid, The 6th International Conference on Biocatalysis in Non-Conventional Media (BNCM 2021), 6-8 May 2021, Milan, Italy.

2. I. Bîtcan, A. Petrovici, A. Ștefan, A. Todea, Iulia Păușescu, F. Peter, Selective glycerol oxidation mediated by covalently immobilized laccases, International Forum on Industrial Biotechnology and Bioeconomy- IFIB 2021, 30 September 2021 - 1 October 2021, Trento, Italy.

3. I. Bitcan, A. Petrovici, A. Ștefan, A. Todea, I. Păușescu, F. Peter, Laccasses stabilization by covalent immobilization onto functionalized magnetic and sepabeads suports, New trends and strategies in the Chemistry of advanced materials with relevance in biological systems, techniques and environmental protection" 13th Edition, online, 7-8 October 2021, Timisoara, Romania.

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 Centre

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

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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 with possible food applications.
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 (Scheme 1). For this reason, the biocatalytic synthesis of novel SFAEs will be carried out in natural deep electric solvents (NADES) and the optimal solvent composition, reaction conditions, enzyme recovery possibilities and downstream processing will be determined. Selectivity and operational stability of different lipases in NADES will be evaluated.

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

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

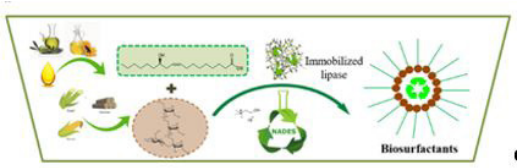

Fig. 1. Enzymatic biotransformations of fatty acids and sugars into biosurfactants

Project implemented by

Politehnica University Timisoara

Implementation period

15.02.2021 – 14.02.2024

Main activities

Phase 1 (2021): Development of suitable natural deep eutectic solvent (NADES) systems and obtainment of sustainable and robust biocatalysts with catalytic activity in NADES.

Activity 1.1. Selection and investigation of ecological solvent systems suitable for carbohydrate esterification;

Activity 1.2. Selection and investigation of biobased reactive solvent systems suitable for carbohydrate esterification;

Activity 1.3. Screening and selection of enzymes with high efficiency for esterification of oligosaccharides;

Activity 1.4. Stabilization of selected enzymes by immobilization;

Activity 1.5. Evaluation of the stability of selected native and immobilized lipases in natural deep eutectic solvents (Part 1);

Activity 1.6. Dissemination of results.

Results

Main scientific achievements of Phase 1:
- Preparation and characterization of binary and ternary natural deep eutectic solvents (NADES);
- Screening and selection of biocatalysts for esterification reactions in NADES;
- Immobilization of most efficient native lipases by entrapment in sol-gel matrices and evaluation of the operational stability of the immobilized enzymes in NADES;
- Confirmation of high catalytic activity and thermal stability of selected native and immobilized lipases in organic solvents and NADES;
- Demonstration of the ability of native and commercial immobilized lipases to synthesize esters of lauric acid with glucose in NADES.

Dissemination:

D1. Todea, A., Dreavă, D.M., Benea, I.C., Bîtcan, I., Peter, F., Boeriu, C.G. Achievements and trends in biocatalytic synthesis of specialty polymers from biomass-derived monomers using lipases, Processes 2021, 9 (4), 646.

D2. Buzatu A.R., Frissen A.E., van den Broek L.A.M., Todea A., Motoc M., Peter F., Boeriu C.G. Biocatalytic synthesis of phenolic sugar esters. 7th International Polysaccharide Conference (EPNOE 2021), 11-15 October 2021, Nantes, France

D3. Boeriu, C.G., Van der Vlist, V., Aparaschivei, D., Frissen, A.E., Todea, A., Peter, F. Enzymatic synthesis of novel biobased aliphatic-aromatic copolyesters. 6th International Conference on Biocatalysis in Non-Conventional Media (BNCM 2021), 6-8 May 2021, Milano, Italia (on line)

Financed through/by

Romanian Ministry of Education and Research, CCCDI - UEFISCDI, project code: PN-III-P4-ID-PCE-2020-2177, project number PCE 157/ 2021

Research Centre

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

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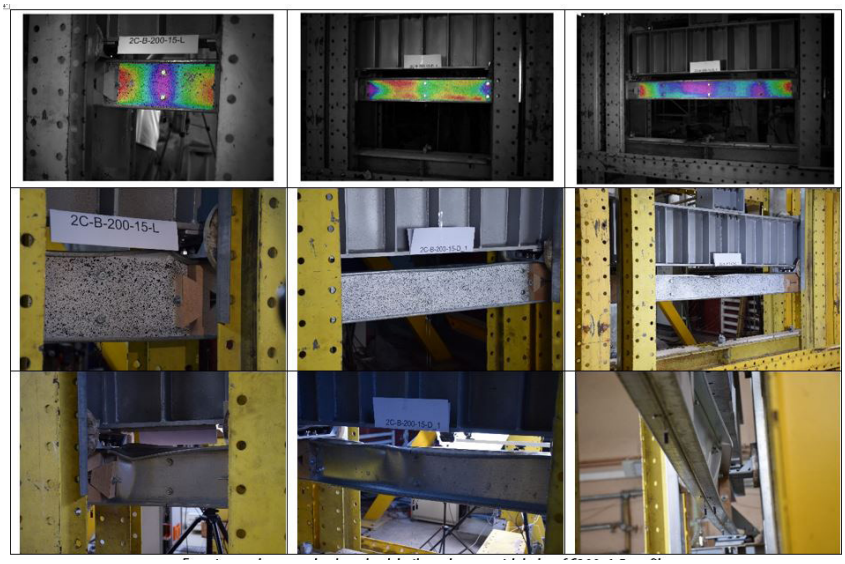
STRUCTURAL DESIGN TOOL FOR COLD-FORMED STEEL STRUCTURES (CFSEXPERT)

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

04.01.2020-31.12.2021

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 straightforward software tools for engineers to use in their projects including cold-formed sections of general shape, according to a design based on Eurocode 3 – Part 1.3 concept.

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 in this special calculation core, but for the support of an efficient marketing and sales process it is also aimed to implement it into three different types of software realization.

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.

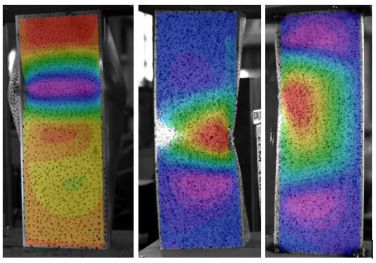
The CFSExpert Member is a stand-alone software configuration to handle a single element, with simply supported or continuous statical system, with specific graphical input and output features limited to cold-formed profiles.

The CFSExpert Engine is a "black-box" 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

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 Centre

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

Research team

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

Goal of the project:

Explosions produced in urban or industrial areas 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 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) 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, Faculty of Civil Engineering, Department of Steel Structures and Structural Mechanics CMMC 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

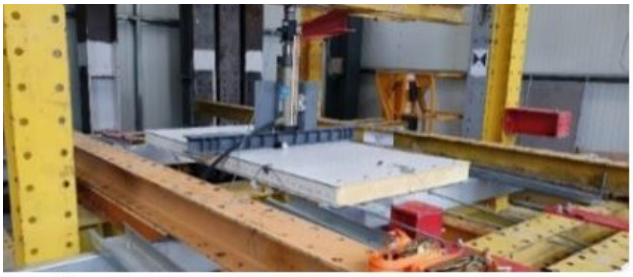
WP2: Experimental program
- Experimental tests on materials and components
- Full-scale static tests on wall sub-structures
- Full-scale blast tests on wall-frame structure systems

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

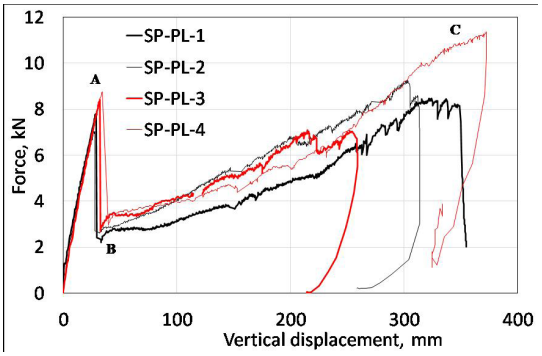
WP4: Project management and dissemination

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

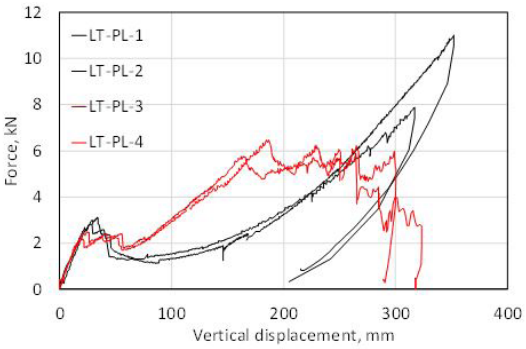


1.a)



1.a)

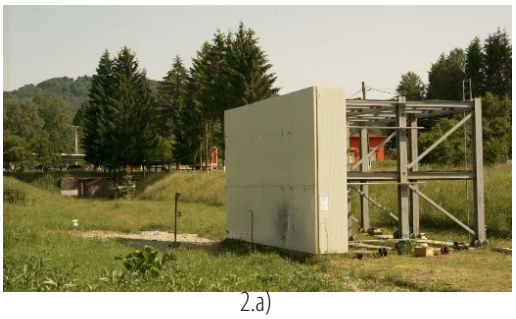
1.b)



1.b)

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

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



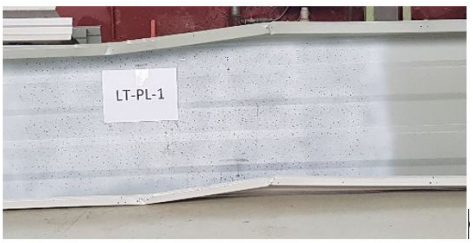
2.a)

2.b)

2.c)

Fig. 2. Blast tests on site: a) structure ready for testing, charge in position; b) the fireball expands; c) deformed shape and damages in the walls

- 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



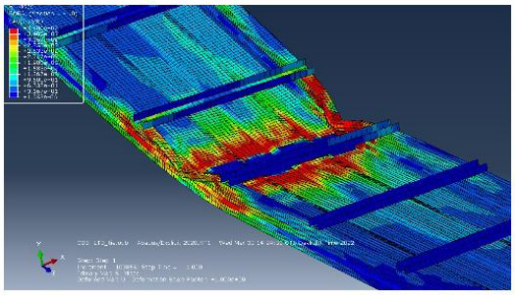


Fig. 3 Liner tray numerical model calibration using ABAQUS

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 blast loading environment is an important step toward the codification and implementation of such systems 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 centre

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

Research team (from UPT)

- Prof. Dr. Eng. Florea DINU (Project Coordinator)
- Prof. Dr. Eng. Dan DUBINA, member of the Romanian Academy
- Prof. Dr. Eng. Viorel UNGUREANU
- Prof. Dr. Eng. Sorin HERBAN
- Prof. Dr. Eng. Adrian CIUTINA
- Lecturer Dr. Eng. Calin NEAGU
- Lecturer Dr. Eng. Ioan MARGINEAN
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- Ph.D student Eng. Simone LINDIRI
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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 equipments 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 equipments 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 equipments 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 2021 four journal papers indexed in Clarivate Analytics Web of Science (WoS, with one of the previous names ISI Web of Knowledge) (https://www.atlantis-press.com/journals/ijcis/125954163/view, https://www.romjist.ro/full-texts/paper698.pdf, https://www.tandfonline.com/doi/abs/10.1080/00207721.2021.1927236, https://www.taylorfrancis.com/books/mono/10.1201/9781003143444/data-driven-model-free-controllers-radu-emil-precup-raul-cristian-roman-ali-safaei).
- The research team published in 2021 three conference papers currently indexed in the international data bases Elsevier and IEEExplore(https://www.sciencedirect.com/science/article/pii/S1877050922000205, https://onlinelibrary.wiley.com/doi/abs/10.1002/asjc.2494 and https://www.sciencedirect.com/science/article/pii/S2405896321014348).
The proceedings of the previous editions of these conferences are indexed in WoS.
- The research team published in 2021 one book (https://www.taylorfrancis.com/books/mono/10.1201/9781003143444/data-driven-model-free-controllers-radu-emil-precup-raul-cristian-roman-ali-safaei) and one book chapter currently indexed in the international data bases Springer Link (https://link.springer.com/chapter/10.1007/978-981-16-0662-5_7).

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 IJCCC journal and at 2020 IEEE International Conference on Systems, Man, and Cybernetics (SMC) and 2020 24th International Conference on System Theory, Control and Computing (ICSTCC) are in the validation process at Ontario Centers of Excellence.

Financed through/by

UEFISCDI

Research Centre

Research Centre for Automatic Systems Engineering

Research team

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- Prof. Dr. Eng. Stefan PREITL – mentor

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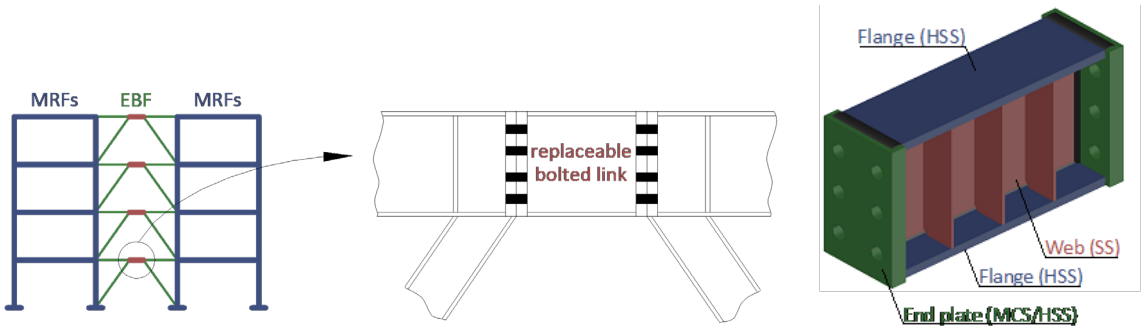
HYBRID REPLACEABLE LINKS FROM STAINLESS AND HIGH-STRENGTH STEEL (HYLINK)TREATMENT

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 recognised, 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 Centre

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

Research team

- Prof. Dr. Eng. Aurel STRATAN
- Ph.D student Eng. Anna PRODAN
- Lecturer Dr. Eng. Ioan BOTH
- Acad. Prof. Dr. Eng. Dan Dubina

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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 Timișoara
Department of Applied Electronics,
Project Director:
Ioana-Monica POP-CĂLIMANU

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. 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.

2. 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.

3. 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.

4. 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.

5. 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, 184450 RON

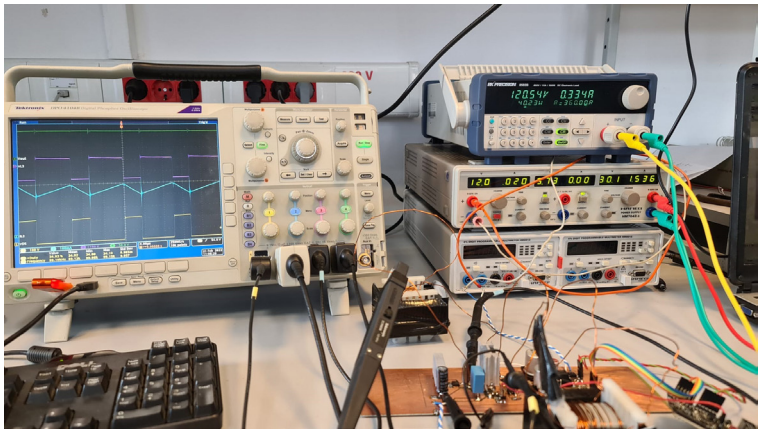

Fig. 1. View of the experimental setup

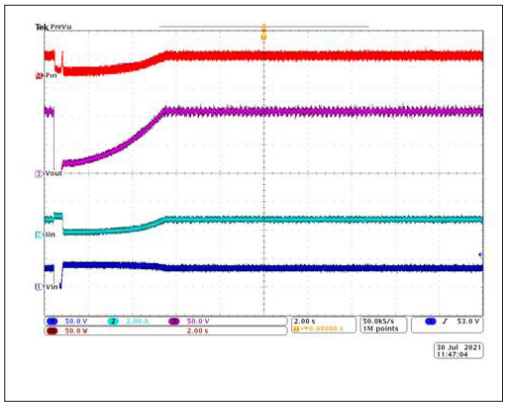

Fig. 2. Oscilloscope waveforms at start-up

Research Centre

Research Centre 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

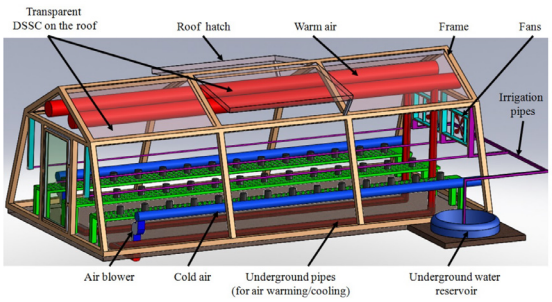
Main activities

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

- Prof. Dr. Eng. Aurel – Ștefan GONTEAN
- Eng. Radu RICMAN
- Eng. Corina COVACI
- Eng. Elisei Ștefan ILIEȘ
- Student Magdalena Patricia MARINCA

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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

- ICPE S.A. of Bucharest – coordinator;
- Politehnica University Timisoara – partner.

Implementation period

May 2020 – April 2022

Main activities

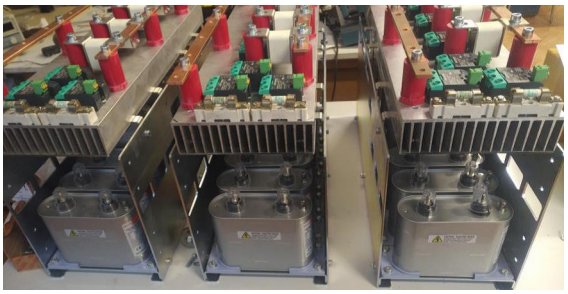
Starting from the identification of this innovative product as having a significant market potential, ICPE is this time the project coordinator and aims to develop it together with the same partner, UPT, to the prototype level. The new project mainly contains industrial research activities:

- 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 second stage (January - December 2021) entitled "Construction and testing of experimental models; Design and testing of automatic capacitive compensator prototypes" is intended to build prototype automatic capacitive compensators based on technical specifications. The main results of the second stage were:

1. Construction of experimental models of assemblies and sub-assemblies;
2. Elaboration of the referential;
3. Prototype design;
4. Construction of prototypes.



Applicability and transferability of the results

The market segment initially targeted by the new product is that of customers in the category of electrical power distribution operators. The large-scale installation of balancing capacitor banks in secondary distribution networks will make a massive contribution to reducing their own technological consumption and increasing the quality of electrical power supplied to consumers.
As the benefits of the new product become known to more and more customers, as the quality of electrical power supplied in secondary distribution networks depreciates, more and more distribution operators and large consumers of electrical will be forced to adopt methods and means of limiting asymmetry disturbances and so the new product will impose itself on the market as the optimal solution.

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 Centre

Research Centre for Power System Analysis and Optimization

Research team

UPT - partner

- Adrian PANĂ – in charge
- Florin MOLNAR-MATEI
- Alexandru BĂLOI
- Attila SIMO
- Ilona BUCATARIU
- Felicia BĂLOI
- Raul-Cristian ROMAN
- Loredana-Nicoleta PAVEN

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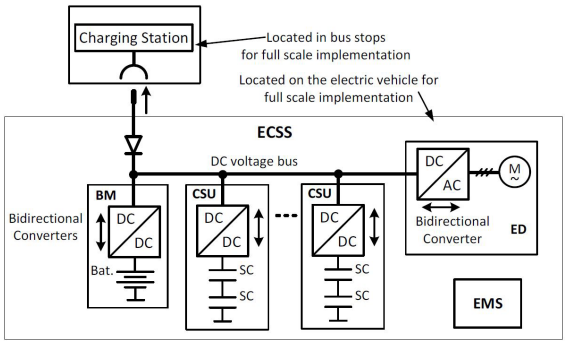
ENERGY CONVERSION SYSTEM FOR AN ELECTRIC CITY BUS/MICROBUS, WITH SUPERCAPACITOR ENERGY STORAGE AND SUPERHIGH POWER DENSITY DRIVE (ECON-BUS)

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 Centre

Research Centre for Smart Energy Conversion and Storage

Research team

- Prof. Dr. Eng. Nicolae MUNTEAN
- Acad. Prof. Dr. Eng. Ion BOLDEA
- Prof. Dr. Eng. Nicolae TUTELEA
- Prof. Dr. Eng. Gheorghe-Daniel ANDREESCU
- Scientific Researcer level II Ileana TORAC (Romanian Academy, Timisoara branch)
- Scientific Researcer 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
- Assist. Prof. Dr. Eng. Liviu-Danut VITAN
- Assist. Prof. Dr. Eng. Adrian MARTIN
- Ph.D. student Eng. Mihaita-Constantin GIREADA

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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

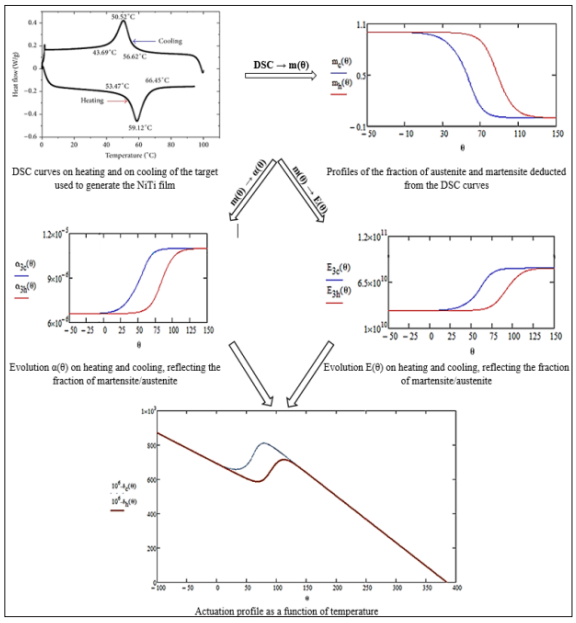
The demonstrators will be manufactured based on the analysis of the models developed by the members of the project team. The design of the bimorphs will be made in various architectures, with different deposition temperatures in order to verify the models over a larger temperature range. Magnetron sputtering 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 Centre

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

Research team

- Prof. Dr. Eng. Habil. Corneliu M. CRACIUNESCU
- Prof. Dr. Eng. Ion MITELEA
- Assoc. Prof. Dr. Eng. Aurel ERCUTA
- Ph.D student Eng. Vlad BOLOCAN
- Ph.D student Eng. Andrei NOVAC

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Project website: 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

01.09.2020-31.08.2022

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) 8 papers in ISI journals:

1. **Albulescu, C.T. (2021)**, COVID-19 and the United States financial markets' volatility, Finance Research Letters. (Q1)
2. **Albulescu, C.T.**, Miclea, S. (2021), How does the national human capital index influence the total factor productivity of the Romanian R&D firms? Human Systems Management. (ESCI)
3. **Albulescu, C.T.**, Mina, M., Oros, C. (2021), Oil-US Stock Market Nexus: Some insights about the New Coronavirus Crisis, Economics Bulletin. (ESCI)
4. **Albulescu, C.T.**, Ajmi, A.N. (2021). Causal change detection between oil price and US dollar exchange rate, Energy Economics. (Q1)
5. Stancu, S., Grecu, E., Aceleanu, M.I., Trasca, D.L., **Albulescu, C.T.** (2021). Does firm size matters for firm growth? Evidence from the Romanian health sector, Romanian Journal for Economic Forecasting. (Q4)
6. **Albulescu, C.T.**, Tiwari, A.K., Kyophilavong, P. (2021). Nonlinearities and chaos: A new analysis of CEE stock markets, Mathemathics. (Q1)
7. **Albulescu, C.T.,** Mutascu, M. (2021). Fuel price co-movements among France, Germany and Italy: A time-frequency investigation, Energy. (Q1)
8. **Albulescu, C.T.**, Tamasila, M., Taucean, I.M. (2021). The nonlinear relationship between firm size and growth in the automotive industry, Journal of Industry, Competition and Trade. (ISI, ESCI)

b) 6 participations in international conferences:

1. 16th International Symposium in Management, Politehnica University Timisoara, Timisoara, Romania.
2. 23rd INFER Annual Conference, University of Lisbon, Lisbon, Portugal.
3. 7th Annual Scientific Conference of Romanian Academic Economists from Abroad, "Lucian Blaga" University of Sibiu, Sibiu, Romania.
4. International Conference TIMTED 2021 "Current Economic Trends in Emerging and Developing Countries", West University of Timisoara, Timisoara, Romania.
5. EURO working group for commodities and financial modelling 63rd meeting & XVIII International conference on finance and banking FI BA 2021, Bucharest, Romania.
6. 35th EBES Conference, Rome, Italy.

c) research stages:
- University of Macedonia

d) 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 Centre

Research Center for Engineering and Management

Research team

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- Lecturer Dr. Caius LUMINOSU
- Lecturer Dr. Șerban MICLEA
- Assist. Prof. Dr. Lavinia MIHALI
- Assist. Prof. Dr. Andra DIACONESCU
- Ph.D student Roxana SÎRBU

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

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 programed as follows:

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

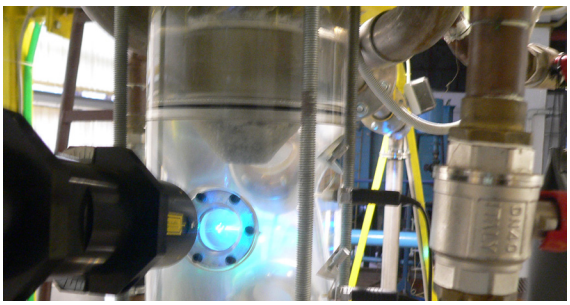
Activity 2. 3D hydrodynamic design of the free runner blades and mechanical design for the free runner rotating system;

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 centre

Research Centre for Complex Fluid Systems Engineering

Research team

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- Ph.D student Eng. Timotei ARDELEAN
- Ph.D Student Eng. Raul SZAKAL
- Eng. Constantin TANASA, Scientific Researcher level II
- Assoc. Prof. Dr. Eng. Adrian STUPARU
- Prof. Dr. Eng. Romeo SUSAN-RESIGA

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RESEARCH CONCERNING CHARACTERIZATION AND IMPROVEMENT OF THE ELECTROMAGNETIC ENVIRONMENT IN MODERN CARS

Goal of the project

-Assessment of the electromagnetic environment in modern vehicles: technical and legal aspects;
-Assessment and analysis of measuring and testing methods and of equipment involved in Automotive EMC;
-Implementation of novel test and measurement methods in Automotive EMC and improvement of the testing repeatability
-Applications of metamaterials to Automotive EMC.

Short description of the project

This project has been a component of the complex project **Hybrid Platform for Communication in Visible Light and Augmented Reality for the Development of Intelligent Systems for Assistance and Active Security of Vehicles, 21PCCDI / 2018.**
The project has ended in 2021, with results evaluated as "Excellent" by UEFISCDI

Project implemented by

Politehnica University Timisoara,
Faculty of Electronics, Communications and Information Technology,
Department of Measurements and Optical Electronics

Implementation period

18.05.2018 – 30.09.2021

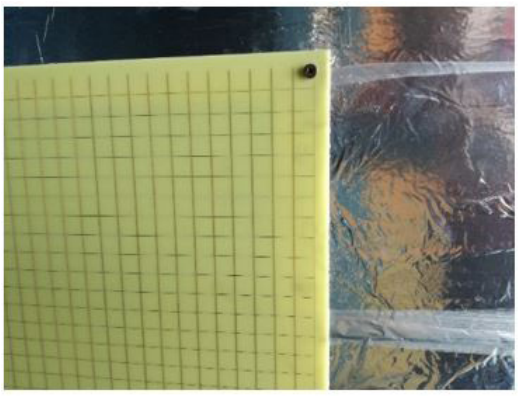
Main activities

1. Characterization of the electromagnetic environment in vehicles:
-Near field and far field measurement;
-Spectral occupancy measurement.
2. Improvement of repeatability of Automotive MC tests
-Assessment of devices and equipment involved;
-Interlaboratory testing and comparisons
-Far-field prediction from near-field measurements data;
-Prediction of far-field radiation from current measurement.
3. Methods of reduction of conducted and radiated emissions;
-Resonance analysis of systems that fail EMC tests;
-Applications of metamaterials: filtering, suppressing of cavity oscillations, screening with frequency selective surfaces.

Results

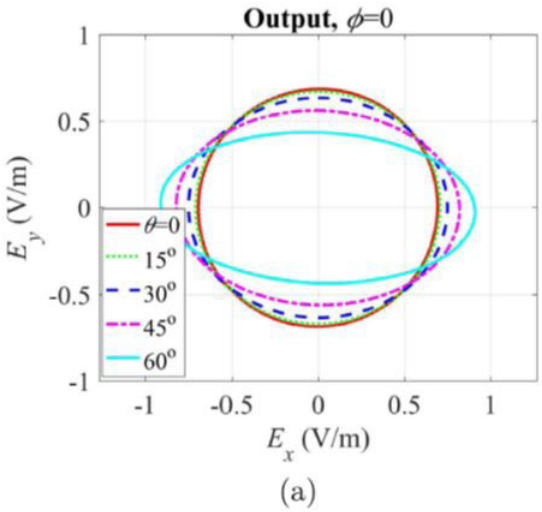
2018-2021

• Documentations and reports concerning assessment of electromagnetic field in modern cars;
• Documentations and reports concerning EMC Automotivex inter-laboratory comparisons, chamber validation and equipment assessment;
• Documentation and reports concerning applications of periodic structures in the Automotive EMC field;
• 37 published papers on:
- Application of Frequency Selective Surfaces ;
- Conduction and radiated immunity;
- ALSE chamber validation;
- Stripline measurements in Automotive EMC;
- Near field measurements and applications to emission reduction;
- Frequency selective surfaces;
- Antenna simulation and measurement
- Spectrum occupancy measurement in the different frequency ranges;
- EM plane wave polarization with Frequency Selective Surfaces

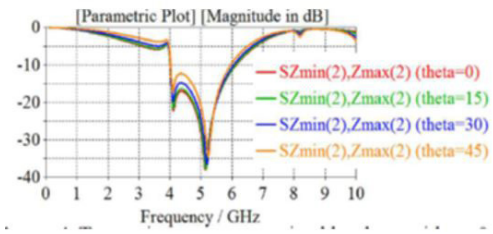


Linear-to-circular polarizer: PCB

Linear-to-circular polarizer: experimental setup



Polarization ellipse



Transmittance of a wide-band polarizer

Applicability and transferability of the results

Results obtained in this research might be useful to:
- EMC laboratories, mainly related to Automotive industry;
- EMC professionals;
- EMC research community;
- EMC standards elaboration;
- Legal authorities that regulate spectrum occupancy;
- Professionals working in Automotive design.

Financed through/by

UEFISCDI

Research Centre

ICER - Research Institute for Renewable Energy

Research Team

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- Cornel Balint
- Septimiu Mischie
- Cora Iftode
- Andrei Silaghi

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Project website: http://www.emclab.ro/carsafe/

SMART BUILDINGS ADAPTABLE TO THE CLIMATE CHANGE EFFECTS (CIA_CLIM)

Goal of the project

The specific objective of the project is centred on the increase of energy efficiency of buildings, by using smart facades with low-thermal transfer and smart energy efficiency through building automatization and solar energy collectors, through a modular laboratory demonstrative application. The resulted system, the smart house, is conceived thus to minimize the input energy for maintenance.

Short description of the project

The four component projects are focusing on two principal research directions:

(i) use of smart facades with the low-thermal transfer, actively integrated for the enhancement of internal comfort and possessing a passive control of energy and

(ii) smart energy efficiency through building automatization and solar energy collectors.

CIA.CLIM
clădiri inteligente adaptabile la efectele schimbărilor climatice

Project implemented by

Politehnica University Timișoara as coordinator (CO), in collaboration with

-Technical University of Civil Engineering of Bucharest (UTCB, P1),

-Technical University of Cluj-Napoca (UTCN, P2),

-National Institute for R & D in Electrical Engineering Bucharest (ICPE – CA, P3) and

-National Institute of R & D for Electrochemistry and Condensed Matter Timișoara (INCEMC, P4)

Implementation period

01.03.2018 - 30.06.2021

Main activities

Project 1 investigates the mechanical properties of cellular materials used as thermal insulations in smart façade systems, through mechanical compression, bending and toughness fracture testing.

Project 2 is focused on obtaining, characterizing and testing of high-property materials used for smart facades as thermal insulation materials and as support for special property layers: photo-catalytic layers and with reduced absorption/reflexion of UV-VIS-IR radiation.

Project 3 investigates the implementation of the electric power distribution in direct current for individual households or in small communities (smart-grid), with renewable energy sources integration.

Project 4 implements the knowledge and data resulted from projects no. 1-3 through a modular laboratory demonstrative application. The project will perform an integrated study on the influence of the facades and the energetic contribution to the internal comfort of the building.

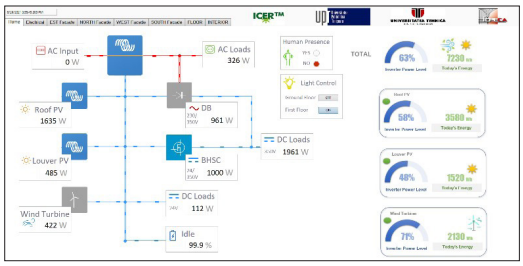
Results

- Determination of mechanical properties of cellular materials used as thermal insulations in smart façade systems;

- Production, characterization and testing of high-property materials used for smart facades as thermal insulation materials and as support for special property layers;

- Implementation of the electric power distribution in direct current for individual households or in small communities (smart-grid), with renewable energy sources integration, finalizing with an experimental platform;

- Modular laboratory demonstrative application for the implementation of project results, performing a global study regarding the influence of the facades and the energetic contribution to the internal comfort of the building.



SCADA system – the main screen

Applicability and transferability of the results

In the construction domain, the energy represents the key-point in achieving efficient buildings. All the results obtained in the frame of the project are expected to be of interest for the economic environment, from manufacturers to contractors. Design guidelines and recommendations will be provided.

Financed through/by

The project is supported by a grant of the Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI), project number PN-III-P1-1.2-PCCDI-2017-0391 / grant agreement 30PCCDI/2018.

Research Centre

- ICER - The Research Institute for Renewable Energy, UPT (CO);
- "St. Nadasan" Research Laboratory for Strength, Integrity and Durability of materials, structures and conductors, UPT (CO);
- Research Center of Environmental Science and Engineering, UPT (CO);
- Intelligent Control of Energy Conversion and Storage Research Center, UPT (CO);
- ACTEX - Integrated Platform of Research and Development for the Behaviour of Structures under Extreme Actions, UPT (CO);
- CAMBI - Advanced Research Center for Ambiental Quality and Building Physics, UTCB (P1);
- EEC - Energy Efficiency in Buildings, UTCB (P1);
- RLSDEPE - Research Laboratory and Sustainable Development in Electronics and Power Electronics, UTCN (P2);
- Department for Efficiency in Conversion and Consumption of Energy, ICPE - CA (P3);
- Renewable Energies – Photovoltaics – Laboratory, INCEMC (P4);
- Chemical and Electrochemical Synthesis Department, INCEMC (P4).

Research team

The research team is composed by 90 researchers of the five institutions.

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https://www.icer.ro/cercetare/proiecte-de-cercetare/cia-clim

Universitatea Politehnica Timişoara

2020

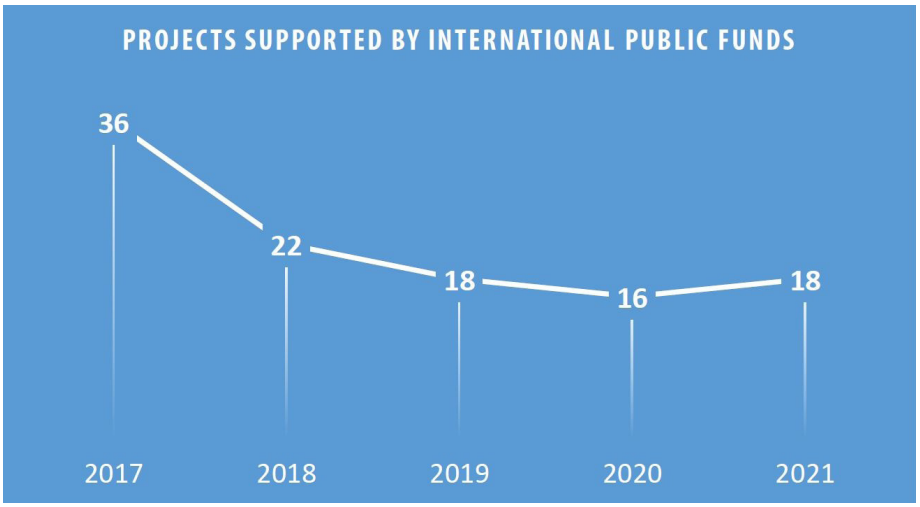
PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

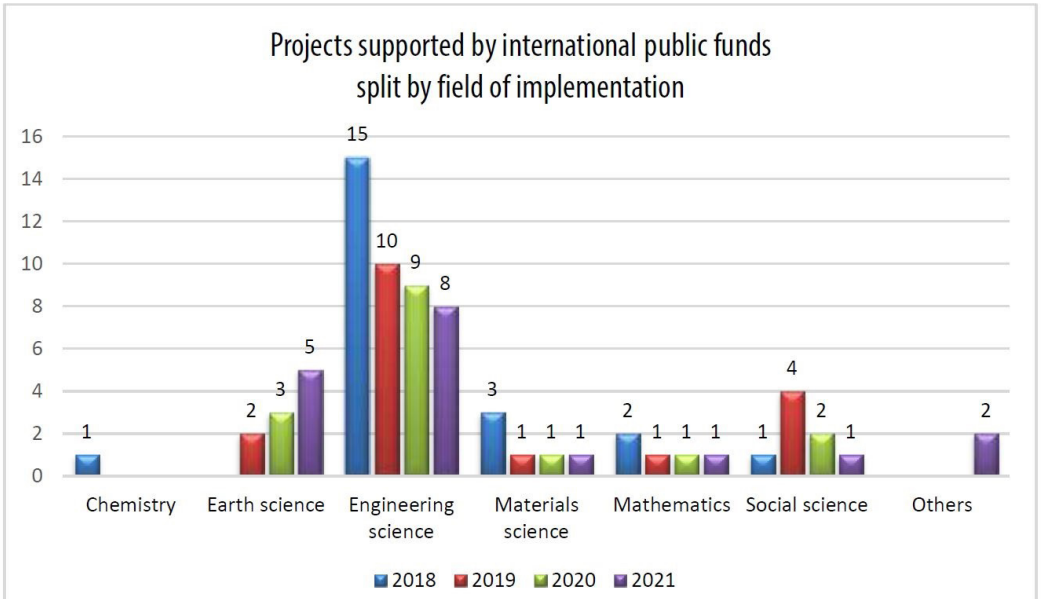
International Research Projects

PROJECTS SUPPORTED BY INTERNATIONAL PUBLIC FUNDS IMPLEMENTED BY UPT 2021

Field	Total number of projects	Number of projects presented
Earth science	5	2
Engineering science	8	6
Materials science	1	1
Mathematics	1	1
Social science	1	1
Others	2	2
Total	18	13

EVOLUTION OF PROJECTS SUPPORTED BY INTERNATIONAL PUBLIC FUNDS IMPLEMENTED BY UPT 2017 - 2021





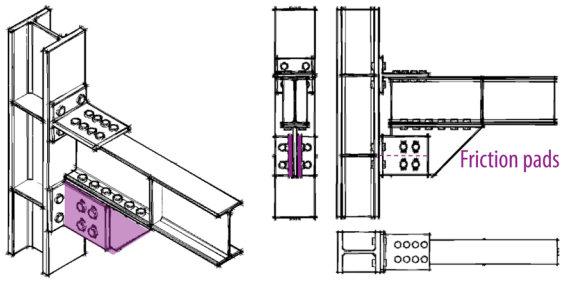
VALORISATION OF KNOWLEDGE FOR FREE FROM DAMAGE STEEL CONNECTIONS (FREEDAM-PLUS)

Goal of the project

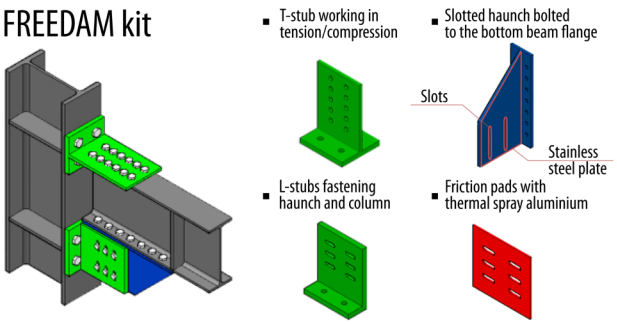
The project aimed at valorisation, dissemination and extension of the results of previous investigations regarding the design and testing of innovative connections equipped with friction dampers able to withstand without any damage severe seismic events, to a wide audience of academic institutions, engineers 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.



Typical layout of a FREEDAM connection



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 is intending to provide the specialists with all available tools (design and manufacture guidelines, codified design procedures, software and mobile app tools for practitioners, website, YouTube channel, etc.).

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.

Financed through/by

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

Research Centre

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

Research Team

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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 events such as natural catastrophes or intentional attacks 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 and members of emergency/rescue units) and reduce collateral damages.

The overall objective of the project is the preparation of scientific background material, derivation of design guidelines, preparation of study cases and production of dissemination materials (design manual, PowerPoint presentations).

The 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.

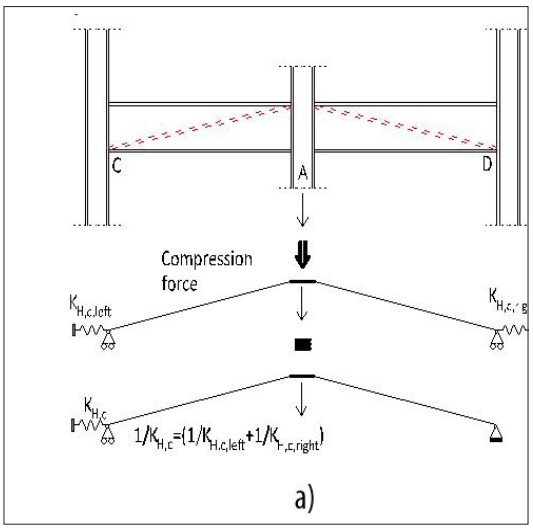
WP4: Dissemination activities

- Organization of training workshops
- Organization of post-project dissemination

Results

Derivation of practice-oriented design guidelines

A main aim of the FAILNOMORE project, 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).



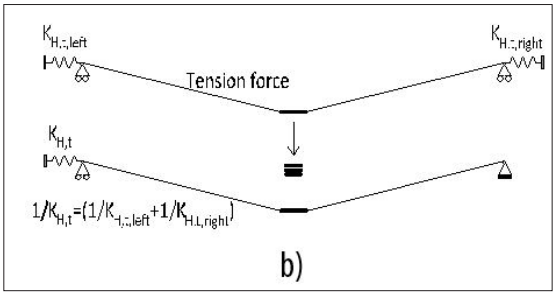


Fig. 3. Development of arching effects:
(a) and catenary action
(b) in the part directly affected by the column removal

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.

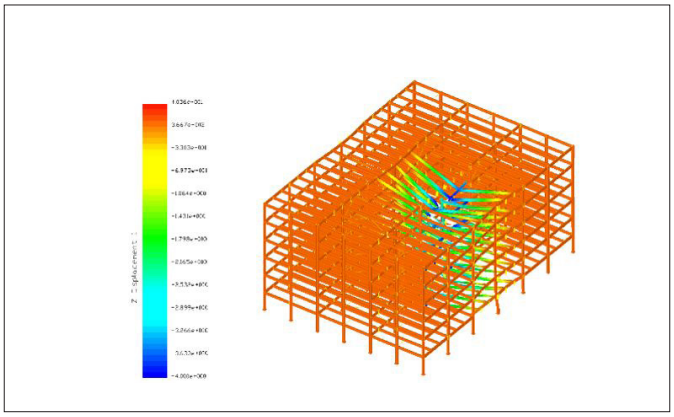


Fig. 4. Failure mode after C4 after column removal

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.

Research Centre

The Research Center for Mechanics of Materials and Structural Safety CEMSIG

Research team

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- Prof. Dr. Eng. Florea DINU
- Lecturer Dr. Eng. Ioan MARGINEAN
- Ph.D student Eng. Dominiq JAKAB

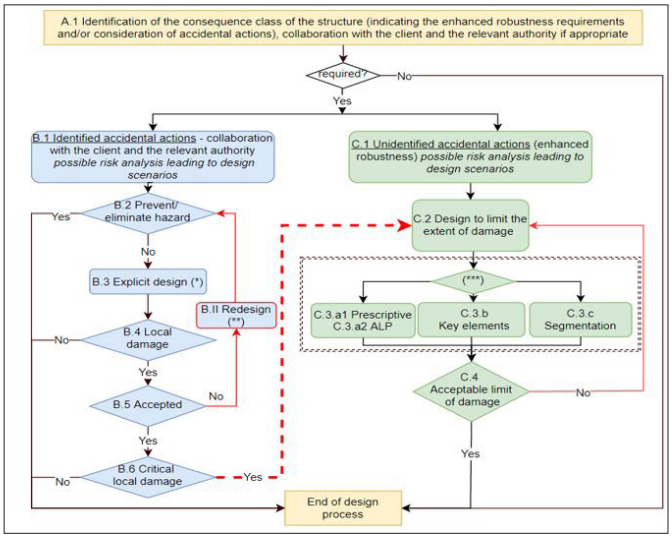

Fig.5. General flowchart of the design process

Financed through/by

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

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CONTRIBUTIONS TO CODIMENSION K BIFURCATIONS IN DYNAMICAL SYSTEMS THEORY

Goal of the project

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

Short description of the project

The project objectives are planned to be achieved during secondments.

Project implemented by

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

Implementation period

1 April 2018 - 31 March 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 codim 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"

Research team

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- M. STERPU,
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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 Univ. of Science and Technology (NTNU), Norway

Implementation period

01.10.2019 – 30.03.2023

Main activities

- Starting the Staff and PhD exchange between partners.
- Organization of the **1st Workshop on Structural Integrity of Additively Manufactured Materials**, Timisoara, 25-26 February 2021 and **1st Winter School Trends on Additive Manufacturing for Engineering Applications**, Timisoara 24-28 January 2021.
- Organization of the **East Europe Conference on AM materials,** Belgrade, 2-4 September 2021
- Study of the influence of manufacturing parameters on the mechanical properties and fracture toughness of 3D printed specimens.

Results and Publications

In 2021 the consortium published the following papers:

- BENEDETTI, M., DU PLESSIS, A., RITCHIE, R. O., DALLAGO, M., RAZAVI, S.M.J., BERTO, F. (2021). Architected cellular materials: A review on their mechanical properties towards fatigue-tolerant design and fabrication. MATERIALS SCIENCE AND ENGINEERING: R: REPORTS, 144, 100606.
- DERBAN, P., NEGREA, R., ROMINO, M., MARSAVINA, L. (2021) Influence of the printing angle and load direction on flexure strength in 3D printed materials for provisional dental restorations. MATERIALS, 14, 3376.
- STOIA, D.I., MARSAVINA, L., LINUL, E. (2021) Mode I critical energy release rate of additively manufactured polyamide samples. THEORETICAL AND APPLIED FRACTURE MECHANICS, 114, 102968.
- BRIGHENTI, R., COSMA, M.P., MARSAVINA, L., SPAGNOLI, A., TERZANO, M. (2021). Mechanical properties of polymers obtained through photo-induced polymerization: a multi physics-based approach. ADVANCED MANUFACTURING TECHNOLOGY, 117, 481-499.

- BRIGHENTI, R., COSMA, M.P. (2021). Mechanical behaviour of photopolymerized materials. J. MECHANICS AND PHYSICS OF SOLIDS, 153, 104456.

- MILOVANOVIĆ, A., SEDMAK, A., GOLUBOVIĆ, Z., MIHAJLOVIĆ, K. Z., ZURKIĆ, A., TRAJKOVIĆ, I., & MILOSEVIĆ, M. (2021). The effect of time on mechanical properties of biocompatible photopolymer resins used for fabrication of clear dental aligners. JOURNAL OF THE MECHANICAL BEHAVIOR OF BIOMEDICAL MATERIALS, 119, 104494.

- COSMA, M.P., BRIGHENTI, R. (2021). Photopolymerized AM materials: modelling of the printing process, mechanical behavior and sensitivity analysis. MATERIAL DESIGN AND PROCESSING COMMUNICATION, 225, 2021.

- ALBERINI R., SPAGNOLI A., TERZANO M., RAPOSIO E. (2021). Computational mechanical modeling of human skin for the simulation of reconstructive surgery procedures. STRUCTURAL INTEGRITY PROCEDIA, 33, 556-563.

1st Winter School: Trends on Additive Manufacturing for Engineering Applications, Timisoara 24-28.01.2021

East Europe Conference on AM materials, Belgrade, 2-4.09.2021

Financed through/by

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

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

Research team

1. Coordinator: Politehnica University Timisoara (UPT), Romania
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3. Institute of Physics of Materials, Academy of Sciences of the Czech Republic (IPM), Czech Republic
4. University of Parma (UniPR), Italy
5. Norwegian Univ. of Science and Technology (NTNU), Norway

Research centre

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

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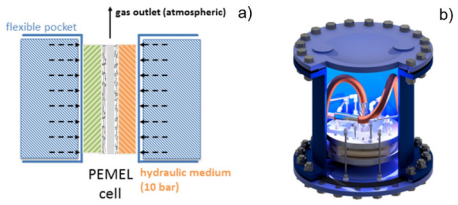
NOVEL MODULAR STACK DESIGN FOR HIGH PRESSURE PEM WATER ELECTROLYZER TECHNOLOGY WITH WIDE OPERATION RANGE AND REDUCED COST (PRETZEL)

Goal of the project

Green hydrogen produced by electrolysis might become a key energy carrier for the implementation of renewable energy as a cross-sectional connection between the energy sector, industry and mobility. Proton exchange membrane electrolyzer (PEMEL) is the preferred technology for this purpose, still costs, efficiency, lifetime and operability need to be optimized. The aim of PRETZEL project is to develop a new PEMEL that provides significant improvements in efficiency and operability to satisfy emerging market requirements.

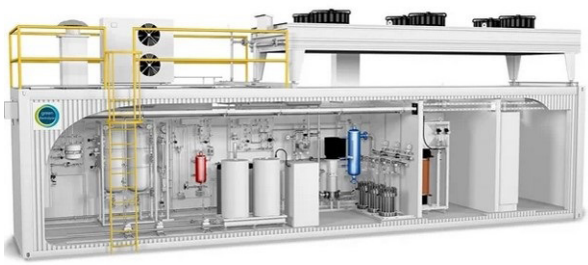
Short description of the project

The central objective of PRETZEL is to develop a new PEMEL for hydrogen production, upscaling a patented design approach based on hydraulic cell compression.



Principle of homogeneous hydraulic cell compression (a) and stack design for hydraulic compression (b).

The system will operate with a maximum energy consumption of 25 kWh, with a production capacity of 4.5 m^3 H_2 / h at rated power, at a pressure of 100 bar and water temperature of 90°C.
All subsystems needed to properly operate a PEMEL stack will be integrated in a housing, equipped with a hydrogen detection and ventilation system.

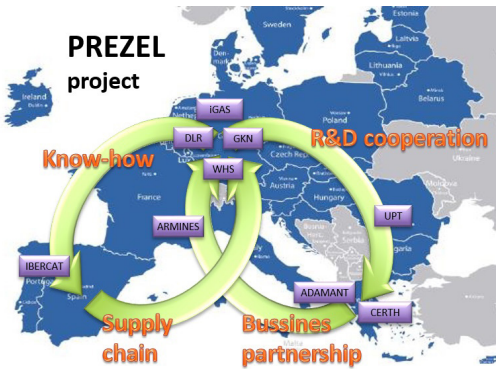


Schematic drawing of a PEMEL system as container solution by iGas energy

Project implemented by

Project Coordinator:
German Aerospace Center, Stuttgart, Germany (DLR)

EU Partners:
- Westphalian University of Applied Sciences, Germany (WHS)
- Association for Research and Development of Industrial Methods and Processes, France (ARMINES)
- Politehnica University Timisoara, Romania (UPT)
- Adamant Composites Ltd., Greece
- GKN Sinter Metals Engineering GmbH, Germany (GKN)
- Centre for Research and Technology Hellas, Greece (CERTH)
- Soluciones Catalíticas IBERCAT, Spain
- iGas energy GmbH, Germany



"PRETZEL"-like shape passing over the geographical location of all PRETZEL partners representing the long-term collaboration in know-how, supply chain, business partnership and R&D

Implementation period

01.01.2018 - 30.06.2021

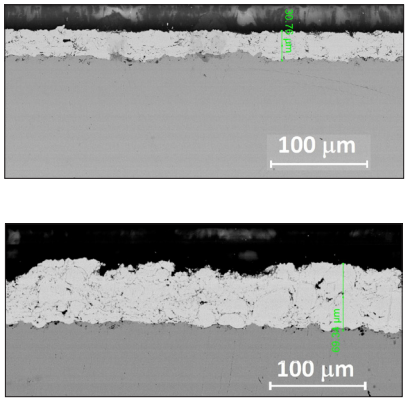
Main activities

UPT's main activities in PRETZEL are the investigation of newly developed bipolar plates (BPP), as cost-efficient alternative for the classical titanium BPP, consisting of highly corrosion resistant Nb-coatings deposited by vacuum plasma spraying (VPS) on copper pole plates in regard of:

- **Corrosion resistance** evaluation in simulated PEMEL environment, at 90°C and O_2 saturated solution, including accelerated stress tests at constant potential of 2 V applied for 6 hours
- **Interfacial contact resistance** (ICR) versus compaction force measurement
- **Structure and morphology** of BPP before and after accelerated stress tests

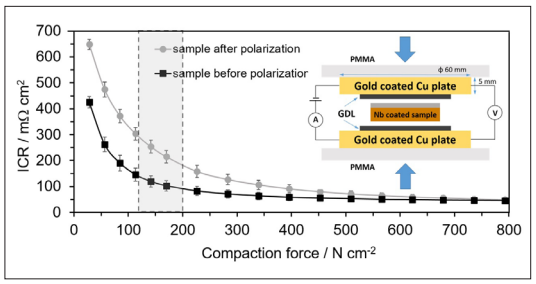
Results

- A 30 µm thick Nb coating fully protects the copper substrate against corrosion in simulated PEMEL environment, showing excellent corrosion resistance properties, with i_{corr} lower than 0.1 µA cm^{-2}.
- Cross-section images show no signs of corrosion, nor the formation of pinholes beneath the coating



Cross section FE-SEM images of Nb-coatings after accelerated stress test

- ICR decreases with compaction force up to 45 mΩ cm^2. In the range of 120 to 200 N cm^{-2}, which is the common pressure applied for assembling commercial PEM electrolyzer stacks, ICR decreases from 130 to 90 mΩ cm^2.



Interfacial contact resistance at different compaction forces

Applicability and transferability of the results

- **System**: Development and validation of a 25 kW PEM electrolyzer system with hydrogen output pressure of 100 bars or higher.
- **Cell components**: Reduction of Ir catalyst loading compared to the state-of-the-art, by the use of new aerogel supports.
- **Protocols**: development of complete protocols for BPP testing, including stress test, corrosion resistance and ICR.

Financed through/by

Fuel Cell and Hydrogen 2 Joint Undertaking under grant agreement No 779478. This JU receives support from the EU Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research

Research Centre

Research Institute for Renewable Energy (ICER-TM), UPT

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- Lecturer Dr. Eng. Mircea Laurentiu DAN
- Prof. Dr. Eng.Adina NEGREA
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- Eng. Anuta SERAC

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PROJECT: 101036006 - OPENINGUPSCIENCE
HORIZON 2020 FRAMEWORK PROGRAMME
CALL: EUROPEAN RESEARCHERS' NIGHT (H2020-MSCA-NIGHT-2020BIS)

Goal of the project

Permanently connected as in a network with similar institutions around the world and, in particular, with the European ones, 6 of the most prestigious universities have joined forces to involve the Romanian public in an exercise of changing the general perception about the current activity research and innovation in which these institutions are involved in science.

For Timisoara, there are involved two universities, Politehnica University and West University. The bough universities share the ExperimetariumTM – an experimental center (first in Romania) with more than 100 m^2, located in downtown Timisoara, where children, parents, young or old visitors can do by themselves more than 300 physics experiments (mechanics, electricity, optics, plasma physics, etc).

Almost all educational institutions have been forced by the pandemic evolution of Covid-19 to adapt their curricula to the online format. With a lot of awkwardness at the beginning, the universities were among the first to implement the necessary technical support of carrying out course, laboratory or seminar activities as well as the maintaining ongoing research programs that have specific contractual conditions with fixed terms on derivable.

Present situation in January 2021: several big cities are in quarantine; the incidence ratio of Covid-19 is over 10/1000 persons. Surprisingly, any difficult situation brings its good side. The online version of the Night event can penetrate the most remote villages that we have reached hard. Even if we hope to get rid of the pandemic by autumn, the online version through all its means of communication, will be maintained and dedicated to the public that has difficulty participating in onsite events.

The main objectives related to **European Researchers' Night 2021** and proposed under this grant are designed for a combination of online and onsite actions which will take place in compliance with the restrictions imposed by local or national authorities. "Flexibility" is the spirit that will guide us in our actions related to the 2021 Night event.

Short description of the project

The general objective of the **Opening Up Science** project is to raise awareness on researchers' work. This will consolidate a format for meetings researchers - public at large and will emphasize the benefits for the society.

Moreover we look to involve the participants in a citizen science project, engaging them in a collaborative process in which researchers and the public are working together. Our awareness campaign is not limited to the events themselves. Rather, our goal will be to use the messages of European Researchers' Night to wedge the door open towards innovation, European research funding and the need for scientists in society. It is also crucial to make the Romanian public aware of the need for an increase in research investment level, using both sources of funding, national budget and EU budget, stressing the newly designed National recovery and resilience plan for Romania.

Our objectives for 2021 Opening Up Science event in Romania are:

- Bringing researchers and public together;
- Increasing awareness of research and innovation activities;
- Creating an understanding of the impact of researchers' work on citizen's daily life;
- Encourage young people to embark on research careers.

Project implemented by

- Alexandru Ioan Cuza University of Iași (UAIC), Faculty of Physics (Coordinator)
- Lucian Blaga University Sibiu (ULBS), Research, Development and Innovation Department
- West University of Timisoara (UVT), Faculty of Physics
- University of Craiova (UCV), Department of Research and Project Management
- Constanta Maritime University (CMU), Department of Navigation
- Politehnica University Timisoara (UPT), Department of Fundamental of Physics for Engineers

Implementation period

01.05.2021 – 31.12.2021

Main activities

General "Opening Up Science" work plan for 2021:

- **End of May**: the event official website and social media accounts are operational; announcement and presentation of the preliminary schedule of the event to the public; awareness campaign launched.

- **Mid-June**: kick off meeting of the steering committee, presentation of the detailed work plan to all participating organizations; preliminary enquiry regarding the public perception of researchers and their work (up to September).
- **July-September:** media presentation and training for researchers, students and volunteers involved in the event.
- **15 August**: the overall schedule is available on the website, outlining activities, venue details and responsible teams; launch of national science contests.
- **1-10 September:** team selection for promotion in schools and social media; training and detailed analysis of activities.
- **19-24 September**: peak of the awareness campaign, distribution of leaflets, posters, invitations, social media invites and promotion, creative outdoor advertising.
- **20 September**: press conference (release) in each location (Iași, Timișoara, Craiova, Constanța and Sibiu)
- **24 September**: activities during the night, online site collection of feedback from the participants.
- **October - December**: post event follow-up; feedback analysis, partner meeting; participation statistics and report preparation; dissemination of results and best practice presentations.

Applicability and transferability of the results

To reach our goal, we brought together the most prestigious researchers exhibiting high levels of communications skills, involving them in tailor-made activities according to the age and the science background of the public, focusing especially on interactive minds-on experiments. Depending on the evolution of the pandemic Covid-19, the interactive hands-on experiments will be adapted to minimal risks in accordance with statutory requirements imposed by local or national authorities. The academic interdisciplinarity of the research fields from the 6 universities of the consortium distributed in the main cultural-geographical regions of Romania offers the advantage of the diversity of activities proposed by "Opening Up Science" edition powered by European Researchers' Night.

M**inds-on experiments** by solving a problem stated at the end of an academic lecture.

Hands-on experiments will be performed by the researchers provide participants a broad overview of the practical application of science using small equipment special created to simulate different phenomena specific to physics-chemical and biological experiments.

Science animation and simulations: Navigation workshops & boat building workshop by state-of-the-art simulators.

Interactive Quizzes, adapted to the knowledge level and age, presented to the public before carrying out experiments, to engage in an exchange of opinions and conversations about science.

Interactive and fun contests: highly appreciated robot race; colouring contest for kids up to 10 years participating in the event in a dedicated corner, which proved to be very crowded based on our previous ERN editions experience.

"Little researchers": science experiments, projects and demonstrations, carried out by primary and secondary school students.

Interactive presentations on topics that raise public interest.

For all considered topics, the **minds-on learning concept** comes superimposed on all activities, as an additional method of attracting interactive attention

Financed through/by

European Commission

Research Centre

Research Centre for Advanced Study Methods for Physical Phenomena

Research team

- Asoc.Prof. Dr. Eng. Marian GRECONICI, project responsible;
- Lecturer Dr. Eng. Simona PRETORIAN, member;
- Lecturer Dr. Eng. Delia-Gabriela TRIF-TORDAI, member;
- Lecturer Dr. Eng. Marius COSTACHE, member.

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Project website: https://cordis.europa.eu/project/id/101036006

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 characterisation 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

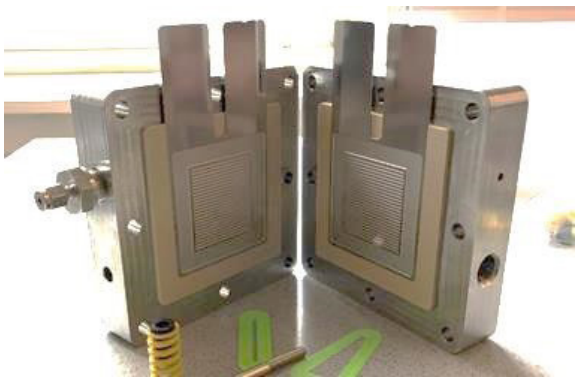
2019-2023

Main activities

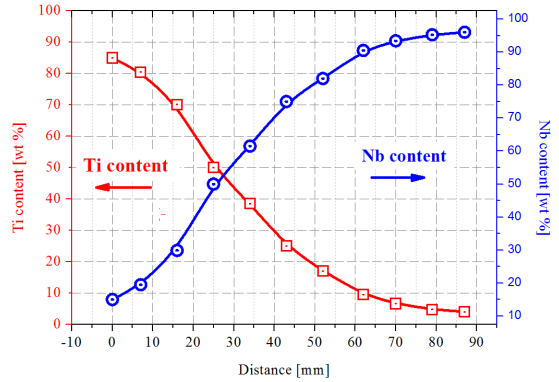
- Coating development via combinatorial exploration
- Ex-situ characterization of coatings and coated substrates
- Bipolar plates design, testing and evaluation
- Dissemination and public awareness activities

Results

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



Test cell developed in SINTEF



Compositional map of a binary library manufactured in Politehnica University Timisoara

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 Centre

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

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

Research team

Politehnica University Timisoara:
- Prof. Dr. Eng. Corneliu M. CRACIUNESCU
- Prof. Dr. Eng. Nicolae VASZILCSIN
- Prof. Dr. Eng. Ion MITELEA
- Assoc. Prof. Dr. Eng. Aurel ERCUTA
- Assoc. Prof. Dr. Eng. Andrea KELLENBERGER
- Lecturer Dr. Eng. Mircea DAN
- Ph.D. student Eng. Delia DUCA
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- Ph D. student Eng. Vlad BOLOCAN
- Ph D. student Eng. Andrei NOVAC

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- Eng. Ann-Karin KVERNBRÅTEN

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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

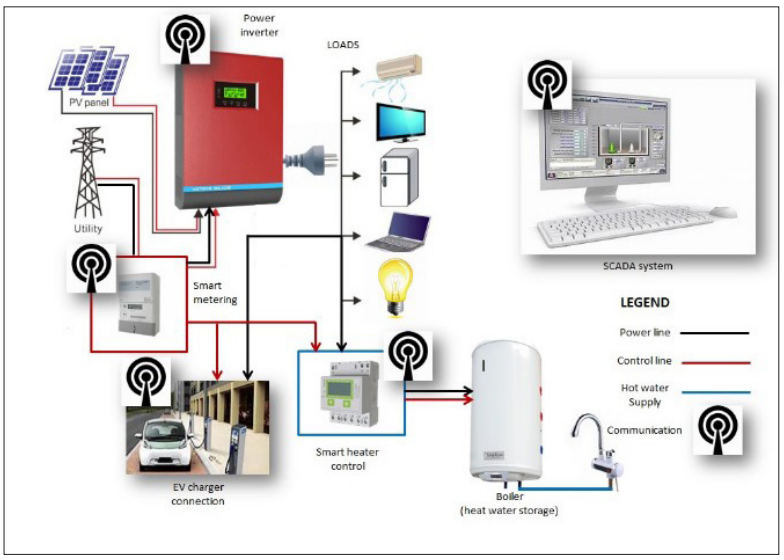
The project aims is to increase the capacity to deliver renewable energy, by integration of the PV systems, in order to reduce the power consumption from fossil fuels.

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;



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 Centre

"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
- Assist. Prof. Dr. Eng. Dănuț VITAN

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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** 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 special languages, in terms of comprehension and translation.

Short description of the project

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

Project implemented by

The project is implemented by the Politehnica University Timisoara, Department of Communication and Foreign Languages, in partnership with 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 following activities will be carried out in 2022: 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 selection of publications that convey metaphorical language; the identification of texts that contain metaphorical language; the identification of the metaphorical linguistic expressions specific to the automobile field, 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).

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 should lead 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 Team

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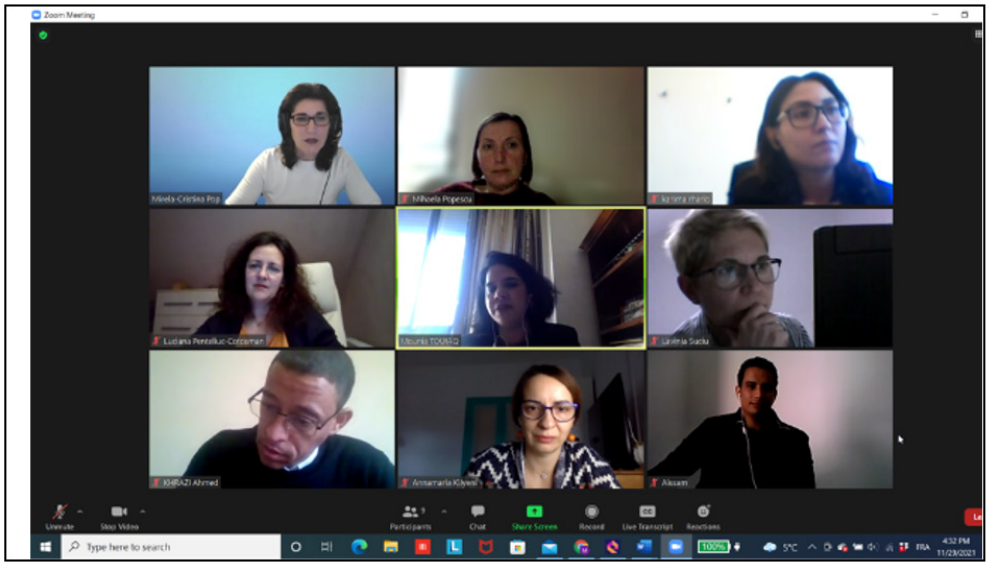

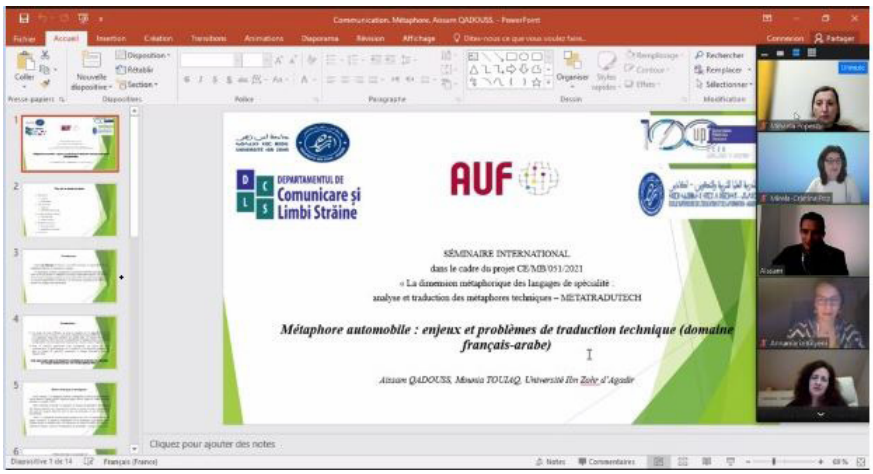

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KINETICS OF MOLECULAR CATIONS INDUCED BY ELECTRONS IN THE EDGE PLASMA OF ITER (CICAM - ITER)

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

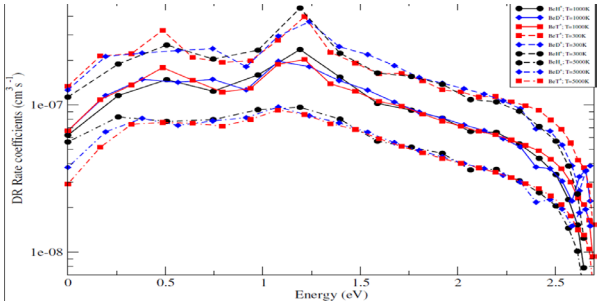
01.05.2021-30.04.2022

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;
• Developement 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 32 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 Centre
Research Centre for Advanced Study Methods for Physical Phenomena

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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 Consortium 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-centred 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

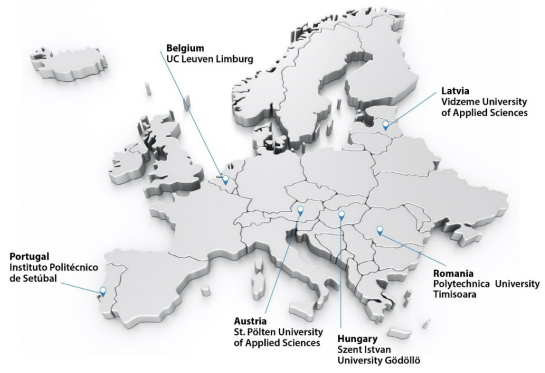
The project is one of the 41 consortiums selected for funding as part of the European Commission Initiative towards creating a number of European Universities.

Implementation period

2020 - 2023

Project implemented by:

- University of Applied Sciences St. Polten, Austria
- Politehnica University Timisoara, Romania
- Polytechnic Institute of Setubal, Portugal
- Szent Istvan University Godollo Hungary
- University College Limburg, Belgium
- Vidzemes University, Latvia



Main activities

The E³UDRES² learning trajectory creates entrepreneurial and engaged professionals committed to designing and implementing the future roads of their regions. To be able to achieve this, E³UDRES² organises six I-Living Labs for educators and 30 I-Living Labs for learners of all ages and levels of prior knowledge. These I-Living Labs are divided into three categories addressing either the challenges linked to well-being & ageing, circular economy, or the role of the human being in an AI society.

E³UDRES² sees research and innovation as the most efficient educational tools to ensure that learners will be equipped with the future-proof hard, soft and innovation skills to fully participate and take responsibility in the "novel worlds" that our regions and Europe will become during the next decades: novel technologies, novel stakeholders, novel challenges, and novel societies will definitely emerge.

WP1: Management

WP2: Future Universities

WP3: Learners

WP4: Researchers

WP5: Innovators and Entrepreneurs

WP6: Sustainability and Dissemination

Results

- Scenarios for a future university, as vision for 2030
- E³UDRES² 2030 Blueprint (Vision for the University of the Future)
- I-Living Labs: Educators for the future (development of 36 transnational I-Living Labs)
- Creation of 3 Research & Development Innovative (R&Di) networks: circular economy, well being & active ageing, human contributions to AI
- Knowledge Exchange Strategy on Innovation for Smart and Sustainable Regions
- Empower Regional Innovation Ecosystems
- Science Engagement
- Open Access
- Annual E3UDRES² conferences and workshops
- Long-term strategy for sustainability of the alliance

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

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SPOTLIGHT HERITAGE TIMISOARA 2021 - FABRIC NEIGHBORHOOD

Goal of the project

Spotlight Heritage Timisoara is a digital cultural initiative of the Politehnica University Timisoara in partnership with the National Museum of Banat, overlapping heritage in digital and physical formats. Spotlight Heritage Timisoara increases the interest of the wider public in Timișoara's historical neighbourhoods, marginal and neglected, by using guided tours and digital storytelling to empower locals and tourists to see, hear, feel, act, co-create and internalize the city. It is also a model of digital culture heritage crowdsourced participatory citytelling to empower citizens and tourists to turn their technological appetite into culture. The project mixes personal memories of people with historical and architectural data, by digitally overlaying an intangible heritage from books, oral stories, archives and art works. The digital and physical itineraries of Iosefin (2019), Elisabetin (2020), Fabric (2021), Cetate (2022), a sum of all previous neighbourhoods and Giroc (2023) offers the visitor multiple routes and possibilities to visit, read and deeply understand the city of Timisoara.

Short description of the project

Spotlight Heritage involves the population of Timișoara and its visitors in a complex real - virtual world that combines the old history of Timișoara, presented as a digital story, through a website and a mobile application, and the museographic exhibition at the headquarters of the National Museum of Banat but also in public places in the neighborhoods, under the title "Timisoara and the allegory of the senses".

The project aims to build multiple layers of personal memories and data from the history of their neighborhoods, communities, ethnicities and inhabitants, presented digitally, through intelligent applications and physically, in exhibitions.

Subsequently, writers, actors, directors, photographers and media artists will transform the collected stories into augmented and virtual reality elements for intelligent tourism applications. Local guides from a variety of environments and age categories will share neighborhood histories using the technologies created.

The 2021 Spotlight Heritage project was dedicated to the Fabric neighborhood.
Fabric neighborhood life from Timișoara is illustrated by the personal histories of the inhabitants interviewed by the team coordinated by Prof. Dr. Smaranda Vultur, coordinator of the Group of Oral History and Cultural Anthropology, since 1997.

Excerpts of interviews with the inhabitants of Fabric were selected to provide a historical, social and cultural background to the 16 stations in the neighborhood presented in the classic exhibition in the attic of the Theresia Bastion, the 16-panel street exhibition and the digital exhibition (web page and virtual reality and augmented reality applications) - the indoor and street exhibition contains only 16 panels / stations, compared to the digital one which contains 22 stations.
The format of the project involves museum exhibitions, street exhibitions, online website, mobile app, augmented reality app, virtual reality demonstrations, festival, street theatre, happenings and digital installations, guiding tours and virtual tours, printed catalogue, guide of standard graphics.

All the digital artefacts are in Romanian - English, licensed with Creative Commons License, which allows share and reuse by all and are published on the web and mobile platform and will be proposed for inclusion in Europeana.
More information can be found on the website:
https://spotlight-timisoara.eu/en/

Project implemented by:

Politehnica University Timisoara (Centre for e-Learning) in collaboration with the Banat National Museum and the Timisoara Association 2023 European Capital of Culture.

Implementation period

April – December 2021

Financed through/by

Timisoara Project Centre, as part of the program Timisoara European Capital of Culture 2023

Results

- Edutainment - Educational walkthroughs,
- Guiding tours of the landmarks, provided by historians, architects, museologists, physical or in virtual reality, combining learning and entertainment for the visitors
- Virtual reality demonstrations, virtual tours with 360 images and videos, AR &VR from selected landmarks in Timisoara
- Web application https://spotlight-Timișoara.eu/
- Mobile and AR apps Spotlight Heritage Timisoara

Applicability and transferability of the results:

The results can be transferred to other digital cultural applications. Parts are also used for the UPT Technical Digital Museum.

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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 Centre

CTI - Research Centre for Computers and Information Technology

Research team

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PROJECTS SUPPORTED BY PRIVATE FUNDS

PROJECTS SUPPORTED BY PRIVATE FUNDS IMPLEMENTED BY UPT 2021

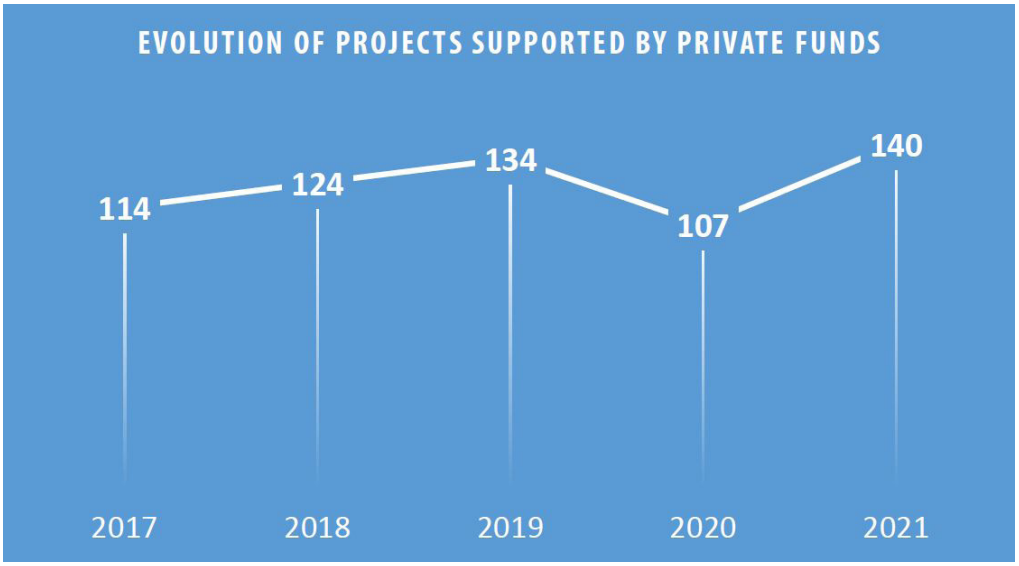
Field	Total number of projects	Number of projects presented
Environment	24	-
Transport, telecomunications and other infrastructures	44	-
Education	2	-
Energy	1	-
Industrial production and technology	65*	10
Engineering and technological sciences	3	-
Social and political systems, structures and processes	1	-
Total	140	10

* National Private Funds: 62 projects;
International Private Funds: 3 projects.

EVOLUTION OF PROJECTS SUPPORTED BY PRIVATE FUNDS CONTRACTED BY UPT 2017 - 2021

A series of inter-institutional collaborations have crucially influenced UPT's ranking classification exercise between 2017 and 2021.
Two main categories of institutional collaborations are to be noted: inter-university collaborations and collaborations with enterprises. Each of them has clearly established, mutually-shared objectives: mutual support, know-how transfer, and cooperation objectives for a common output.

UPT has always maintained a close relationship with the community, with the external environment, this relationship being its own reason to exist. Beyond the actual research and formal education, the research accomplished through technological transfer has been a constant concern for the University departments, faculties and management structures, which is reflected in the number of contracts with private companies.



This chapter presents a selection of the research contracts with third parties.

RESEARCHING FACILITY MANAGEMENT INDUSTRY 4.0/IIOT SOLUTIONS REGARDING INTEGRABILITY/INTEROPERATIBILITY AND SUPERVISION

Goal of the project

The project was a research grant obtained in a competition organized by **Continental Automotive Romania SRL.**
The scope of the grant was to research **Facility Management Industry 4.0/IIoT solutions** regarding integrability/interoperability and supervision.

Short description of the project

The research grant focused mainly on local and global interfacing, the most important component in Industry 4.0/IIoT, to elevate the local legacy structures towards integrability/interoperability. The procedure followed the highest hierarchical level in the local structure, but descended when was necessary on the hierarchical levels depending on the context. Also, the project targeted the research of a centralizing monitoring solution considering constraints as low-cost, large interoperability capabilities, fast and robust data integration and storing, optimal dashboard functioning.

Project implemented by

Politehnica University Timisoara, Department of Automation and Applied Informatics

Implementation period

01.07.2021-31.03.2022

Main activities

Objectives (O) and Activities (A):

O1. Interoperability solutions for local structures

A1. Realizing interoperability studies for local structures.

A2. Researching and developing local wrapper/gateway solutions.

A3. Testing local wrapper/gateway solutions.

O2. Centralizing monitoring solution

A4. Researching and developing interfacing structures in the centralizing application.

A5. Researching and developing a centralizing application experimental model using Node-RED.

A6. Testing the components of the centralizing monitoring solution.

Results

- Gaining interoperability for local points in the building management system. Architectures and strategies were conceived and developed to obtain interoperability of the legacy structures. Wrapper/Gateway solutions were researched and developed for analyzed local points that are requiring protocol conversion (e.g. from legacy Modbus TCP and serial, OPC DA, other proprietary or rudimentary interfacing). The solutions targeted to output the Industry 4.0 flagship protocol OPC UA, but depending on identified constraints, other strategies were adopted (e.g. web-based solutions).
- Interfacing solutions within the centralizing application in the Node-RED environment. The interfacing targeted an expandable set or protocols and technologies including OPC UA, Modbus TCP, S7, web services, databases, file manipulation.
- Centralizing solution approaching SCADA concepts with respect to constraints as low-cost, fast and robust data integration and storing, optimal dashboard functioning.

All components were tested gradually on the local level, within the centralizing monitoring solution, and the experimental model as a whole.

Applicability and transferability of the results

• The project solved interoperability issues in the Facility Management, and provided IIoT/Industry 4.0 state-of-the-art solutions for central supervision and data integration. Therefore, the new perspective and tools over the Facility Management will impact positively the availability, maintenance, efficiency, costs, reaction at incidents within the Facility Management.
• The project will impact the quality of future investments of the company by opening perspectives towards new technologies and solutions, with high efficiency and low costs.

Financed through/by

CONTINENTAL AUTOMOTIVE ROMANIA S.R.L.

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- Inf. Adriana FULOP

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HMECS - HPC MEMORY ERRORS CORRECTION SOLUTION, 3RD PART

Goal of the project

The goal of our project is to provide a method for fast verification of the ECC codes under different error patterns. The main target is to use multiple ECC blocks, with different ECC solution, for a simultaneous validation and comparison evaluation.

Short description of the project

The proposed method is based around a flash memory emulator block that provides that can be configured to emulate the behavior of different FLASH memories, store the useful data, ECC code and the error mask.

Project implemented by

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

Implementation period

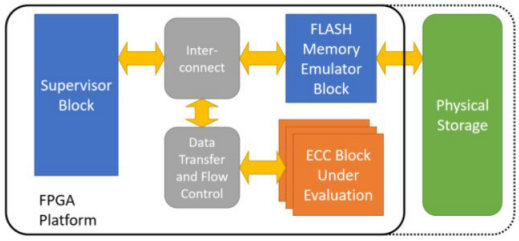
02.08.2021 – 24.12.2021

Main activities

The main activities in our research project are:
- Implement a flash memory emulator block that can emulate the behavior of FLASH memories
- Implement a supervisor module to coordinate the data flow through the platform and implement the test method
- Implement additional blocks which are required for a proper operation (interconnect, data transfer and flow control unit)
- Simulate the implemented test method
- Test and evaluate the proposed method

Results

The proposed embodiment was implemented on an FPGA platform and has a Flash memory emulator block which emulate both the behavior of different Flash memories and the errors that are generated in such memories. The Flash memory emulator block is connected to some form of physical storage to store the data, ECC codes and error mask type (i.e., DDR4 RAM, SRAM, SD Card, HDD).
The platform must also contain one or more ECC blocks with the ECC code under evaluation. Multiple ECC blocks can be different implementations of the same ECC algorithm, different ECC algorithms or a combination of the two, which allows us to make a comparison between error correction codes.



Applicability and transferability of the results

The proposed test and evaluation method provides fast verification of the ECC and an accurate timing evaluation of the ECC runtime under different error patterns.
It also can be used to compare different ECC solutions at the same time because the supervisor can generate both deterministic and non-deterministic test error patterns.

Financed through/by

CONTINENTAL AUTOMOTIVE ROMANIA S.R.L. of Timisoara

Research Centre

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

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DEVELOPMENT, SIMULATION AND TESTING OF A RISC-V CORE FOLLOWED BY A FPGA IMPLEMENTATION OF A SECURED DATA PROCESSING SOLUTION

Goal of the project

The main objective of our project is to extend the RISC-V ISA with custom instructions to efficiently perform fast encryption in hardware, such that our implementation can be used for a multitude of smart sensors dedicated for IoT applications and Edge Computing.

Short description of the project

The main aspect we focus on in our project is a new approach for initialization and secure operation based on specific instructions reflected in an updated compiler, ensuring the protection of intellectual property through combined hardware and software methods.

Project implemented by:

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

Implementation period

03.01.2021 – 23.12.2022

Main activities

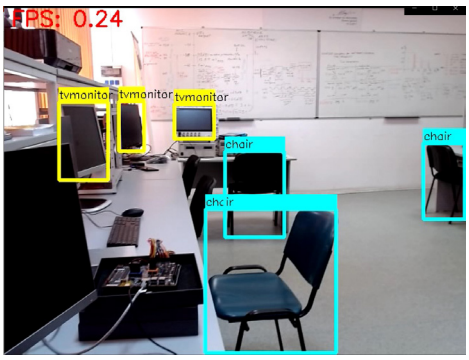
The main activities in our research project are:
- Comparative analysis of the RISC-V architectures of the main manufacturers
- Evaluation of the performances and of the used resources for the analyzed architectures
- Implement a custom instruction to fast and efficient AES encryption and decryption
- Integrate the custom instructions in a RISC-V GNU Toolchain

Results

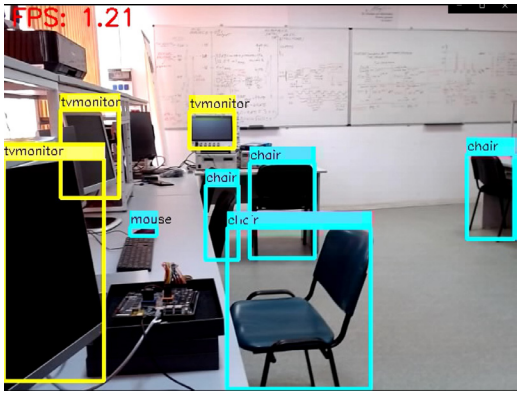
One of the RISC-V architectures we analyzed is the SiFive Unmatched. This is based on the Quad-core SiFive U74 core.

The analyzed RISC-V architecture was compared in terms of performance with a Raspberry Pi 4.

The comparison was made based on an OpenCV object detection with yolov5 NN and the results showed that the Raspberry Pi 4 has a higher processing speed than the SiFive Unmatched.



OpenCV object detection using SiFive Unmatched (0.24 FPS)



OpenCV object detection using Raspberry Pi4 (1.21 FPS)

Applicability and transferability of the results

The extension of the RISC-V ISA with custom instructions for encryption can provide greater security in the smart sensor-based IoT applications (i.e., smart cities, smart security, smart homes and health).

Financed through/by

CONTINENTAL AUTOMOTIVE ROMANIA S.R.L. of Timisoara

Research Centre

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

Research team

- Prof. Dr. Eng. Aurel – Ștefan GONTEAN
- Eng. Corneliu BĂRBULESCU
- Eng. Elisei Ștefan ILIEȘ
- Eng. Magdalena Patricia MARINCA

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HMECS - HPC MEMORY ERRORS CORRECTION SOLUTION, 2ND PART

Goal of the project

The scope of the project is to push the number of writes barrier for the non-volatile memories by implementing state of the art error correction code algorithms.
The target is represented by specific error correction algorithms which can be used for automotive applications.

Short description of the project

Our project involves the development of an innovative error correction solution that can protect the data stored in non-volatile memories in the structure of high-performance computing systems used in automotive applications.

Project implemented by:

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

Implementation period

01.04.2021 – 30.07.2021

Main activities

The main activities in our project are:

- Build a Linux functional setup
- Analyze the encoding and decoding algorithms for ECC
- Analyze the performances of the ECC algorithms
- Choose an optimal algorithm for the automotive field
- Develop the encoding and decoding algorithms
- Simulates the developed algorithms
- Build a demonstrator
- Check the real operation of the developed algorithms using the implemented demonstrator

Results

Starting from a Simulink implementation of an error correcting code, we have created a VHDL IP as an error correction solution. The ECC block has input and output of standard AXI stream bus interface and it contains the encoding/decoding algorithm and the errors injection. A small Reed Solomon example was successfully implemented.

The Reed-Solomon code is used to encode an initial set of input data. The initial data is merged with random errors, eventually corrected using the Reed-Solomon decoding algorithm.

Applicability and transferability of the results

The solution proposed by us for error correction can extend the lifetime of the memory-based products because it provides reliable data storage for various types of non-volatile memories. It also can allow the use of less expensive memories, with a simple structure, without a built-in protection against errors.

Financed through/by

CONTINENTAL AUTOMOTIVE ROMANIA S.R.L. of Timisoara

Research Centre

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

Research team

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HARDWARE VERIFICATION MANUAL UPDATE AND IMPLEMENTATION

Goal of the project

Updating the hardware verification manuals of components and electronic control units within the Vitesco Technologies Engineering company

Short description of the project

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

Project implemented by:

Faculty of Electronics, Telecommunications and Information Technologies,
Department of Measurements and Optical Electronics (MEO)

Implementation period

01.02.2021 – 30.07.2021

Main activities

- Update existing hardware verification manuals in accordance with the requirements of the integration plans.
- Generation of manuals for newly introduced components to be integrated into the electronic control unit (ECU).
- Participate in online meetings on testing requirements.
- The updating of the manuals refers both to the steps to be executed and to the experimental setup (how the devices must be interconnected).
- Verification of the results obtained by colleagues in tests/ measurements performed manually or through semi-automatic tests. Changes to the hardware verification manuals for a better understanding of the test mode.

In the following some details are presented:

- Knock sensor interface – studying the way to connect a Knock sensor to a microcontroller, what requirement must be met and updating the verification manual.
- Study of hardware verification manuals for ASICs that have High Side & Low Side Driver and development of a generic hardware verification manual for them.

Results

Hardware verification manual updates for: Knock sensor interface, CAN interface, High Side & Low Side Driver (generic hardware verification manual), Brushless Driver Chip.
New hardware verification manual for a new family of microcontrollers used in the automotive field.

Applicability and transferability of the results

The documents are used within Vitesco, at all branches where ECU checks are performed.

Financed through/by

- Vitesco Technologies Engineering Romania SRL

Research team

- Lecturer Dr. Eng. Robert PAZSITKA

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ZERO GRAVITY - CENTER

Goal of the project

The objective of the research contract is to provide consultancy to **ORACLE ENGINEERING SRL Ghiroda** for the design of a closed-loop vertical wind tunnel.

Short description of the project

The project research team provided consultancy on the design of a closed loop vertical wind tunnel. The aerodynamic losses along the wind tunnel loop were determined by the beneficiary by numerical simulation. The geometry of the wind tunnel loop has been reshaped iteratively based on the recommendations of the UPT team to deliver uniform flow in the flight testing section and to diminish aerodynamic losses. The fans are then selected for the closed loop vertical wind tunnel to operate at the targeted operating points in the design phase.

Project implemented by

Faculty of Mechanical Engineering,
Department of Mechanical Machines, Equipment and Transportation

Implementation period

10.02.2021 – 10.08.2021

Main activities

- Technical assistance in performing numerical simulation of two-dimensional and three - dimensional flow to improve aerodynamic performances of the closed loop vertical wind tunnel;
- Analytical calculation of aerodynamic losses along the closed-loop vertical wind tunnel and verification of the main results obtained in the numerical simulation;
- Verification and analysis of numerical results and debate together with the beneficiary of the conclusions and recommendations on the investigated technical solutions;
- Checking the aerodynamic parameters of the operating points of the closed - loop vertical wind tunnel and formulating recommendations for selecting fans;

Results

• The geometry designed by the beneficiary team includes a single closed loop wind tunnel according to the configuration available on site.
• The geometry of the closed loop wind tunnel was iteratively reshaped based on numerical investigations to diminish aerodynamic losses and deliver uniform flow in the flight testing section.
• Analytical calculation of aerodynamic losses along the closed-loop vertical wind tunnel and verification of the main results obtained in the numerical simulation were performed.
• Next, the verification and analysis of numerical results were debated together with the beneficiary. Then, the conclusions and recommendations regarding the investigated technical solutions were drawn.
• Finally, the aerodynamic parameters of the closed loop vertical wind tunnel operating points were checked and recommendations for fan selection were suggested.

Applicability and transferability of the results

The results obtained in the project are focused on the evaluation of the technical solutions designed by the beneficiary for a closed loop vertical wind tunnel to be implemented

Financed through/by

ORACLE ENGINEERING SRL

Research team

- Assoc. Prof. Dr. Eng. Adriana Sida MANEAa
- Scientifical Researcher level I Dr. Eng. Sebastian MUNTEAN

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RESEARCH BY MEANS OF ELECTROMAGNETIC COMPATIBILITY RELIABILITY SIMULATIONS AND DESIGN OF AUTOMOTIVE PRODUCTS

Goal of the project

The goal of the project was divided into several work packages:
WP-1: Analog simulation of Conducted Emissions (voltage and current methods) to reduce the emission levels for different project schematics, and comparison with laboratory results;
WP-2: Impedance and S parameter simulation using 3D electromagnetic tools;
WP-3: 3D simulations for assessing the contact and Shielding Effectiveness of different enclosures and comparison with practical validation;
WP-4: Signal and power integrity simulations for different scenarios;
WP-5: Acceleration factor for random vibration testing of PCBs (simulation and laboratory results)

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

Faculty of Electronics, Telecommunications and Information Technologies,
Department of Measurements and Optical Electronics (MEO)

Implementation period

15.06.2021-15.12.2021

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.

It has been proven that this approach based on simulations, instead of multiple laboratory tests, will reduce with up to 75% the development budgets, by obtaining faster and cheaper solutions to implement on PCBs.
There is a clear demand for a proactive approach, in order to move the EMC and Reliability assessment early in the design phase, when the cost of change is up to 1000 times lower, compared with the cost of redesign close to start of production.
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

Articles published between 15.06.2021 – 15.12.2021 – UPT:

[1] Ciprian Bleoju, **Andrei-Marius Silaghi, Aldo De Sabata**, „Simulation and Measurement of Conducted Emissions-Current Probe in Automotive EMC", International Symposium on Signals, Circuits and Systems (ISSCS), 15-16 July 2021, Iasi, Romania, pp.1-4.

[2] **Andrei-Marius Silaghi**, Ciprian Bleoju, **Aldo De Sabata**, „EMC Simulation of a Power Filter in the Automotive Area", 26th IEEE International Symposium on Design and Technology in Electronic Packaging (SIITME), 27-30 October 2021, Timişoara, Romania, pp.1-4.

[3] **Andrei-Marius Silaghi**, Catalin Pescari, Ciprian Bleoju, **Aldo De Sabata**, „Solving Automotive Signal Integrity Issues by EMC Simulation", 26th IEEE International Symposium on Design and Technology in Electronic Packaging (SIITME), 27-30 October 2021, Timișoara, Romania, pp.1-4.

[4] Iulia-Eliza Ținca, **Ionuț Ailinei**, **Andrei-Marius Silaghi**, Ciprian Bleoju, **Arjana Davidescu**, **Liviu Marșavina**, „Evaluation of Finite Element Modelling Techniques of Printed Circuit Boards under Dynamic and Static Loading and Validation with Experimental Data", 26th IEEE International Symposium on Design and Technology in Electronic Packaging (SIITME), 27-30 October 2021, Timișoara, Romania, pp.1-4.

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

- Lecturer Dr. Eng. Andrei-Marius SILAGHI
- Prof. Dr. Eng. Aldo DE SABATA
- Ph.D student Eng. Ionut AILINEI

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RESEARCH AND INVESTIGATIONS ON THE MORPHOLOGY OF METALLIC COATINGS IN THE AUTOMOTIVE INDUSTRY

Goal of the project

The main aim of this project was to investigate the microstructure of the developed metallic coating through various methods on the surface of different components used in the automotive industry.

In order to reach the main aim, the project has the following specific goals:
Goal 1: To understand the fundamental processes governing the coatings deposition processes ;
Goal 2: To establish a mutual link between the coating processing parameters and the deposited microstructure, thus the coating properties required for the intended use in specific applications;
Goal 3: To optimize the metallographic sample preparation procedure for each investigated batch of components;
Goal 4: To optimize the SEM parameters in order to obtain details about the microstructure and the chemical composition of the investigated coatings.

Short description of the project

The project aims to further develop procedures and methods in order to investigate the metallic coatings deposited on different components (like screws and connectors) in order to improve their electrical properties with applications in the automotive industry.

Project implemented by

Hulka Iosif in agreement with UPT and DUEVERDE SRL, A27 Bucovinei street, apt. 5, 300359, Timisoara

Implementation period

06.09.2021-06.09.2023

Main activities

- Metallographic sample preparation in terms of cutting fine samples like small screws, connectors, and pins without damaging the Ni or Sn coating
- Mounting the specimens in phenolic resin with high carbon content
- Grinding the samples on SiC abrasive papers with grit sizes: P300, P600, P800, P1200 and P2400;
- Polishing the samples with diamond suspension until a smooth lustrous surface is achieved
- Etching the samples in order to reveal the microstructure of the coatings.
-Scanning electron microscopy in order to investigate the microstructure and quality of coatings
- Energy Dispersive X-Ray Analysis in order to reveal the chemical composition of the coatings
- Interpretation of results
- Preparing reports based on the observations

Results

Observations of the Ni and Sn-based coatings deposited on various components in terms of:
- Coating thickness in accordance with the requirements imposed by the technical drawing
- Coating failure and cracks
- Identification of unwanted debris due to the manufacturing process
- Coatings' contamination

Applicability and transferability of the results

The results of the investigations were used in order to improve the quality of components by enhancing the coating's electrical properties thus with transferability to products used in the automotive industry.

Financed through/by

DUEVERDE SRL

Research Centre

Research Institute for Renewable Energy - UPT

Research team

- Iosif HULKA
- Bogdan PASCU

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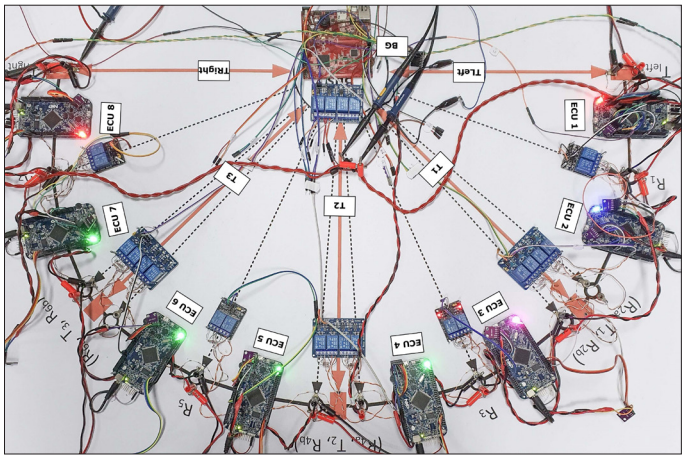
NEW CONCEPTS FOR SECURE CONNECTIVITY INSIDE CARS

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 defense 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

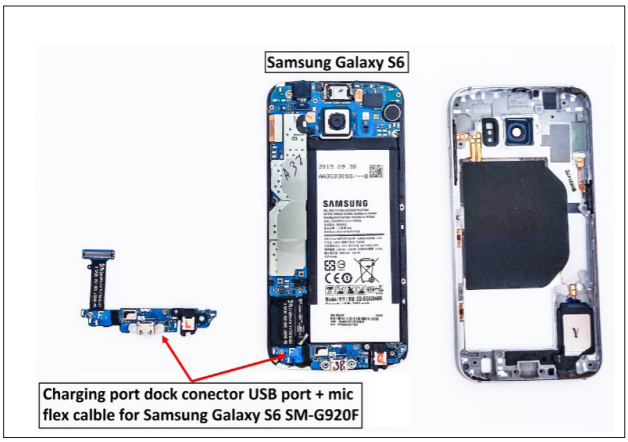
Main activities

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 analyze 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";

[2] Adriana Berdich, Bogdan Groza, Efrat Levy, Asaf Shabtai, Yuval Elovici, Rene Mayrhofer, "Fingerprinting Smartphones Based on Microphone Characteristics from Environment Affected Recordings".

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

- Prof. Dr. Eng. Bogdan GROZA
- Ph.D student Eng. Lucian POPA
- Ph.D student Eng. Adriana BERDICH
- Ph.D student Eng. Tudor ANDREICA

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RESEARCH-DEVELOPMENT AND CONSULTING FOR HYDRO-KINETIC DEEP-RIVER (HK-DR) TURBINES

Goal of the project

The project goal is to develop a complete methodology for design, analysis and optimization of horizontal axis hydro-kinetic turbines for deep river hydropower plants. Both efficiency and cavitation performance are optimized within the constraints of river depth, water velocity, required unit power, etc. Three dimensional unsteady turbulent flow analysis is performed to comprehensively assess the performances.

Short description of the project

The project develops a complete methodology for geometry and hydrodynamics of horizontal axis hydrokinetic turbines.

Project implemented by

Research Centre for Complex Fluid Systems Engineering from the Politehnica University Timişoara and VEPA GmbH Vienna, Austria.

Implementation period

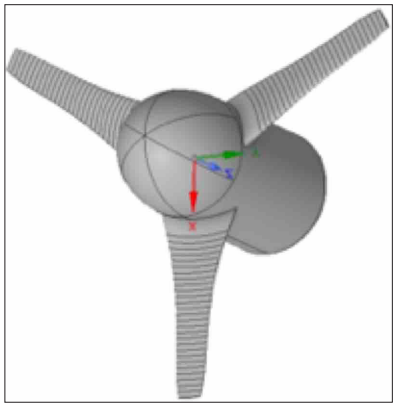
September 2021 – May 2022, with extension for model testing

Main activities

The project includes both basic and applied research activities for:
- Three-dimensional blade geometry and full rotor of HK-DR turbines;
- Analysis domain and discretization for both uniform upstream flow and rotor in the channel with non-uniform flow;
- Three-dimensional unsteady turbulent flow analysis;
- Performance assessment for output power and behavior within a full range of rotor speed;
- Cavitation assessment on the suction side of the rotor blades;
- Stress analysis of rotor blades

New methodologies are developed for smooth blade reconstruction (using Singular Value Decomposition for interpolation with a family of hydrofoils) and for the 3D flow analysis

Results

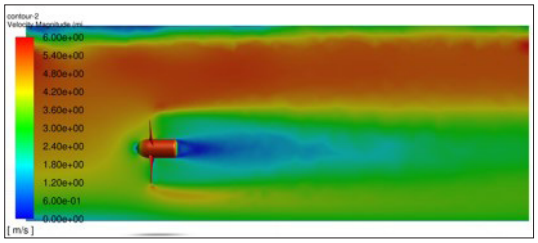


The main results of the project are:

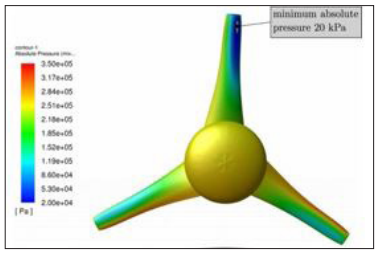
• A novel blade reconstruction methodology using advanced interpolation within a family of airfoils, based on Singular Value Decomposition;

• A novel flow simulation methodology, with rotating subdomain which includes the full rotor within a stationary domain;

• Two-phase (free surface) 3D channel flow simulation for the full rotating rotor in the river



• Cavitation assessment and design optimization for cavitation-free operation



• Determination of the rotor speed range for normal operation, and the runaway speed.

Numerical results are going to be validated against experimental model test data performed by VEPA GmbH.

Applicability and transferability of the results

The deep-river hydrokinetic turbines are going to be manufactured in Germany and installed in a large hydrokinetic power plant on the Congo river.

Financed through/by

Research-Development and Consulting Agreement BCI 2/2021 between VEPA GmbH Austria and Politehnica University Timisoara

Research Centre

Research Centre for Complex Fluid Systems Engineering

Research team

- Prof. Dr. Eng. Romeo SUSAN-RESIGA
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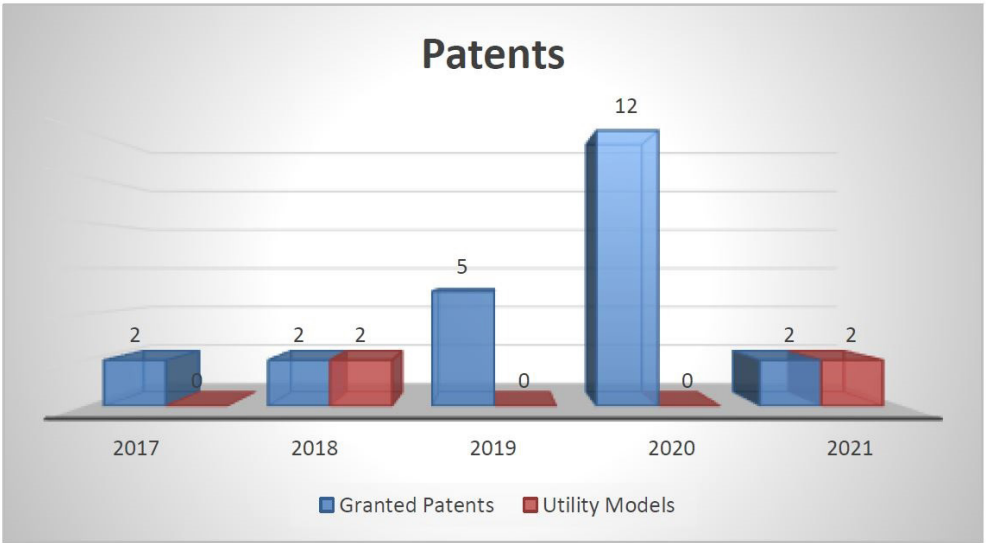
Universitatea Politehnica Timișoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

PATENTS

EVOLUTION OF PATENTS UNDER AFFILIATIONS OF UPT 2017 - 2021



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

Granted Patents

INVENTORS: MARIUS TRAIAN GHEJU, IONEL BALCU, GIANNIN EMANUEL MOŞOARCĂ, COSMIN NICOLAE VANCEA

PATENT NO. 132867 / 2021

SYNERGIC REACTIVE COMPOSITION FOR TREATMENT OF HEXAVALENT CHROMIUM POLLUTED WATER

ROMÂNIA

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

BREVET DE INVENŢIE

Nr. 132867

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: COMPOZIŢIE SINERGICĂ REACTIVĂ PENTRU TRATAREA APELOR POLUATE CU CROM HEXAVALENT

Inventatori: GHEJU MARIUS TRAIAN, TIMIŞOARA, TM, RO; BALCU IONEL, TIMIŞOARA, TM, RO; MOŞOARCĂ GIANNIN EMANUEL, TIMIŞOARA, TM, RO; VANCEA COSMIN NICOLAE, 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 28/04/2017, cu condiţia plăţii taxelor anuale de menţinere în vigoare a brevetului.

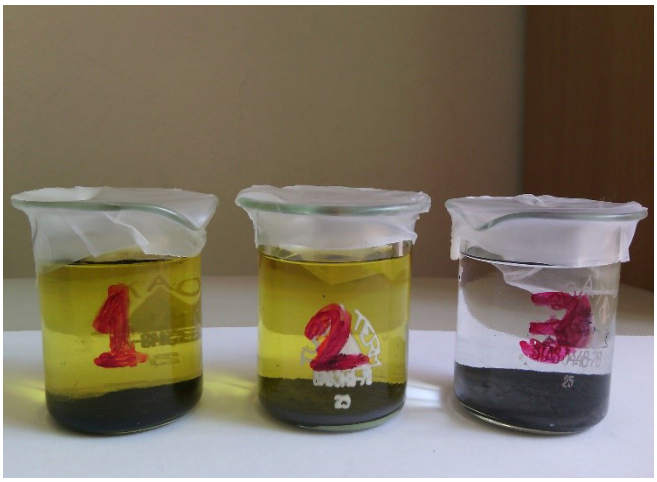
Confirm cele de mai sus prin semnarea şi aplicarea sigiliului
Director General

Bucureşti, Data eliberării 30/08/2021

The present invention refers to a reactive composition, with synergic effect, which can be used for the removal of toxic hexavalent chromium from aqueous effluents.

Over the last three decades, metallic iron (Fe^0) has been demonstrated to represent a highly efficient reagent for in situ remediation of groundwater, wastewater treatment, and safe drinking water production, due to its low cost, no toxicity, widely availability, simple operation and low maintenance of Fe0-based technologies. However, efficiency of Fe^0-based treatment systems was found to be affected by limitations, resulted mainly from precipitation of corrosion products, which leads to an incomplete utilization of Fe^0.

The issue to be solved by the invention is to develop a reactive composition which can increase the efficiency of Fe^0 to remove Cr(VI) from polluted waters. According to the invention, the proposed composition consists in a mixture of Fe^0 (70-90%) and MnO_2 (10-30%). The favorable synergistic effect observed in "Fe(0) + MnO_2" system was ascribed to capacity of MnO_2 to accelerate Fe^0 oxidative dissolution, and to generate supplementary amounts of secondary adsorbents/reductants with removal ability towards Cr(VI).



Treatability experiments of 100 mg/L Cr(VI) solution at pH 6.9, after 4 days:
(1) Fe^0 only,
(2) double dose of Fe^0 only,
(3) Fe0 + MnO2.

INVENTORS: FLORICA MANEA, KATALIN BODOR, ILIE VLAICU, NICOLETA LUNGAR, ANIELA POP, RODICA PODE

PATENT NO. 132097 / 2021

PROCEDURE FOR THE DRINKING WATER TREATMENT

ROMÂNIA

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI

BREVET DE INVENȚIE

Nr. 132097

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; AQUATIM S.A., TIMIŞOARA, TM, RO

Titlul invenţiei: PROCEDEU PENTRU TRATAREA APEI ÎN SCOP POTABIL

Inventatori: MANEA FLORICA, TIMIŞOARA, TM, RO; BODOR KATALIN, TIMIŞOARA, TM, RO; VLAICU ILIE, TIMIŞOARA, TM, RO; LUNGAR NICOLETA, TIMIŞOARA, TM, RO; POP ANIELA, SATU MARE, SM, 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 05/12/2016, 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

București, Data eliberării 30/09/2021

OFICIUL DE STAT PENTRU INVENȚII ȘI MĂRCI • ROMÂNIA •

The invention relates to a procedure for the advanced treatment of drinking water, for the treatment of industrial and waste effluents and for the treatment of municipal wastewater, based on a modular installation, which includes an electrolyzer equipped with boron-doped diamond electrodes. The application of the proposed process is based on the reactions obtained in the electrolyzer with boron-doped diamond electrodes, which can function both as an electrooxidation/electroreduction and electro-disinfection processes. In addition, in the presence of the chloride anion in water, electrolytic processes are initiated in the electrolyzer, with germicidal effect. The operation of the electrolyzer in the process of anodic oxidation by applying an appropriate polarity allows the removal of ammonium, nitrite and organic loading from the water. By simply changing the polarity of the electrolyzer, the conditions of a cathodic process are ensured, which allows the removal of nitrate from the water. The process for treating drinking water according to the invention has the following advantages: high degree of removal from the water of several types of pollutants / impurities (organic loading, ammonium, nitrite, nitrate, microorganisms), simple operation with the possibility of total automation and high versatility..

By the operation of the electrolyzer as the electrooxidation cell, the following pollutants can be removed from the water: the organic loading on the basis of reactions (1) and (2), ammonium based on reactions (3-5) and nitrite based on reactions (6-8).

$H_2O + BDD \rightarrow BDD(\cdot OH) + H^+ + e^-$ (1)

$BDD(\cdot OH) + R \rightarrow BDD + CO_2 + H_2O + H^+ + e^-$ (2)

Anode: $2NH_{3\,(aq)} + 6\,OH^- \rightarrow N_2 + 6H_2O + 6\,e^-$ (3)

Cathode: $6H_2O + 6e^- \rightarrow 3H_2 + 6OH^-$ (4)

Overall reaction: $2NH_{3(aq)} \rightarrow N_2 + 3H_2$ (5)

Anode: $NO_2^- + 2OH^- \rightarrow NO3^- + H_2O + 2e^-$ (6)

Cathode: : $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$ (7)

Overall reaction: $NO_2^- + H_2O \rightarrow NO_3^- + H_2$ (8)

By the operation of the electrolyzer as the electroreducation cell, nitrites and nitrates can be removed from the water according to the reactions (9-13) occurring at the cathode.

$NO_3^- + H_2O + 2e^- \rightarrow NO_2^- + 2OH^-$ (9)
$NO_2^- + 5H_2O + 6e^- \rightarrow NH_3(g) + 7OH^-$ (10)
$2NO_2^- + 4H_2O + 6e^- \rightarrow N_{2(g)} + 8OH^-$ (11)
$2NO_2^- + 3H_2O + 4e^- \rightarrow N_2O(g) + 6OH^-$ (12)
$2H_2O + 2e^- \rightarrow H_2 + 2OH^-$ (13)
$2\,Cl^- \rightarrow Cl_2 + 2\,e^-$ (14)
$Cl_2 + H_2O \rightarrow HOCl + HCl$ (15)
$Cl_2 + 4\,H_2O \rightarrow 2\,ClO_2 + 8\,H^+ + 8\,e^-$ (16)

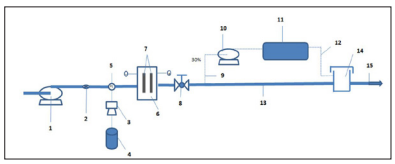


Fig. 1. The flow chart illustrating the modular system for the realization of the advanced treatment process of drinking water according to the conception of this invention

The process for the treatment of drinking water is based on a modular system, which comprises an electrolyzer (6) with boron-doped diamond electrodes (7) and a reverse osmosis unit (11). The raw water, which can come from different water sources, is supplied by pump (1) in the electrolyzer (6), in which NaCl solution is dosed optionally with the dosing pump (3) in the tank (4), ensuring a minimum flow in the electrolyzer controlled by the flow meter (5). NaCl is injected to ensure a conductivity of at least 1000 µS / cm necessary for the efficient operation of the electrolyzer (6), at current density of at least 25 mA/cm^2 and reversing the polarity applied to the boron-doped diamond electrodes (7) every 10 minutes of electrolysis. Depending on the composition of the raw water, the electrolyzer can function either only as an electrooxidation cell, or only as an electroreduction cell or as an electrochemical cell in which the two oxidation and reduction processes alternate. For decreasing the concentration of Na^+ and Cl^-, part of the water thus treated is directed through a return loop, (9) + (10) + (11) + (12), where it passes through a unit of reverse osmosis (11), which also retains other organic and inorganic contaminants depending on the membrane used, the flow of the treated water fraction being entrained in the return loop being controlled by adjusting the flow of a pump (10).

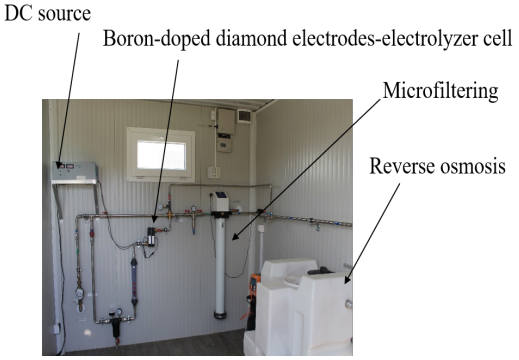


Fig. 2. Image of the modular system (at pilot plant scale) for the realization of the advanced treatment process of drinking water according to the conception of this invention

UTILITY MODELS

INVENTORS: ŞTEFAN PAVEL, DANIEL-VIOREL UNGUREANU, ALEXANDRU BÎNZAR, ANCUŢA LETIŢIA TUTELCĂ, SILVIU CRISTIAN SUCIU, CĂLIN MARIUS POPOIU

UTILITY MODEL NO. RO 2020 00024

ELECTRICAL INSTALLATION FOR AIR AND SURFACE DISINFECTION FROM THE PUBLIC TRANSPORT


ROMÂNIA

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

CERTIFICAT

privind
Modelul de Utilitate înregistrat
Nr. RO 2020 00024

Titlul: INSTALAŢIE ELECTRICĂ PENTRU DEZINFECTAREA AERULUI ŞI A SUPRAFEŢELOR DIN MIJLOACELE DE TRANSPORT ÎN COMUN

Durata Modelului de Utilitate este de 6 ani, cu începere de la data de: 24/06/2020

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

OFICIUL DE STAT PENTRU INVENTII SI MĂRCI • ROMÂNIA •

Bucureşti, Data eliberării: 30/06/2021

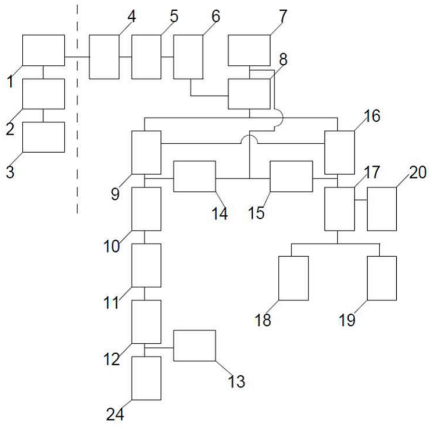
The technical problem which is solved by the invention, consists in realization of a fixed electrical installation which is used for surface and air disinfection with UVC ultraviolet radiation from the public transport, mounted on the ceiling of the transportation vehicle, powered by the electrical source of the public transport vehicle. The command of the disinfection installation can be executed manually or via Wi-Fi, from a predetermined distance

ADVANTAGES:

Being a fixed technical solution, located on the ceiling of the vehicle and powered by the electrical source of the public transport vehicle, compared to other types of similar solutions, for the same disinfection effect, it offers a lower manufacturing and operation costs. It uses three UVC germicidal lamps (26), two at the wavelength of 253.7 nm, and one at the wavenelgth of 183 nm [3], UVC radiation generators and ozone.

The disinfection lamps are incorporated in an assembly protected by a slotted stainless steel with rhomboidal slots (perforations), expanded (successive "zig-zag" L-bends), with multiple reflection surfaces for the dispersion of the radiation into the device, for air disinfection, and into the exterior, onto the surfaces which necesits disinfection found inside the space of the public transport vehicle.

The installation operates, disinfects the air and the surfaces, within 10 minutes, during the intended break of the tram driver or the bus driver, at the end of the public transportation vehicle route, place where the Wi-Fi transmitter is mounted and/or in the depot.



INVENTORS: ŞTEFAN PAVEL, DANIEL-VIOREL UNGUREANU, ALEXANDRU BÎNZAR, AUREL MOLDOVAN

UTILITY MODEL NO. RO 2020 00037

INSTALLATION FOR REMOTE MONITORING OF CORROSION OF THE GROUND CONSTRUCTIONS COATED OR NOT WITH ZINC

ROMÂNIA

OFICIUL DE STAT PENTRU INVENŢII ŞI MĂRCI

CERTIFICAT

privind
Modelul de Utilitate înregistrat
Nr. RO 2020 00037

Titlul: INSTALAŢIE PENTRU MONITORIZAREA DE LA DISTANŢĂ A COROZIUNII ÎN SOL A CONSTRUCŢIILOR METALICE ACOPERITE ŞI NEACOPERITE CU ZINC

Durata Modelului de Utilitate este de 6 ani, cu începere de la data de: 03/08/2020

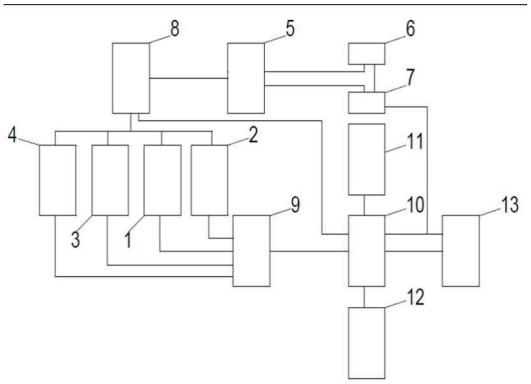
Confirm cele de mai sus prin semnarea şi aplicarea sigiliului
Director General

București, Data eliberării: 30/07/2021

Installation for real-time remote monitoring of ground constructions coated or not with zinc. The technical issue solved by this invention, consists in making an installation for real – time remote monitoring of the coated or no coated ground metal constructions found at predetermined depths and data recording, transmission of the obtained data and archiving it.

ADVANTAGES:

- Ensures remote monitoring of the installation;
- Provides recording, saving, archiving and real-time data transmission;
- Provides remote control.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HONORARY MEMBERS

EVOLUTION OF HONORARY MEMBERS OF UPT 2017 - 2021

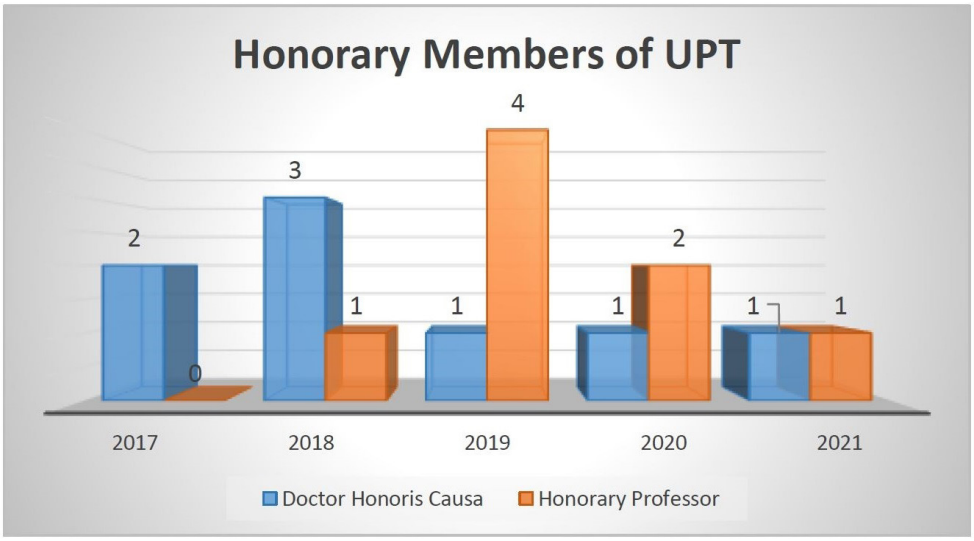
The conferring of honorary degrees is one way in which the University recognizes individuals distinguished by accomplishments consonant with the overarching mission of the University.

Nominees may be eminent scholars, scientists, artists, or professionals who have advanced their disciplines in important ways, or they may be individuals outside of the academic world who have made particularly distinguished contributions to society.

Politehnica University Timisoara recognizes scientific excellence by conferring the honorary degree of Doctor Honoris Causa and Honorary Professor to distinguished Researchers for their contribution to the development of UPT and continuous support.

The University strives for a robust pool of honorary degree recipients enriched by individuals from all backgrounds of engineering.

We also find it rewarding to honor individuals who have not already been publicly recognized by a number of other institutions.



DOCTOR HONORIS CAUSA
Professor Jan AWREJCEWICZ, Lodz University of Technology, Poland

• Professor Jan AWREJCEWICZ was born on August 26, 1952 in Telesze, Poland. He graduated the Faculty of Mechanical Engineering, Mechanics specialization, within the Lodz University of Technology, where he received his Engineer's Degree in 1977. After that, he enrolled in a PhD program at the Lodz University of Technology, and in 1981 he defended his PhD thesis in the field of Mechanics.

• He started his career at Lodz University of Technology, where in 1994 he became professor. Between 1998 and 2012, he was the Head of the Department of Automation and Biomechanics and starting from 2012 he is the Head of Department of Automation, Biomechanics and Mechatronics, which is founded by Professor Awrejcewicz.

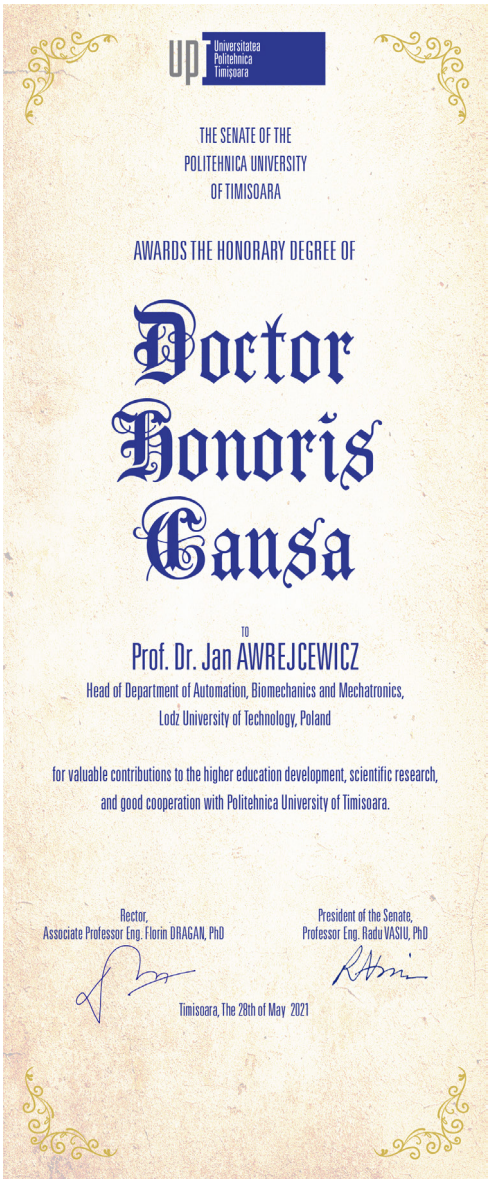
• As recognition of his scientific results, in 2005 he was appointed Member of The Academy of Engineering in Poland and in 2016 he was appointed Correspondent Member of Polish Academy of Sciences. He received the Doctor Honoris Causa Award from 6 European universities. Professor Jan AWREJCEWICZ is a top-class researcher in the field of mechanics and dynamical systems.

• The entire scientific activity of Prof. Dr. Jan AWREJCEWICZ was mainly targeted at the field of mechanical engineering, with significant theoretical contributions in Mechanics, Biomechanics, Mechatronics, Dynamical Systems, and Control.

• His remarkable results obtained in research and innovation, respectively in research management, include numerous significant Polish and European project to which is added a registered patent in the field of biomechanics.

• As a good friend of the Politehnica University Timisoara, Prof. Dr. Jan AWREJCEWICZ was – over the years – in permanent contact with Timisoara and with Politehnica University. He participated in many scientific conferences held in UPT; he was invited and accepted unreservedly the position of Keynote Speaker for conferences organized in Timisoara. The lectures were given at a very high scientific and technical level. Professor Jan AWREJCEWICZ is also an outstanding member of the Scientific Committee and an active reviewer for the series of conferences AVMS organized by Politehnica University Timisoara and published by Springer Verlag.

• Professor Jan AWREJCEWICZ promoted and collaborated with the Politehnica University, by facilitating visits of UPT faculty members to the prestigious research and education institution in Poland.



HONORARY PROFESSOR
Professor Livija CVETICANIN, University of Novi Sad, Serbia

- Professor Livija CVETICANIN was born in 1952 in Senta, Yugoslavia and graduated from the Faculty of Mechanical Engineering of the University of Novi Sad in 1975. In 1981 she obtained a PhD in Technical Sciences from the University of Novi Sad, Serbia, with PhD These "Nonlinear Vibrations of the Rotor with Variable Mass".
- Professor Cveticanin completes all levels of university education at the Faculty of Technical Sciences at Novi Sad University. Between 1975-1983 he held the position of assistant in the Department of Mechanics and Construction Mechanics, between 1983-1988 he was a lecturer, and between 1988-1992 he held the position of associate professor at the same department. Since 1992 he has been a university professor at the University of Novi Sad, with activities in the field of vibration and rotor dynamics.
- Over time, Professor Livija Cveticanin has carried out a remarkable teaching activity, teaching various disciplines in the field of mechanical engineering. During his teaching career he collaborated with various universities in Europe.
- In parallel with the teaching activity, Professor Livija Cveticanin also carried out a very rich scientific research activity at national and international level.
- Livija Cveticanin is an internationally known personality for her achievements in the field of **technical mechanics** and **mechanical vibration**. In the field of publications, the activity of Professor Livija Cveticanin is remarkable, both for the large number of publications and for their consistency and quality, given the prestige of the publishers who published them. The balance of publications is mentioned in summary, consisting of: 6 Monographs, 17 Chapters in monographs, 177 papers in journals with ISI impact factor, 119 papers published in Conference Proceedings, 36 papers published in other non-ISI journals.
- During her professional career, Professor Livija Cveticanin had collaborative relationships with teachers from the Faculty of Mechanics in Timişoara and the Faculty of Engineering in Hunedoara. It constantly aimed at consolidating existing collaborations as well as finding new possibilities for collaboration between the two universities.

Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

HABILITATION THESIS

EVOLUTION OF HABILITATION THESIS IN UPT 2017 - 2021

Habilitation (from Latin habilis "fit, proper, skillful") is the highest academic qualification a scholar can achieve by his or her own pursuit.

In this chapter we present the habilitation thesis supported by teachers from Politehnica University Timisoara, both at UPT and, also, at other universities.

The habilitation thesis are presented in chronological order, according to institution where they were sustained.

STRATEGIES, MODELLING AND INFORMATION TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT

Author: Larisa IVAȘCU

Abstract

The results of the research and publication activity of the candidate were presented in national and international academic and scientific events, through articles published in journals or in the volumes of conference papers. The candidate has published over 173 scientific articles throughout her career (2010-2020). After defending his doctoral thesis, she published 128 scientific articles (2013 - present).

The first direction of research presents education for sustainable development because the development and involvement of organizations in the implementation of this concept begins with the education of individuals. From this perspective, the role of engineering education for sustainable development is presented. Following the involvement of students in education for sustainability, it is necessary to approach education in the context of open collaboration between universities and private partnerships.

The second direction presented and researched by the author is that of different approaches to sustainability in competitive organizations. The fundamentals of concept development, enterprise management, organizational requirements for sustainable development and the relationship between stakeholders and organizational involvement are presented.

The third direction presents a series of models developed based on organizational characteristics and implications. Implementing models within organizations also involves measuring efficiency, so this direction also involves proposing an approach to measuring the implications of sustainability in industry in the context of Industry 4.0.

The fourth direction targeted by the author's concerns is that of risk management. The organizational approach to sustainable development involves risk assessment and appropriate treatment. The concerns focused on addressing organizational risk, IT implications, opportunity risk, but also the relationships between occupational risks and education, innovation and benefits.

The risks in different fields of activity are investigated, and after analyzing the results, the author proposes solutions and models for improving the analyzed situation.
The fifth direction targeted by the research activity is the development of organizational strategies in the context of streamlining organizational activities. The author's concerns in this direction are aimed at reducing the impact on the environment of some important areas.

Waste management, climate change, greenhouse gas emissions, improved processes to produce sustainable items and the assessment of economic opportunities and challenges are among the research undertaken. Following the management of mobility projects, the author has undertaken several collaborations with colleagues from China, Pakistan, Hong Kong, Singapore and Thailand.
The evaluation of the principles of the circular economy in Romania and China, but also of the implications of Chinese stakeholders in sustainable development are the starting pillars of a research network. This research group operates and has generated several studies that have been submitted for publication to a number of high-impact journals.

The full abstract at:
http://www.upt.ro/img/files/2020-2021/doctorat/abilitare/Ivascu/Rezumat_Ivascu_Larisa_en.pdf

Habilitation Commission

Prof. Dr. Ec. Eng. Marian Liviu MOCAN
Politehnica University Timisoara
Prof. Dr. Eng. Laura BACALI
Technical University of Cluj-Napoca
Prof. Dr. Eng. Ionel CIOCA
"Lucian Blaga" University of Sibiu

CONTRIBUTIONS ON DEVELOPMENT OF QUALITY ENGINEERING AND MANAGEMENT WITH APPLICATIONS IN THE THEORY OF ATTRACTIVE QUALITY AND SIX SIGMA METHODOLOGY

Author: Adrian Pavel PUGNA

Abstract

The presentation of the results obtained in the research activity of the candidate occupies most of the content of the habilitation thesis. The habilitation thesis is structured on 3 important and highly topical research directions in the field of Engineering and Management, as it results from the specialized literature:

1. Theory of Attractive Quality;
2. Six Sigma Methodology;
3. Modern applications of experimental design.

The first part of the thesis presents the bases of the Theory of Attractive Quality as well as the candidate's contributions to the development of new and applied models in this research field.
In 2015, the candidate contributed to the development of a new model for the design of new products and services.
The HWWP (Health - Weapon - Wealth - Prospect) model which connects Maslow's pyramid (Maslow's hierarchy of needs), the Kano model and methodology, the importance of customer wants and the customer satisfaction coefficient (SC).
This model represents a fundamental theoretical contribution to the development of the Kano model and a reference point for further research.
In 2016 the candidate contributed to the realization of a refined HWWP model, based on the non-uniform partition with elasticity curves.
In 2016, the candidate contributed to the development of a strategic approach to analyzing variations in potential customer needs for a better understanding of what "quality elements" need to be cultivated before launching the product or service, called "A Greenhouse Approach for Value Cultivation" or the Greenhouse model.
In 2020, the candidate contributed to the realization of a generalized HWWP model. Also in 2020, the candidate contributed to the development of a new model for evaluating the "student voice" in the development stage of a mobile phone application, called the HWWP - DDDI model.

The second part of the thesis presents the fundamental elements underlying the Six Sigma methodology. It also presents some of the candidate's achievements in the application of the Six Sigma methodology in the Automotive industry.

Part 3 presents the fundamentals of experimental design, with emphasis on Taguchi and RSM (Response Surface Methodology) methodologies. Some of the candidate's contributions to the use of these methodologies in the production and testing of sintered basalt parts as well as in the production of silver-doped TiO_2 nanoparticles are presented.

The full abstract at:
http://www.upt.ro/img/files/2020-2021/doctorat/abilitare/Pugna/Rezumat_Pugna_Adrian_en.pdf

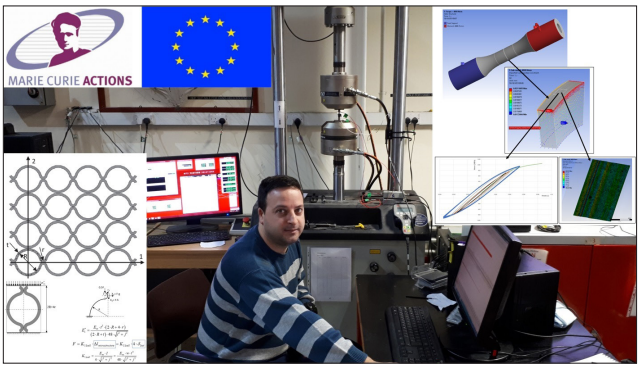
Habilitation Commission

Prof. Dr. Ec. Eng. Marian Liviu MOCAN
Politehnica University Timisoara
Prof. Dr. Eng. Silvia AVASILCĂI
"Gheorghe Asachi" Technical University of Iasi
Prof. Dr. Eng. Claudiu Vasile KIFOR
"Lucian Blaga" University of Sibiu

MECHANICS, FATIGUE AND FRACTURE OF MATERIALS AND STRUCTURES

Author: Anghel Vasile CERNESCU

Abstract



This habilitation thesis represents my research activity since 2010, after receiving the PhD title, and up to now. This work is a collection of analytical and experimental studies where the Mechanics of Continuum, Fatigue, and Fracture Mechanics concepts are applied to solve different problems.

Structured in three parts, the work contains carried out researches, proposals for the academic career development, annexes, and references.

The first part details research conducted on nonmetallic materials, components and structures such as acrylic resins, complete dentures, sandwich beams, and composite materials.

The second part contains research on metallic materials, components and structures and includes: the mechanical behaviour of a cylindrical cell core structure, fatigue crack propagation in low alloy steel, fatigue tests of the overhead line conductors, respectively failure analysis of a coupling of railway wagons.

The third part contains proposals for career development and has three directions: scientific, professional, and academic. Clear proposals and solutions are discussed in this section.

The work ends with annexes and references and also represents a content that reflects the professional profile of the author.

The full thesis at:

http://www.upt.ro/img/files/2020-2021/doctorat/abilitare/Cernescu/Rezumat_Cernescu_Anghel_en.pdf

Habilitation Commission

Prof. Dr. Eng. Liviu MARSAVINA
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Prof. Dr. Eng. Anton HADAR
Politehnica University of Bucharest
Prof. Dr. Eng. Mircea-Cristian DUDESCU
Technical University of Cluj-Napoca

CONSTRUCTIVE AND TECHNOLOGICAL ANALYSIS OF MECHANICAL ELEMENTS PROCESSED WITH CONCENTRATED ENERGIES AND BY 3D PRINTING

Author: Mircea Dorin VASILESCU

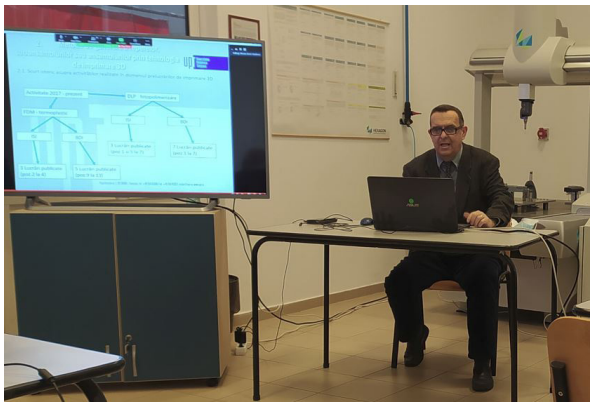
Abstract

The habilitation thesis is the result of research in multiple domains specific to the processing of materials with conventional and unconventional technologies. The research has been gathered and disseminated by the author in books, articles, research contracts, projects, and stands built or under construction. The habilitation thesis is comprised of 6 chapters including a bibliographical list which certifies the thesis's preoccupation with the domain under discussion. Each of the six chapters included in the thesis comprises a unitary structure starting from an overview of the problem addressed, analyzing the concerns and needs that led to the completion of the studies, presenting the scientific and research ensemble from the moment of the research, covering the directions reached by the research over time.

The first chapter deals with technological and structural aspects linked to the processing of materials by way of energetically activated fluids when processing metallic and non-metallic materials used in the industrial field. An in-depth analysis is provided, of aspects related to both the phenomenological part and the generation of the energetical medium made from water or abrasive suspended in water.

The second chapter addresses both the new methods of generating the parts, subassemblies, or assemblies by FDM 3D printing technology as well as the methods of modifying the structure of a water jet or laser processing plant starting from the elements.
The analysis covers the creation of the components of the mixing chamber of water with abrasive from elements generated by 3D printing, as well as the creation of the parts for installations applied in engraving, cutting, or welding with laser beam of plastic materials, and not only.

The third chapter tackles new methods of generating parts and structures using 3D printing, namely the phenomenological one of generating elements through thermoplastics processes and, respectively, the production of elements by photo polymerization methods through the two DLP and SLA procedures.



The fourth chapter revolves around aspects of constructing experimental stands destined for laboratory activity and specific devices.
In chapter five, some of the activity carried out by the author of the thesis in the field of student activity is presented and analyzed. Future directions of professional development are tackled in the sixth and final chapter.

Owing to the diversity of the problems analyzed, and to the way in which they can be addressed, one can observe the great number of possibilities of extending and deepening the research into the matter from a process-oriented and didactic point of view. In addition, this last chapter also includes a bibliographic synthesis of the documentation elaborated by the author of the thesis, or that was used in the professional training of the author of the thesis.

The full abstract at:

http://www.upt.ro/img/files/2020-2021/doctorat/abilitare/Vasilescu/Rezumat_abilitare_en_VasilescuM.pdf

Habilitation Commission

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"Transilvania" University of Brașov
Prof. Dr. Eng. Titus SLAVICI
Politehnica University Timisoara

USE OF BIOMASS THROUGH BIODEGRADATION PROCESS TO OBTAIN CLEAN ENERGY. TECHNOLOGY AND EXPERIMENTS

Author: Adrian Eugen CIOABLĂ

Abstract

The main parts presented in the habilitation thesis are connected with the following: professional and academic activities carried out, namely the development of pilot plants for the production of biogas from different renewable sources, the accomplishment of laboratory determinations for biofuels according to the European norms of standardization in the field, anaerobic fermentation processes on laboratory and pilot scale, with applications in combustion processes and their impact on the environment.

They fall into the fields of mechanical engineering and environmental engineering.

Also, there are presented key elements regarding research activity, namely experimental results included all the aspects related to the most accurate determination of the materials produced from the point of view of the laboratory analyzes, before and after the anaerobic fermentation processes, respectively the detailed study of all the process parameters during the tests with the determination of the quantity and quality of the biogas product.

Also, the direction of the tests on combustion plants of the produced biogas was approached, respectively the potential of using the biomass used in combustion processes.
One other important element presented in the thesis is connected with the plan for the evolution and development of the professional, scientific and academic career.

The presented topics of interest that the author considers, the specific elements of developing the present directions and how they use the research and academic resources, by involving young master's / Ph.D students in the research activity, respectively, will be presented for the disciplines the author is in charge with.

The qualification thesis ends with the bibliographic references associated with the first parts involving scientifical and research and one Annex which contains the list of figures and tables.

The full abstract at:
http://www.upt.ro/Informatii_teze-de-abilitare-sustinute_285_ro.html

Habilitation Commission

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"Dunărea de Jos" University of Galați
Prof. Dr. Eng. Gheorghe VOICU
Politehnica University of Bucharest

CONSTITUTIVE MODELS FOR THE VISCOPLASTICITY AND DAMAGE OF THERMOPLASTIC POLYMERS

Author: Dan-Andrei ȘERBAN

Abstract

The habilitation thesis presents a summary of the author's main scientific contributions between 2012 (the date of the author's PhD defence) and 2020, in the field of experimental and numerical analyses of the mechanical behaviour of polymeric compounds.

The first part of the thesis is concerned with a presentation of the experimental results on various polymers, with the main focus of showcasing of their viscoplastic behaviour through both monotone and cyclic tests. Two parameters were identified as major factors for the non-linear behaviour: temperature and time (through the effects of the strain rate and long-term loading). Apart from the significant effect on stiffness and strength (which increase proportionally with the strain rate and decrease with temperature), a peculiarity of thermoplastic polymers is that, at different temperatures, the same compound can exhibit either brittle or ductile characteristics.

In the second part of the thesis, three formulations were evaluated for their accuracy in modelling the stress-strain response of thermoplastic polymers at different strain rates and temperatures: the viscoelastic formulation, the elastic-plastic formulation and the viscoplastic formulation. For the viscoelastic formulation, the Wiechert model showed the best results, when compared to the other investigated rheological models, for the elastic-plastic formulations, the Multi-linear hardening model exhibeted the optimal response while the Bingham-Maxwell model was found to be most adequate viscoplastic formulation.

The third part of the thesis is concerned with the experimental determination and numerical approximation of the failure of thermoplastic polymers when subjected to various loading conditions. The considered failure model was initially developed for metals and it assumes that the failure in ductile materials is caused by the nucleation and subsequent growth of voids in the material during straining (phenomenon also observed in polymers).

From a mathematical standpoint, this formulation considers that the critical plastic strain (responsible for the void nucleation) is a function of three tensor invariants: the first invariant of the total stress tensor (the hydrostatic pressure) and the second (through the von Mises equivalent stress) and third (through the Lode angle) invariants of the stress deviator tensor.

For the calibration of the model, several experimental procedures were considered: tensile tests on flat notched specimens, compression tests on round notch specimens and Arcan tests. Numerical analyses were performed with identical test conditions in order to determine the critical plastic strain, stress triaxiality and Lode angle parameter. The results were combined into a damage model that accounts for a wide range of stress triaxiality variation and it was evaluated using simulations that replicate the compression of a metamaterial structure with open Kelvin cells, yielding accurate results and thus validating the considered approach.

The full thesis at:

http://www.upt.ro/img/files/2020-2021/doctorat/abilitare/Serban_Dan/Rezumat_abilitare_Serban_Dan-Andrei_en.pdf

Habilitation Commission

Prof. Dr. Eng. Dorin LELEA
Politehnica University Timisoara
Prof. Dr. Eng. Dan-Mihai CONSTANTINESCU
Politehnica University of Bucharest
Prof. Dr. Eng. Adrian PASCU
Lucian Blaga University of Sibiu

COMPLEX- AND HYPERCOMPLEX-VALUED NEURAL NETWORKS

Author: Călin-Adrian POPA

Abstract

The habilitation thesis presents the most important scientific, professional, and academic achievements of its author, starting from May 29th, 2015, when the author defended his PhD thesis.
In this period, the author elaborated 29 papers, all as first author, out of which 6 were journal papers, published in high impact academic journals, and 23 were conference papers, published at premiere conferences in the field of artificial intelligence, more precisely of neural networks. The author was also the director of two research grants won by competition. The scientific research of the author continued in the domain of complex- and hypercomplex-valued neural networks, with convolutional neural networks, stacked denoising autoencoders, deep belief networks, deep Boltzmann machines, and especially recurrent neural networks, more specifically Hopfield networks and bidirectional associative memories, for which different dynamic properties were studied. All these achievements are presented in detail in **Chapter 1** of the thesis.

Chapter 2 presents learning algorithms for quaternion-valued neural networks: enhanced gradient descent algorithms, conjugate gradient algorithms, scaled conjugate gradient method, quasi-Newton learning methods, and Levenberg-Marquardt learning algorithm.

Then, **Chapter 3** is dedicated to complex-valued convolutional neural networks, a variant based on the Fourier transform, and a hybrid real–complex-valued variant of these networks. The classical deep learning models stacked denoising autoencoders, deep belief networks, and deep Boltzmann machines were extended to the complex-valued domain next.

Chapters 4 and 5 mark the transition to the study of dynamic properties for complex- and hypercomplex-valued neural networks (more precisely, quaternion-valued neural networks in this case).

Dynamic properties of octonion-valued neural networks are discussed in **Chapter 6**. Octonion-valued neural networks were introduced by the author in a paper summarized in the first section of Chapter 6. Then, the author introduced Hopfield networks and bidirectional associative memories with octonion values, which are the subject of the next two sections.

The asymptotic and exponential stability properties of octonion-valued Hopfield neural networks with different types of delays are discussed in the rest of the chapter.

Matrix-valued neural networks were also introduced by the author, in his PhD thesis. **Chapter 7** presents the Hopfield and bidirectional associative memory variants of these networks, for which the asymptotic and exponential stability and dissipativity properties were analyzed. A special type of matrix-valued neural networks, Lie algebra-valued neural networks, were also first formulated by the author. As such, the last section of Chapter 7 introduces Hopfield networks and bidirectional associative memories with Lie algebraic values.

Lastly, the thesis ends with **Chapter 8**, which sketches the scientific, professional, and academic future work plans of the author.

The full thesis at:
http://www.upt.ro/Informatii_teze-de-abilitare-sustinute_285_ro.html

Habilitation Commission

Habil. Mihai Victor MICEA
Politehnica University Timisoara
Prof. Dr. Eng. Vasile Ion MANTA
"Gheorghe Asachi" Technical University of Iasi
Prof. Dr. Eng. Dorian GORGAN
Technical University of Cluj-Napoca

MULTI-SCALE ENERGETICS: FROM MOLECULAR TO SOLAR

Author: Nicolina Rodica POP

Abstract

The first part of the habilitation thesis begins with an overview of author research results poiting out the main scientific publications and research and collaborative projects.

The next chapter is dedicated to the coherent states formalism and proprieties for anharmonic oscillators. For these coherent states were calculated the expectation values of different quantum observables which give us information on their statistical behavior. The statistical properties of the coherent states are useful in quantum optics and quantum electronics and the coherent states representation may play an important role in the quantum information theory.

Chapter 3 of the habilitation thesis proposes to develop the theoretical approach of the electron/molecular cation reactive collisions based on the stepwise version of the MQDT (Multichannel Quantum Defect Theory), as well as the production of cross sections and rate coefficients for applications. Dissociative recombination, rovibrational and dissociative excitation of molecular cations with electrons are major elementary process in the kinetics and in the energy balance of astrophysical ionized media (supernovae, interstellar molecular clouds, planetary ionospheres, early Universe), fusion plasmas in the divertor region, plasmas formed at the hypersonic entry of the spacecrafts and in many other cold media of technological interest.

Calculations were been perform in a large range of energy and for a large number of ro-vibrational levels, in order to answer to the tremendous need of rate coefficients coming from different communities of fundamental and applied physics.

Part of these data serves to the interpretation and often to the calibration - of the experimental results, giving a deeper insight into the understanding of the mechanisms and interactions governing the relevant elementary processes.

The practical output of our research are accurate cross sections and rate-coefficients for the relevant collision processes, usefully in the modeling of various reactive media of astrophysical and energetic interest: Early Universe, plasma processing of surfaces , ITER project for thermonuclear fusion.

These results will be uploaded to the KIDA or LxCAT database, usefully to Astrochemistry and Plasma Low-Temperature community.

The work continues with the presentation of parametric models for solar irradiance in **Chapter 4**.

The studies from this chapter are focused on increasing the quality of modeling and assessing solar potential under clear sky, aiming to contribute in increasing the accuracy in solar energy production estimation.

Thus, aiming to increase the accuracy of solar energy production estimates, is need for developing clear-sky solar irradiance models tuned for properly capturing the effect of aerosols at a high concentration in atmosphere.

The last part of the habilitation thesis begins with the presentation of the didactic and mentoring activity and the research projects for the international students.

The last section includes the information relevant to career development at the research level.

The full abstract at:
http://doctorat.unibuc.ro/wp-content/uploads/2020/10/Rezumatul-tezei-de-abilitare_NicolinaPop.pdf

Habilitation Commission

Prof. Dr. Ştefan ANTOHE
University of Bucharest
Prof. Dr. Cristian ENĂCHESCU
„Alexandru Ioan Cuza" University of Iași
Prof.dr. Niculae PUŞCAŞ
Politehnica University Timisoara

Universitatea Politehnica Timişoara

2020

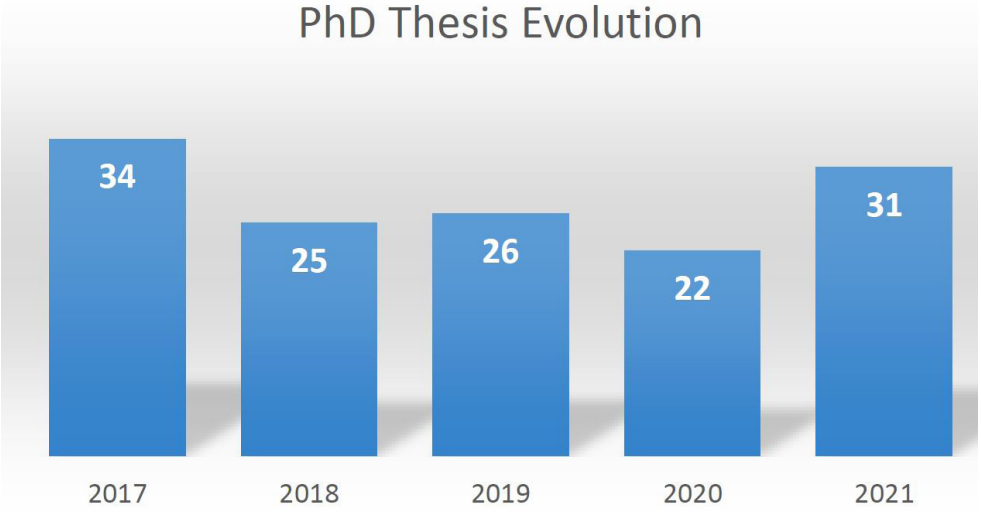
PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

PhD THESIS

EVOLUTION OF PhD THESIS DEFENDED IN UPT 2017 - 2021

Ph.D students of UPT are those with a high degree of personal motivation that stems from their natural curiosity and love of intellectual pursuits. It is expected that after they obtain their degree they will metamorphose into scholars for whom also the temptation of researching new and exciting subjects is irresistible, or at least preferable to all other choices.

Doctoral programs usually encompass intensive training in research methods, including interviewing, surveys, questionnaires, clinical trials and laboratory experiments; later, those skills are put into practice when the doctoral candidate conducts fieldwork for his dissertation. Skills gained in qualitative and quantitative research methodology and statistical analysis are transferable to non-academic research environments, particularly for industrial research. In addition, employers outside of academia seek individuals with sound research skills to carry out projects at think tanks and research institutes in both the private and government sectors.



In this chapter we present a list of the PhD Thesis defended in Politehnica University Timisoara during 2021.

Architecture

Alexandru CIOBOTĂ PhD adviser prof. S. M. BICA	*Participarea gospodăriei în evoluția peisajului cultural în comuna Pietroasa. Direcții de cercetare transdisciplinară* (Participation of the household in the evolution of the Pietroasa Commune's cultural landscape. Transdisciplinary research approaches)
Ileana Codruța NEGRULESCU PhD adviser prof. C. DUMITRESCU	*Scurt îndreptar umanist pentru arhitecți. De ce arhitecții și profanii domeniului au percepții divergente?* (A short humanistic guide for architects. Why do architects and Laymen Have Divergent Perceptions?)
Elena-Roxana FLORESCU PhD adviser prof. S. M. BICA	*Pământul ca material de construcție. Tradiție constructivă și inovație ecologică* (Earth as a building material. Constructive tradition and ecological innovation)

Systems Engineering

Andrei Mihai NICOLAE PhD adviser prof. I. SILEA	*Unelte și strategii IIoT pentru interoperabilitatea sistemelor și pentru creșterea inteligenței soluțiilor din industria apei* (IIoT tools and strategies for systems interoperability and for increasing the intelligence of water industry solutions)
Dadiana-Valeria GRANDO (married CĂIMAN) PhD adviser prof. T.L. DRAGOMIR	*Determinarea de semnături pentru consumatori casnici pe baza datelor înregistrate de contoarele inteligente* (Determination of signatures for household consumers based on data registered by smart meters)

Computers and Information Technology

Mohamed Lafif TEJ PhD adviser prof. Ș. HOLBAN	*Contribuții la determinarea arhitecturii rețelelor neuronale* (Contributions to the Determination of Neural Network Architectures)
Augustin-Cătălin IAPĂ PhD adviser prof. V.-I. CREȚU	*Algoritmi și un set de date care folosesc dinamica tastării tastelor în cazul textului scris liber pentru autentificarea continuă în platforme educaționale care cuprind cursuri online deschise masive (MOOC)* (Free-text keystroke dynamics data set and algorithms for continuous authentication in educational platforms with Massive Open Online Courses (MOOC))
Marina-Adriana MERCIONI PhD adviser prof. Ș. HOLBAN	*Îmbunătățirea performanței rețelelor neuronale profunde prin dezvoltarea de noi funcții de activare* (Improving performance of deep neural networks by developing novel activation functions)
Felicia Mirabela DUME (married COSTEA) PhD adviser prof. V.-I. CREȚU	*Contribuții în domeniul modelelor generative aplicate în învățarea electronică* (Contributions in the field of generative models applied in eLearning)
Marius BABA PhD adviser prof. I. JIAN	*Clasificarea comportamentului folosind rețele de senzori video în mediu urban* (Behaviour classification in urban area using video based sensor networks)

Lucian UNGUREAN PhD adviser prof. M. MICEA	*Evaluarea stării de degradare a bateriilor reîncărcabile în sisteme alimentate cu baterii* (Rechargeable batteries state of health assesment for battery powered embedded systems)
Gabriel Nicolae CÂRSTOIU PhD adviser prof. M. MICEA	*Maximizarea eficienței de gestionare a bateriilor reîncărcabile în aplicații critice de stocare de energie* (Maximizing the management efficiency of rechargeable batteries in critical energy storage applications)
Eugenia Ana CAPOTA PhD adviser prof. M. MICEA	*Metode de planificare timp real pentru sisteme distribuite cu niveluri mixte de criticalitate* (Scheduling methods for mixed criticality real-time distributed systems)

Chemical Engineering

Alin Daniel GOLBAN PhD adviser prof. R.PODE	*Sinteze de hidroxizi dubli stratificați din deșeuri industriale cu aplicații în procese de tratare avansată a apelor* (Synthesis of layered double hydroxides from industrial waste with applications in advanced water treatment processes)

Civil Engineering and Building Services

Iosif BOROS PhD adviser prof. V. A. STOIAN	*Evaluarea performanței energetice și a ciclului de viață a clădirilor* (Assessment of the energy performance and life cycle of buildings)
George Narcis PELEA PhD adviser prof. T.E. MAN	*Probleme actuale privind managementul exploatării și întreținerii sistemelor de irigații aflate în vestul României* (Current management issues in exploitation and maintenance of irrigation systems in western part of Romania)
Andrei-Roman FORTON PhD adviser prof. A. CIUTINA PhD adviser prof. H. DI BENEDETTO	*Thermomechanical behaviour of bituminous materials including RAP and rejuvenator and environmental impact of their fabrication process* (Thermomechanical behaviour of bituminous materials including RAP and rejuvenator and environmental impact of their fabrication process)
Viorel-Constantin TODEA PhD adviser prof. V. A. STOIAN	*Performanța seismică a pereților compoziți oțel-beton cu goluri centrale* (Seismic performance of composite steel-concrete shear walls with central openings)
Nicola CHIEFFO PhD adviser prof. M. MOȘOARCĂ	*Evaluarea vulnerabilității seismice a clădirilor istorice din zidărie solicitate la acțiuni seismice de suprafață* (Seismic vulnerability assessment of historical masonry building under near-field earthquake)

Electronic Engineering, Telecommunications and Information Technologies

Gordana-Raluca BARB PhD adviser prof. M. OTEȘTEANU	*Optimizarea performanțelor sistemelor de comunicații 5G* (Performance Optimization for 5G Wireless Communication Systems)

Teodor-Cosmin DEHELEAN PhD adviser prof. C.-A. NAFORNIȚĂ	*Contribuții la concepția unui sistem îmbarcat pe automobile pentru protecția pietonilor* (Contributions to the design of an automotive embedded system for pedestrian protection)

Electrical Engineering

Andy-Sorin ISFĂNUȚI PhD adviser prof. Ion BOLDEA	*Contribuții în proiectarea și controlul mașinilor sincrone cu magneți permanenți pe bază de Ferite, cu randament ridicat, pentru acționarea compresoarelor de putere redusă* (Design and control contributions to high efficiency Ferrite-PMSM drives for small compressors)
Dumitru CIULICĂ PhD adviser prof. M. PĂNOIU	*Cercetări privind optimizarea controlului stațiilor retehnologizate sistem SCADA* (Research on optimizing the control of SCADA system upgraded stations)

Power Engineering

Mihaela-Daciana MIC (married CRĂCIUN) PhD adviser prof. Ș. KILYENI	*Utilizarea rețelelor neuronale bayesiene la prognoza consumului de energie electrică* (Bayesian neural network based electrical load forecasting)

Engineering and Management

Roxana - Mihaela OARZĂ (married SÎRBU) PhD adviser prof. A. DRĂGHICI	*Ingineria și managementul investițiilor verzi* (Engineering and Management of Green Investment)
Corina-Monica RUSNAC (married DUFOUR) PhD adviser prof. A. DRĂGHICI	*Propunerea unei infrastructuri de sănătate și securitate în muncă pentru facilitarea inovației orientată spre sustenabilitate* (A proposed occupational health and safety infrastructure as enabler for sustainability - oriented innovation)
Traian Mihai POPESCU PhD adviser prof. G. I. PROȘTEAN	*Contribuții în managementul riscului de securitate cibernetică: Model de referință pentru strategia de management al riscului securității cibernetice pentru internetul obiectelor (IoTSRM2)* (Contributions to cybersecurity risk management: IoT security risk management strategy reference model (IoTSRM2)

Mechanical Engineering

Septimiu Radu ALBEȚEL PhD adviser prof. M. NAGI	*Studii şi cercetări privind influența geometriei nervurilor discontinue, dispuse alternant (OFFSET) asupra performanțelor schimbătoarelor de căldură din aluminiu în plăci brazate* (Studies and researches regarding the OFFSET fin influence on the aluminum brazed plates heat exchangers performances)
Evelin-Anda DAVID (married LAZA) PhD adviser prof. M. NAGI	*Studii şi cercetări privind eficientizarea consumului energetic al pompelor de căldură într-un sistem acvacol recirculant* (Studies and research on energy efficiency of heat pumps in a recirculating aquaculture system)

Materials Engineering

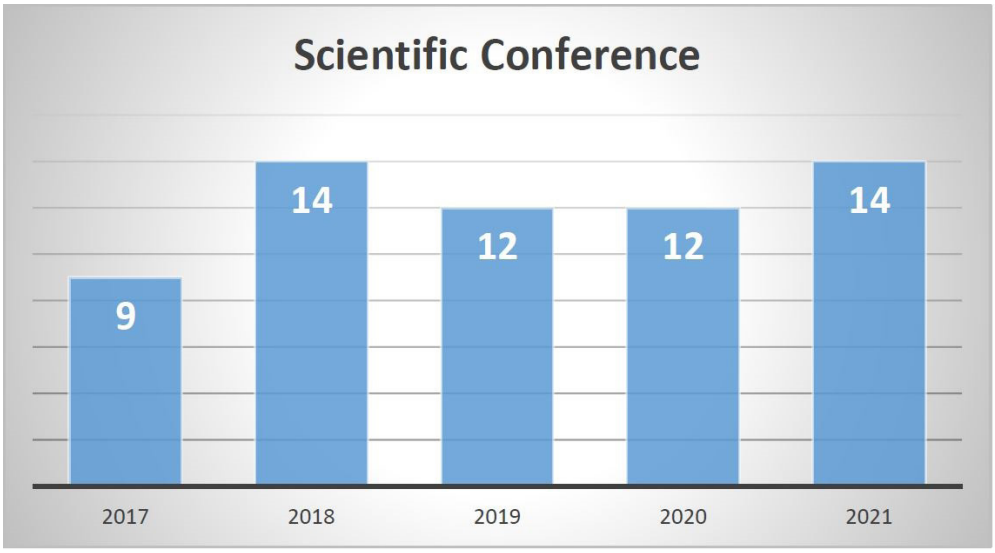
Miruna MAGAON PhD adviser prof. T. HEPUȚ	*Cercetări privind îmbunătățirea proceselor de degazare și dezoxidare a oțelurilor pentru țevi* (Research on improving the steel degassing and deoxidation processes for pipes)

Industrial Engineering

Roxana - Mihaela BABANATIS - MERCE PhD adviser prof. D. ȚUCU	*Optimizarea procesului de sortare a măslinelor în sistemele de producție individuale sau în întreprinderile mici* (Olive sorting process optimization in domestic production or small olive mills systems)

SCIENTIFIC CONFERENCES

EVOLUTION OF SCIENTIFIC CONFERENCES 2017 - 2021



1st Workshop on Structural Integrity of Additively Manufactured Materials
25-26 February 2021, Timisoara, Romania
Organizer(s): SIRAMM project, No. 857124, Politehnica University Timisoara (ROMANIA), University of Belgrade (SERBIA), Institute of Physics of Materials, Brno, (CZECH REP.), University of Parma (ITALY), NTNU (NORWAY)
https://www.siramm.unipr.it/Workshop_SIAMM21.htm

The Workshop was organized in the framework of the H2020-WIDESPREAD-2018, Project No. 857124, Twinning project coordinated by Politehnica University Timisoara.
The general aim of the workshop was to promote international collaboration and share the current knowledge on the structural integrity of additively manufactured materials and the related disciplines. Of particular interest was the understanding of the role of the AM printing conditions and parameters on the final reliability and safety of AM materials, especially those to be used in load bearing applications.
The workshop has 4 keynote lecturers: Dr. Antonio Elia Forte – Harward University (USA), Dr. Chao Gao – NTNU Trondheim (Norway), Dr Paul A Hooper - Imperial College London (UK), Dr. S. M. Javad Razavi – NTNU Trondheim (Norway) and 40 papers divided into five sessions:
• Characterization of AM materials'; • AM technologies advancements; • Modeling of AM processes and materials; • Quality and control of AM materials
• Mechanics and damage of AM materials
The Chairmans of the Workshop where: Prof. Liviu Marsavina - Politehnica University Timisoara (Romania), Prof. Roberto Brighenti - Univ. of Parma (Italy) and Prof. Filippo Berto – NTNU Trondheim (Norway).
Publication of papers: Papers were published after normal peer review process in the **Materials Design & Processing Communications,** an Open Access journal published by Wiley (indexed in Scopus), https://onlinelibrary.wiley.com/journal/25776576

Professional Communication and Translation Studies: Digital Culture, Communication and Translation
26-27 March 2021, Virtual conference
Organizer(s): Department of Communication and Foreign Languages, Politehnica University Timisoara
https://sc.upt.ro/ro/home-pcts

The international conference **Professional Communication and Translation Studies (PCTS)** has been organized by the Department of Communication and Foreign Languages since 2001.
The conference focuses traditionally on the following topics:
• Communication and public relations: theoretical and didactic problems and solutions;
• Linguistic insights into professional communication;
• Translation theory and translation didactics: their roles in communication;
• Foreign language teaching.
Given the success of the previous conferences, the 12th edition of the conference aimed to continue the exchange of ideas on the impact of new technologies on communication, to highlight the evolution of humanities and social sciences in conjunction with technological innovation, and to identify (new) trends in the language industry in the post web 2.0 era.
Publication of papers: Selected papers published in the volume **Professional Communication and Translation Studies** (peer-reviewed, indexed by EBSCO, Index Copernicus, CEEOL, Fabula, Google Scholar, WorldCat) or in the **Scientific Bulletin of Politehnica University Timisoara, Transactions on Modern Languages** (peer-reviewed, indexed by CEEOL, EBSCO, ERIHPLUS, Europeana, Google Scholar, MLA, ULRICH'S and WorldCat).
The languages of publication are English, French or German.

International Conference on Applied Sciences ICAS2021

May 12-14, 2021, Hunedoara, Romania (on-line)

Organizers: Politehnica University Timisoara and Unieversity 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 has been focused on several fields of application, operation and influence of the applied sciences and technologies on industry.

Topics of the conference covers a comprehensive spectrum of issues from:

1. Fundamental Sciences: Pure and Applied Mathematics, Physics, Chemistry, Numerical Approximation and Analysis, Computational Methods, Applied Statistics and others...

2. Computers Engineering: Modeling and Simulation, Software Engineering, Data Bases, and others...

3. Electrical Engineering: Circuits and Systems, Signal Processing, Electric Motors, Control Engineering, and others...

4. Mechanical Engineering: Mechanics, Mechatronics, Robotic Systems Engineering, Production Engineering, Constructions, Automotive and Traffic Engineering, Safety Engineering, Reliability, and others...

5. Materials Engineering: Metallic Materials, Composite Materials, Metal Alloys, Metallurgy, Heat Transfer, and others...

Publication of papers: Journal of Physics: Conference Series, Volume 2212, 2022 - IOPscience

SACI 2021

IEEE 15th International Symposium on Applied Computational Intelligence and Informatics

IEEE 15th International Symposium on Applied Computational Intelligence and Informatics (SACI 2021)

May 19 - 21, 2021, Timisoara, Romania

Organizers: Óbuda University, Budapest, Hungary, Politehnica University Timisoara,
IEEE Chapter of Systems, Many, and Cybernetics Society, Romania

http://conf.uni-obuda.hu/saci2021/

SACI 2021 has featured several kinds of presentations, including invited talks, contributed papers and posters. The outcome of SACI 2021 is a better understanding of some leading research areas, as already Computational Intelligence and Informatics have demonstrated.

SACI 2021 has welcomed papers on the following topics:

- Computational Intelligence
- Intelligent Mechatronics
- Systems Engineering
- Intelligent Manufacturing Systems
- Intelligent Control
- Intelligent Robotics
- Informatics

Published papers by:
IEEE Xplore Digital Library, please visit:
http://ieeexplore.ieee.org/search/searchresult.jsp?newsearch=true&queryText=SACI%202021

Building Services and Environmental Comfort (ICCA 2021)
20-21 May, 2021, virtual conference
Organizers: AIIR - Romanian Association of Building Services; Politehnica University Timişoara - Department of Civil Engineering and Building Services Engineering
http://www.aiir-timisoara.ro

The 30-th Conference "Building Services and Environmental Comfort" with theme "Building Services and Ambiental Comfort" was organized online. Specialists of all classes, students, performers, designers, researchers, and teachers have participated in this conference. The key issues of renewable energy supply, of energy storage and proposals for solving them can be found in the 15 presentations of authors from our country and from abroad, all presented in the plenary of the conference.
Topics: ambiental comfort, environmental protection, HVAC systems, energy efficiency, renewable energy, energy storage, technical and economic parameters of the installations, the influence of the improper functioning of the facilities on human health, issues in facilities management and marketing.
The conference was attended by 86 specialists and researcher who addressed topics such as renewable energy sources (solar energy, wind energy, soil, and environmental energy), energy storage, air and water quality, but also the aspects regarding technical sustainability.
Researchers' concerns closely related to future work/activity, have led to the presentation of valuable works with current topics and personal contributions to solve, gravitating in the areas of primary factors of life: air, water, heat, light, which fits perfectly with the motto of the conference "Homo sanus in domo pulchra."

16-th International Conference „Acoustics & Vibration of Mechanical Structures" – AVMS-2021
May 28-29, 2021, Timişoara, Romania
Organizers: Politehnica University Timisoara
Romanian Academy Timisoara Branch,
Romanian Acoustical Society,
University of Niš -Serbia
http://www.mec.upt.ro/meca/avms/main.php

The conference focused on a broad range of topics related to acoustics and vibration, such as:
• noise and vibration control, • noise and vibration generation and propagation, • effects of noise and vibration, • condition monitoring and vibration testing, • modelling, prediction and simulation of noise and vibration, • environmental and occupational noise and vibration, • noise and vibration attenuators, • biomechanics and bioacoustics.
The book also discusses analytical, numerical and experimental techniques applicable to analyze linear and non-linear noise and vibration problems (including strong nonlinearity) and it is primarily intended to emphasize the actual trends and state-of-the-art developments in the above-mentioned topics. The primary audience of this conference consist of academics, researchers and professionals, as well as Ph.D students concerned with various fields of acoustics and vibration of mechanical structures.

Publication of papers:
Springer Proceedings in Physics, ISSN 0930-8989
https://link.springer.com/book/9783030967864

18th International Conference NETTIES (Networking Entities) & DigiCulture Erasmus + Closing Workshop, Timişoara, Romania

July 22-23, 2021

Conference Location: physically in the Auditorium of the UPT Conference Center and at the Triade Foundation, online through Zoom and Facebook

Organizers: Politehnica University Timisoara (the ID/IFR and e-Learning Center and the Multimedia Center), IAFeS - International Association for e-Science, and Triade Foundation

https://elearning.upt.ro/en/comunitate/peste-500-de-participanti-fizic-si-virtual-la-conferinta-internationala-iafes-netties-workshop-de-incheiere-a-digiculture-erasmus/

The presentations done face to face or online represented the view from different European countries, in order to provide a better understanding of the global changes and challenges that are in front of us on the way towards digital transformation in all sectors.

The topics of the conference were:

- the presentation of the sustainable and effective education program, dedicated to adult learners with low digital skills and low-skilled adults
- the online, free, MOOC courses for digital skills and social inclusion for the creative industries, the open digital certificates granted after course completion
- the digital culture in education, science, and technology by IAFeS and DigiCulture partners, from countries such as Romania, Austria, Denmark, Italy, Sweden, Greece, and Germany.

Publication of papers: Conference proceedings have been published in Vienna by IAFES as volume 10 of the IAFES Book Series, under ISBN 978-3-9505150-0-8.

The book will also be available online on the IAFES site (www.iafes.net).

The XI International Conference "Industrial Engineering and Environmental Protection"" (IIZS2021)

October 7- 8, 2021, 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/

IIZS2021 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 (11 ; 2021 ; Zrenjanin), ISBN 978–86–7672–348–5, 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/

ICSTCC 2021

25th International Conference on System Theory, Control and Computing (ICSTCC 2021)

October 20 - 23, 2021, Iasi, Romania

Organizers: Faculty of Automatic Control and Computer Engineering of Gheorghe Asachi Technical University of Iasi; Faculty of Control Systems, Computers, Electrical and Electronics Engineering of "Dunarea de Jos" University of Galati; 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

http://icstcc2021.ac.tuiasi.ro/

ICSTCC 2021 has featured several kinds of presentations, including invited talks, contributed papers and special sessions. The outcome of ICSTCC 2021 has been a better understanding of some leading research areas, as already System Theory, Control and Computing have demonstrated.

ICSTCC 2021 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: http://ieeexplore.ieee.org/search/searchresult.jsp?newsearch=true&queryText=ICSTCC%202021

sim INTERNATIONAL SYMPOSIUM

SIM 2021: 16th International Symposium in Management-Management, Innovation and Entrepreneurship in Challenging Global Times

22-23 October 2021, Timisoara, Romania

Organizer(s): Politehnica University Timisoara, West University of Timisoara

The 16th edition of SIM gathered researchers, academics, doctoral students and practitioners who exchanged experiences and research results regarding economic management and the management of industrial systems. The participants of this conference edition, engaged in the new wave of creative-innovative research in a time of globalization, offer feasible solutions for these issues.
They discuss both theoretical and practical problems through an economic and engineering perspective, setting clear approaches and adapted algorithms for significant present-day issues, with profound implications for industrial organizations which were born as a result of the research in the fields of business and economy, but which suffered an unprecedented economic fall because of the Covid-19 pandemic alongside the corporate demands generated by the development of top technologies.
Conference topics:

- management of innovation,
- business process management,
- entrepreneurship and innovation,
- financial management and financial governance,
- strategic management,
- change management,
- supply chain and operations management
- sustainable management,
- the economics of small and medium-sized enterprises
- third sector organisations management.

Publication of papers:
The accepted papers will be published by Springer, in the **"Lecture Notes in Management and Industrial Engineering"** Series, ISSN 2198-0772: https://www.springer.com/series/11786 (The publication is currently in process).

2021 IEEE 27th International Symposium for Design and Technology in Electronic Packaging (SIITME 2021)

27 – 30 October, 2021, Timisoara, Romania

Organizers: Politehnica University Timisoara, Continental Automotive Romania

https://siitme.ro/

Short Description. Topics:

A. Emerging Technologies & Trends in Advanced Packaging
B. Power Electronics and Microsystems Packaging
C. Assembly and Manufacturing Technology
D. Electrical Design, Simulation & Modeling
E. Optoelectronics & Advanced Communication Packaging
F. Applied Reliability
G. Challenge in Global Education

Publication of papers: IEEE

The 12th International Conference "Innovative Technologies for Joining Advanced Materials" - TIMA21

November 25-26, 2021, Timisoara, Romania (Online through the zoom platform)

Organizers: • Dr. Eng. Nicuşor-Alin Sîrbu (Conference Chair) - ISIM Timisoara
• Assoc. Prof. Dr. Eng. Florin Drăgan - Politehnica University Timisoara
• Prof. Dr. Eng. Vladimir-Ioan Crețu - Technical Sciences Academy of Romania - Timisoara Subsidiary

http://www.isim.ro/tima/index.php

The international conference has been focused on several fields of application, has featured several kinds of presentations, including invited talks, contributed papers and posters.
The conference topics were:
• New joining technologies, Materials coatings, Modelling and simulation of welding processes •Specific problems in advanced materials joining • Non-Destructive Testing NDT • Mechanical and structural characterization of advanced materials and joints •Quantitative non-destructive testing • Fracture mechanics of advanced materials • Damage of advanced materials under time-dependent-actions and remaining life assessment, fatigue, creep, corrosion, irradiation • Quality of welded joints and welded structures
Publication of papers:
Conference proceedings will be published in T**rans Tech Publications'** periodicals 'Key Engineering Materials' (printed and online) and "Advanced Materials Research " (online), selected materials, science related papers only, with Indexing and DOI. The periodical will be available in full text online at: www.scientific.net/KEM , or https://www.scientific.net/SSP or www.scientific.net/AMR or https://www.scientific.net/NHC.
Conference proceedings will be indexed in major international database: SCOPUS, Ei Compendex, REAXYS etc.

Conference on Heritage and Sustainable Innovation (CoHeSION 2021)

December 11th 2021, Timisoara, Romania

Organizer(s): Faculty of Architecture and Urban Planning, Politehnica University Timisoara

https://www.cohesion.ro/

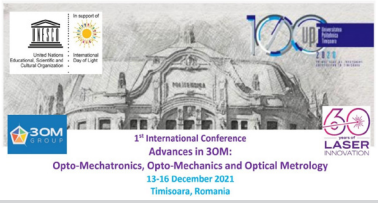
Architecture in all its shapes, can be a base for identity, integrity and « spirit of place », value, individuality, emotion and can play an important role in ensuring social cohesion and welfare of human. Depending on the context (community, culture) it has multiple values. As activities it can include new building design, complex heritage building conservation or restoration, urban planning and interior design but also interest towards understanding the needs of education in architecture faculties. In a world currently marked by social distancing the conference is trying to create o cohesion between researchers, architects and teachers, bring them together from all around the world and create a bond that will link them together. At the same time, the conference is aiming to highlight the multidisciplinary and interdisciplinarity of architecture, and to stimulate focused discussions concerning current challenges in online education in architecture faculties and architecture, urban planning and interior design projects which bring forward the collaboration/cohesion between different professionals.

CoHeSION 2021 has welcomed papers on the following topics:

• History, theory, criticism and research of architecture, urban planning, landscape architecture and interior design; •Urban strategies: sites presentation and initiatives;• Heritage management: management of establishments, sites, assemblies and individual buildings; interaction with actors; economic, legal, administrative, political, cultural, fiscal and environmental contexts; • Technology and techniques; • Interior design

• Education for architecture, planning and urban design

Publication of papers: Proceeding of the CoHeSION 2021 have been published online in the **Journal of Architecture, Urbanism and Heritage**, a peer-review academic journal which publishes research papers and advances theory, research and practice in the fields of architecture and urban planning (http://www.jauh.ro)



1st International Conferince Advances in 3OM: Opto-Mechatronics, Opto-Mechanics and Optical Metrology

13-16 December 2021, Timisoara, Romania

Organizers: 3OM Optomechatronics Group Romania, Politehnica University Timișoara

http://3om-group-optomechatronics.ro/advances-in-3om-conference-2021/home/

A broad domain is targeted by the scientific contributions to the Conference, as defined by the '3OM' concept that reunites three complementary domains:

• Opto-Mechatronics is a blend of Optics & Photonics, Precision Mechanics, Electronics, Control & Automation, as well as IT;

• Opto-Mechanics usually fills the gap between the high requirements of Optical Design and the capabilities of Mechanical technologies, addressing tolerances, errors, positioning issues, and methods to tackle them.

Optical Metrology is a large umbrella of applications which benefits from both domains above and includes fields as diverse as industrial measurements (e.g., Non-Destructive Testing (NDT)), biomedical imaging (with a range of techniques, for example Optical Coherence Tomography (OCT) or Photoacoustics), Remote Sensing, as well as Security & Defense. Other fields that apply 3OM are also within the topics of the Conference, including Laser Manufacturing and Robotics, as well as Lasers in Medicine.

Publication of papers:

Papers submitted to the Conference are published by SPIE (The International Society for Optics and Photonics, https://spie.org/). Contributions recommended by the Scientific Committee can be submitted to seven Special Issues of MDPI as Materials, Photonics, Applied Science.

Universitatea Politehnica Timişoara

2020

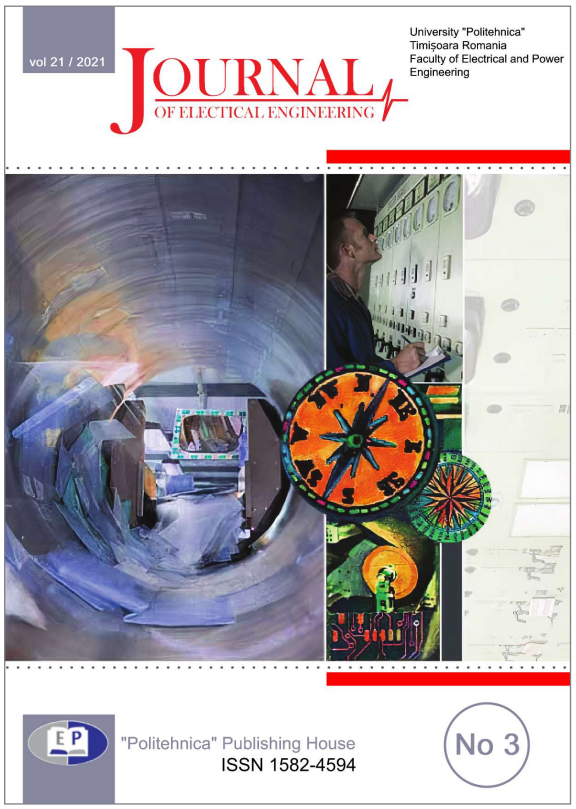
PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

SCIENTIFIC JOURNALS

Transactions on Modern Languages
Volume 20, Issue 1 , 2021

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 21, Issue 1, Issue 2, Issue 3 , 2021

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
Volume XIV, Issue 1, Issue 2 , Issue 3, Issue 4 , 2021

http://acta.fih.upt.ro/

- 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 on the basis of its originality, importance and timeliness.
- ACTA TECHNICA CORVINIENSIS - Bulletin of Engineering is accredited and ranked in the "B+" CATEGORY Journal by 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
Volume XIX, Issue 1, Issue 2 , Issue 3, Issue 4 , 2021

http://annals.fih.upt.ro/

- The Journal 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.
- The Journal 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 etc.

Nonconventional Technologies Review
Volume XXV, Issue 1, Issue 2 , Issue 3, Issue 4 , 2021

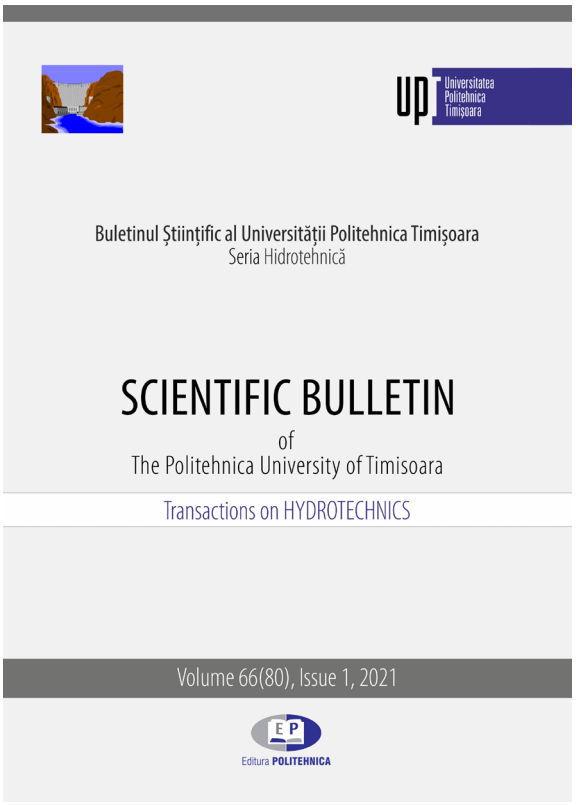
www.revtn.ro

- 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; On-line: ISSN 2359-8654

Academic Journal of Manufaturing Engineering
Volume 19, Issue 1, Issue 2, Issue 3, Issue 4 , 2021

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 66 (80), Issue 1, 2021

http://www.ct.upt.ro/buletinhidro/index.htm

- The Scientific Bulletin of the Politehnica University Timişoara, Transactions on Hydrotechnics is coordinated since 1992 by the Faculty of Hydrotechnical Engineering. Published papers in the journal focus on engineering sciences, civil engineering, theoretical and applied hydraulic, mathematics and numerical modeling, hydrology and water management, hydrotechnical developments and constructions, land improvement (irrigations, drainage, erosion control), engineering and sustainable rural development, water supply and sewerage systems, wastewater treatment, hydraulic structures and technologies.
- The Journal is published entirely in English, with abstracts and keywords, with international exposure.
- "The revue is known for experts from home and abroad, is accredited and ranked in the "B+" CATEGORY Journal by CNCSIS, and is indexed by EBSCO Publishing."
- ISSN 1224-6042, ISSN-L 1224-6042

Universitatea Politehnica Timişoara

2020

PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

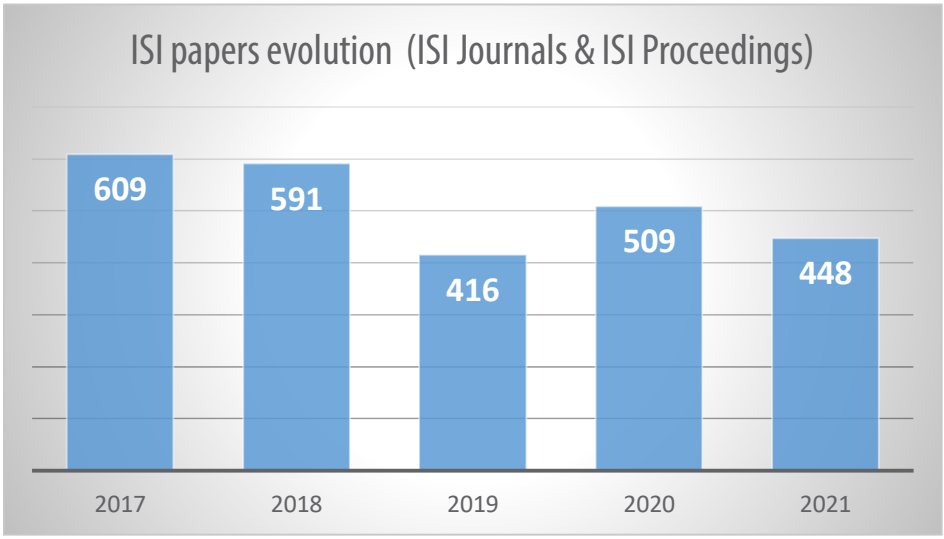
ISI PAPERS

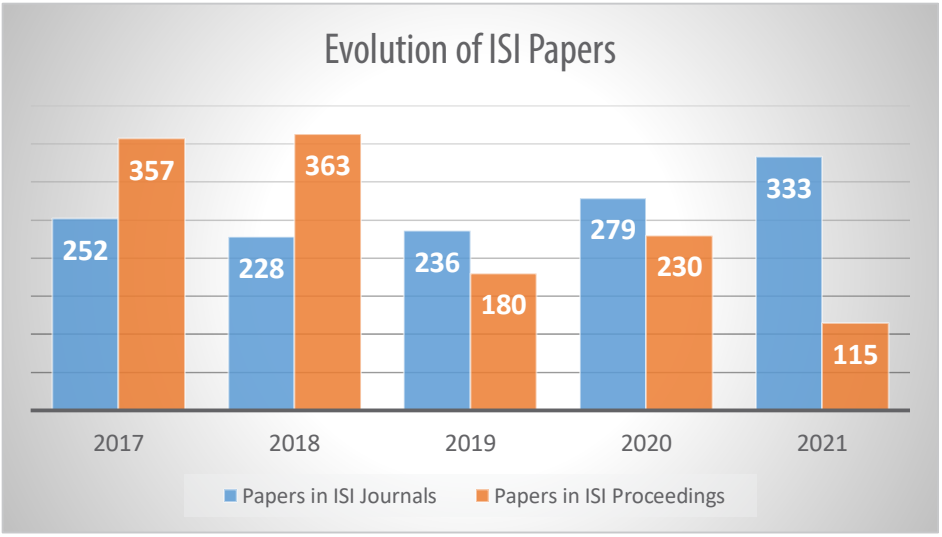
EVOLUTION OF ISI PAPERS UNDER AFFILIATIONS OF UPT 2017 - 2021

Scientific writing and publication marks the endpoint of research that has been performed, completed, peer reviewed and accepted, and complements teaching and training.

In this chapter we present the publications/papers written by our professors, PhD students, researchers etc. These publications can be: papers published in ISI Journals or papers presented at Conference and indexed in ISI Proceedings.

The number of papers presented in the below figures is greater than the number of papers presented in previous Research Reports. This number varies from year to year because annually it increases the number of publications indexed in the ISI Clarivate Analytics database.





* The data for 2021 was obtained from Web of Science - Clarivate Analytics in 14 July 2022

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.

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: 318

Hot Paper

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: 149

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: 106

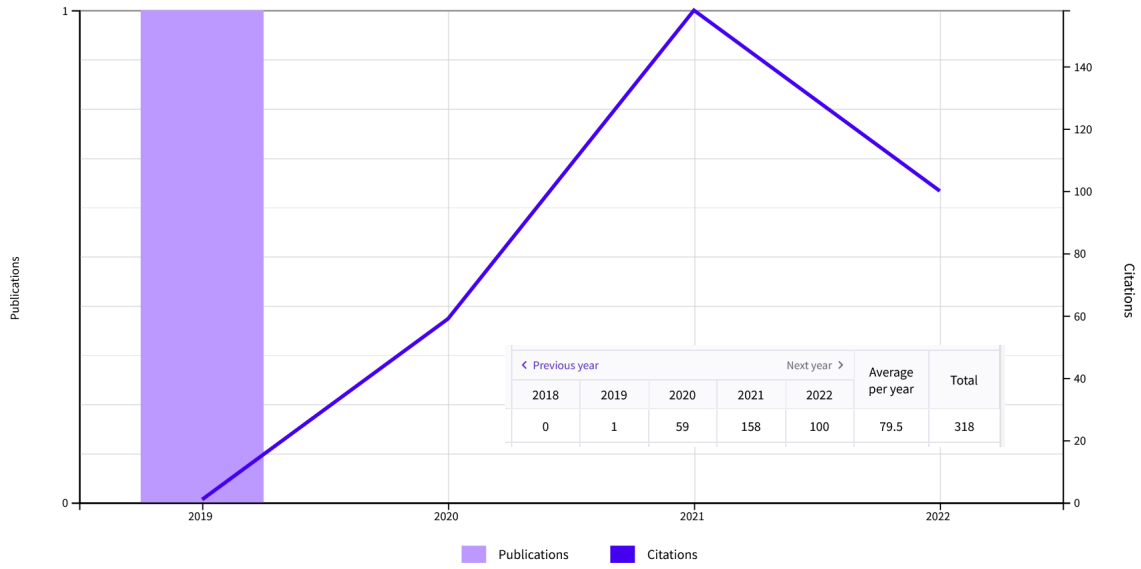
Hot Paper

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 26 July 2022

Web of Science - Clarivate Analytics Hot Paper

This hot paper was published in the past two years and received enough citations in January/August 2021 to place it in the top 0.1% of papers in the academic field of **Chemistry**.

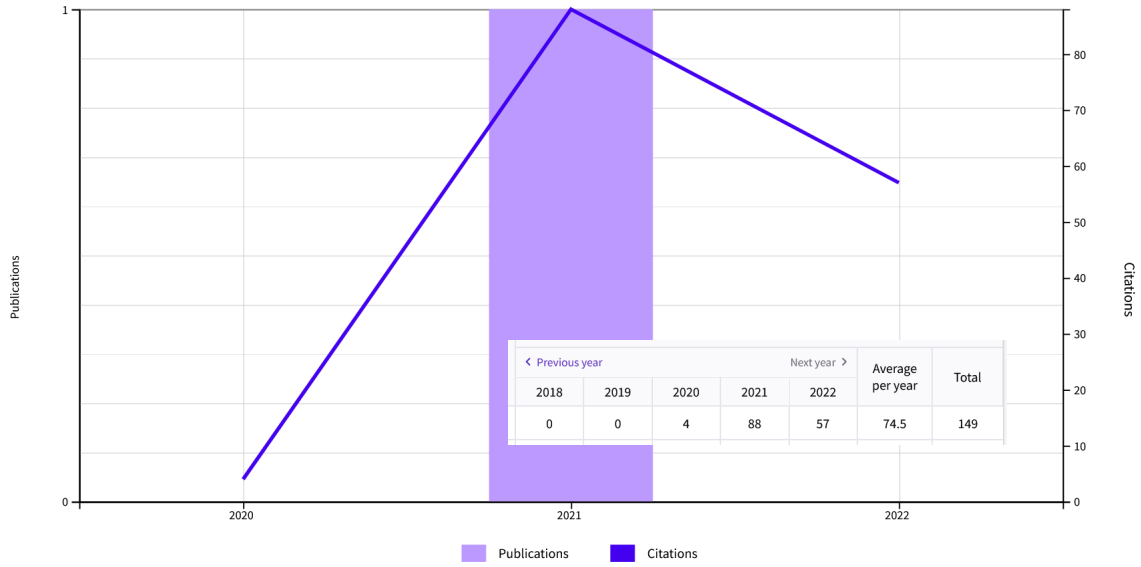


Rajak, D.K., Pagar, D.D., Menezes, P.L., Linul, E. Fiber-Reinforced Polymer Composites: Manufacturing, Properties, and Applications, POLYMERS, Volume: 11, Issue: 10, Article Number: 1667, PubMed ID: 31614875, eISSN: 2073-4360, 2019;
Times Cited in Web of Science Core Collection: 318

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 Hot Paper

This hot paper was published in the past two years and received enough citations in May/June and September/December 2021 to place it in the top 0.1% of papers in the academic field of **Economics & Business**.

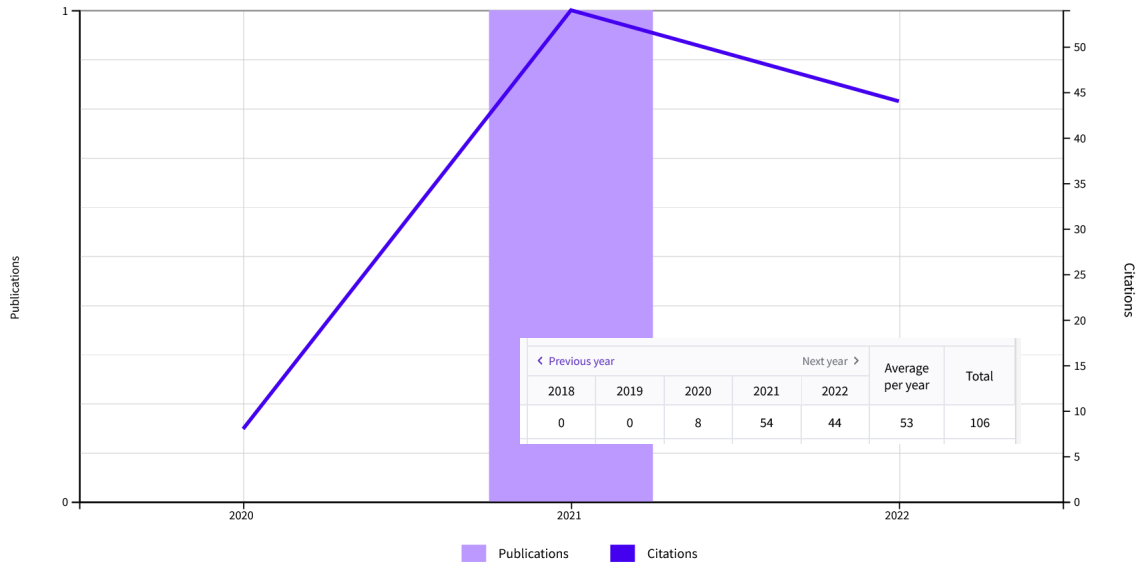


Albulescu, C.T. COVID-19 and the United States financial markets' volatility, FINANCE RESEARCH LETTERS, Volume: 38, Article Number: 101699, PubMed ID: 32837380, ISSN: 1544-6123, eISSN: 1544-6131, 2021;
Times Cited in Web of Science Core Collection: 149

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 September/October 2021 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: 106

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 Papers

Selected from the most recent 10 years of data, Highly Cited Papers reflect the top 1% of papers by field and publication year. Highly Cited Papers help identify breakthrough research within a research field and are used within Web of Science to identify and refine the most influential research papers.

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: 472

Highly Cited Paper

Precup, R.E., Hellendoorn, H. A survey on industrial applications of fuzzy control, COMPUTERS IN INDUSTRY, Volume: 62, Issue: 3, Pages: 213-226, ISSN: 0166-3615, eISSN: 1872-6194, 2011;
Times Cited in Web of Science Core Collection: 351

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;
Times Cited in Web of Science Core Collection: 348

Highly Cited Paper

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: 325

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;
Times Cited in Web of Science Core Collection: 318

Highly Cited Paper

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: 269

Highly Cited Paper

Gheju, M., Balcu, I. Removal of chromium from Cr(VI) polluted wastewaters by reduction with scrap iron and subsequent precipitation of resulted cations, JOURNAL OF HAZARDOUS MATERIALS, Volume: 196, Pages: 131-138, PubMed ID: 21955659, ISSN: 0304-3894, 2011;
Times Cited in Web of Science Core Collection: 198

Highly Cited Paper

Highly Cited Papers received enough citations as of January/December 2021 to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.
* The data was obtained from Web of Science - Clarivate Analytics in 26 July 2022

Web of Science - Clarivate Analytics Highly Cited Papers

Selected from the most recent 10 years of data, Highly Cited Papers reflect the top 1% of papers by field and publication year. Highly Cited Papers help identify breakthrough research within a research field and are used within Web of Science to identify and refine the most influential research papers.

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: 181

Highly Cited Paper

Sarbu, I., Sebarchievici, C. Review of solar refrigeration and cooling systems, ENERGY AND BUILDINGS, Volume: 67, Pages: 286-297, ISSN: 0378-7788, eISSN: 1872-6178, 2013;
Times Cited in Web of Science Core Collection: 178

Highly Cited Paper

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: 149

Highly Cited Paper

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: 141

Highly Cited Paper

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: 131

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: 106

Highly Cited Paper

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: 92

Highly Cited Paper

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Web of Science - Clarivate Analytics Highly Cited Papers

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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: 89

Highly Cited 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: 85

Highly Cited Paper

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: 67

Highly Cited Paper

Fiedler, T., Al-Sahlani, K., Linul, P.A., Linul, E. Mechanical properties of A356 and ZA27 metallic syntactic foams at cryogenic temperature, JOURNAL OF ALLOYS AND COMPOUNDS, Volume: 813, Article Number: 152181, ISSN: 0925-8388, eISSN: 1873-4669, 2020;
Times Cited in Web of Science Core Collection: 39

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: 28

Highly Cited Paper

Gherhes, V., Stoian, C.E., Farcasiu, M.A., Stanici, M. E-Learning vs. Face-To-Face Learning: Analyzing Students' Preferences and Behaviors, SUSTAINABILITY, Volume: 13, Issue: 8, Article Number: 4381, eISSN: 2071-1050, 2021;
Times Cited in Web of Science Core Collection: 23

Highly Cited Paper

Highly Cited Papers received enough citations as of January/December 2021 to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.
* The data was obtained from Web of Science - Clarivate Analytics in 26 July 2022

Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2021, 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.

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: 472

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 2021, 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.

Precup, R.E., Hellendoorn, H. A survey on industrial applications of fuzzy control, COMPUTERS IN INDUSTRY, Volume: 62, Issue: 3, Pages: 213-226, ISSN: 0166-3615, eISSN: 1872-6194, 2011;
Times Cited in Web of Science Core Collection: 351

Abstract: Fuzzy control has long been applied to industry with several important theoretical results and successful results. Originally introduced as model-free control design approach, model-based fuzzy control has gained widespread significance in the past decade. This paper presents a survey on recent developments of analysis and design of fuzzy control systems focused on industrial applications reported after 2000.

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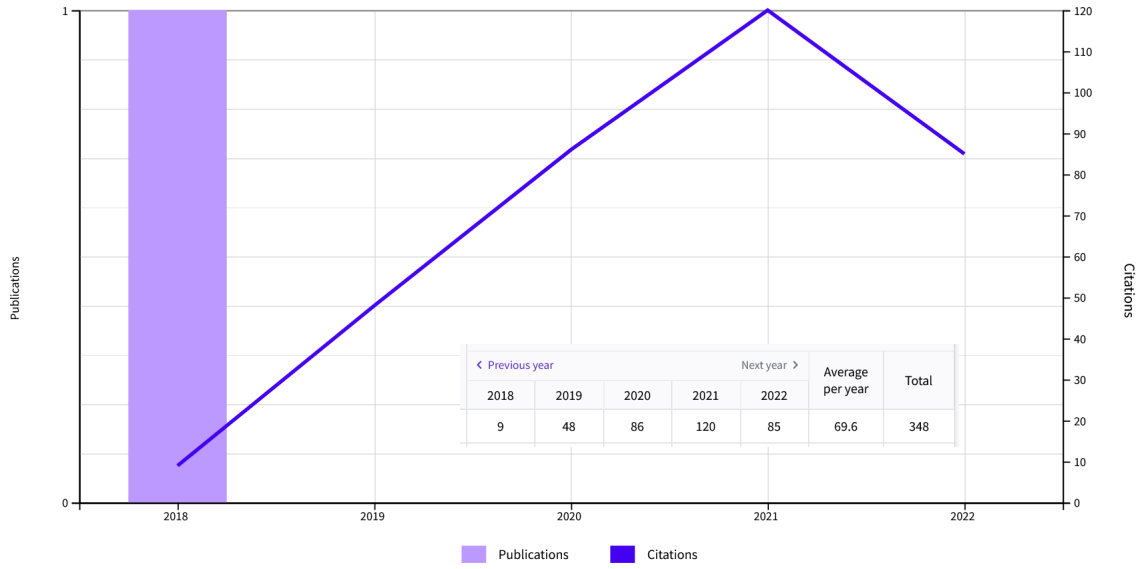
As of January/December 2021, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Environment/ Ecology** based on a highly cited threshold for the field and publication year.

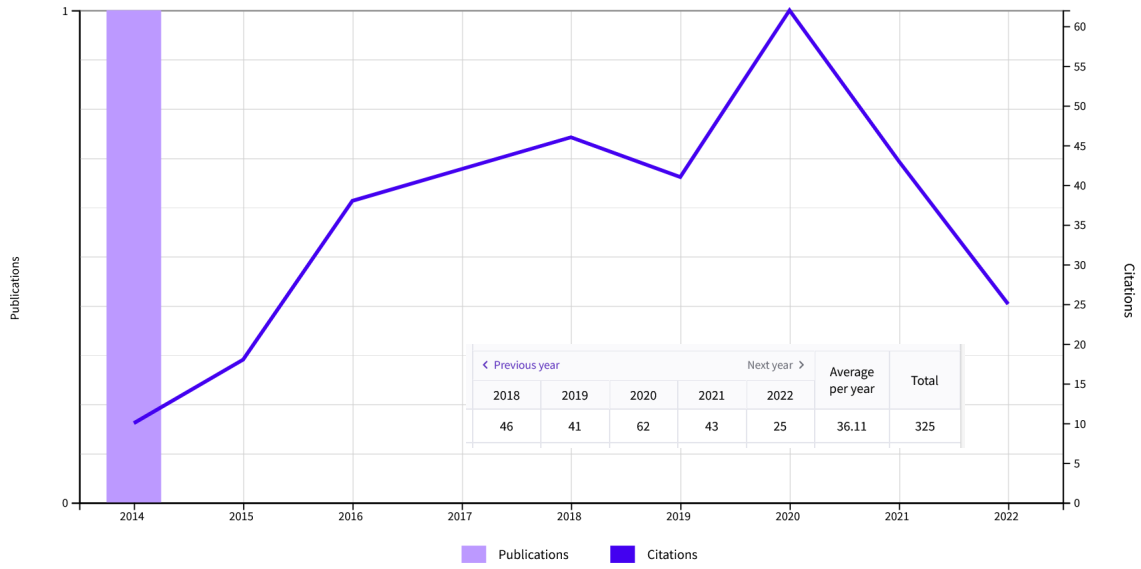


Sarbu, I., Sebarchievici, C. A Comprehensive Review of Thermal Energy Storage, SUSTAINABILITY, Volume: 10, Issue: 1, Article Number: 191, ISSN: 2071-1050, 2018;
Times Cited in Web of Science Core Collection: 348

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 2021, 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.

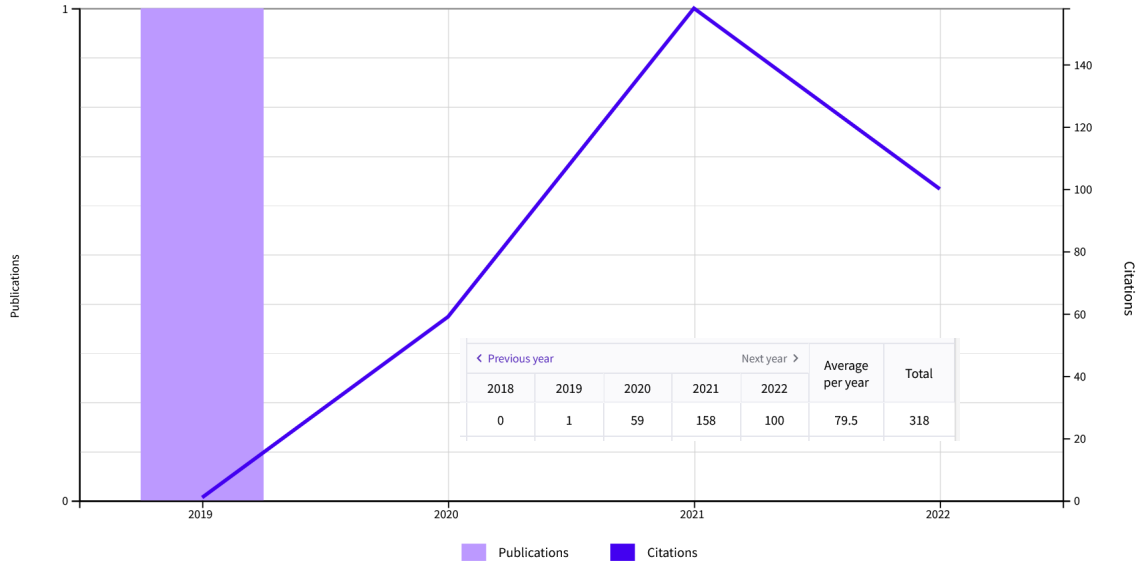


Sarbu, I., Sebarchievici, C. General review of ground-source heat pump systems for heating and cooling of buildings, ENERGY AND BUILDINGS, Volume: 70, Pages: 441-454, ISSN: 0378-7788, eISSN: 1872-6178, 2014;
Times Cited in Web of Science Core Collection: 325

Abstract: A large number of ground-source heat pumps (GSHP) systems have been used in residential and commercial buildings throughout the world due to the attractive advantages of high energy and environmental performances. The GSHPs are proven renewable energy technology for space heating and cooling. This paper provides a detailed literature review of the GSHP systems, and their recent advances. The operation principle and energy efficiency of a heat pump are defined first. Then, a general introduction on the GSHPs and its development, and a detailed description of the surface water (SWHP), ground-water (GWHP), and ground-couplet (GCHP) heat pumps are performed. The most typical simulation and ground thermal response test models for the vertical ground heat exchangers currently available are summarized including the heat transfer processes outside and inside the boreholes. Also, some information about a new GWHP using a heat exchanger with special construction, and the possibility to obtain the better energy efficiency with combined heating and cooling by GCHP are presented. The various hybrid GCHP systems for cooling or heating-dominated buildings are well described. Finally, the energy, economic and environmental performance of a closed-loop GCHP system is also briefly reviewed. It is found that the GSHP technology can be used both in cold and hot weather areas and the energy saving potential is significant.

Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2021, 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.

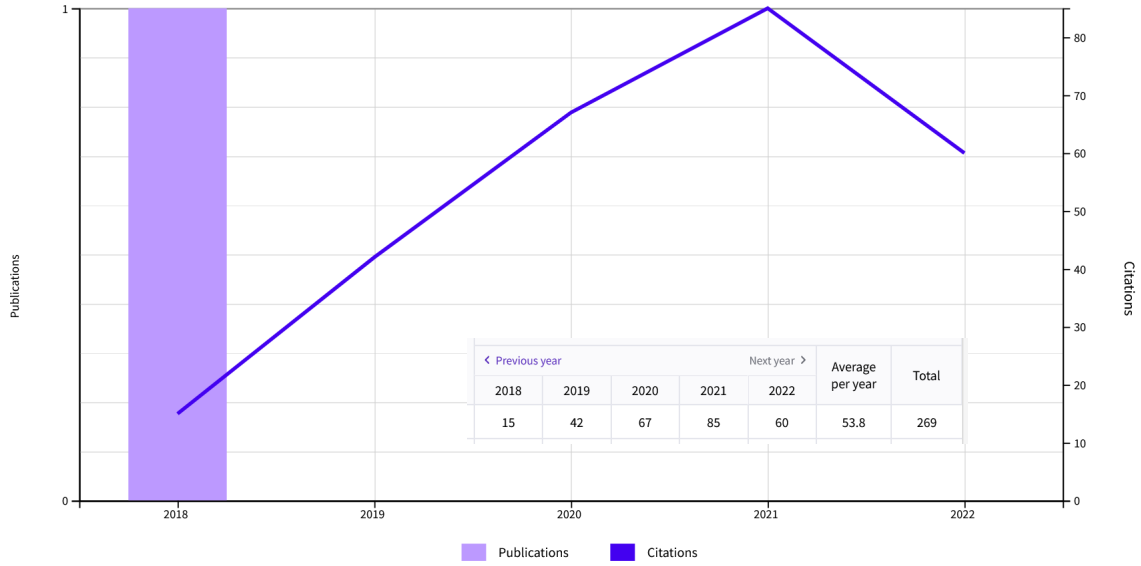


Rajak, D.K., Pagar, D.D., Menezes, P.L., Linul, E. Fiber-Reinforced Polymer Composites: Manufacturing, Properties, and Applications, POLYMERS, Volume: 11, Issue: 10, Article Number: 1667, PubMed ID: 31614875, eISSN: 2073-4360, 2019;
Times Cited in Web of Science Core Collection: 318

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 2021, 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.

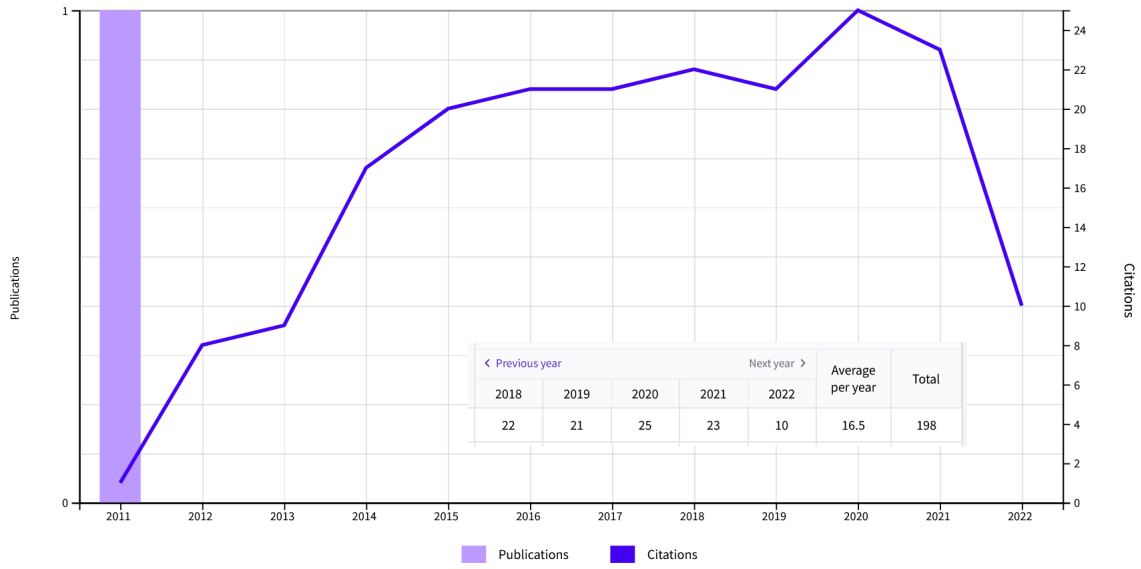


Ancuti, C.O., Ancuti, C., De Vleeschouwer, C., Bekaert, P. Color Balance and Fusion for Underwater Image Enhancement, IEEE TRANSACTIONS ON IMAGE PROCESSING, Volume: 27, Issue: 1, Pages: 379-393, PubMed ID: 28981416, ISSN: 1057-7149, eISSN: 1941-0042, 2018;
Times Cited in Web of Science Core Collection: 269

Abstract: We introduce an effective technique to enhance the images captured underwater and degraded due to the medium scattering and absorption. Our method is a single image approach that does not require specialized hardware or knowledge about the underwater conditions or scene structure. It builds on the blending of two images that are directly derived from a color-compensated and white-balanced version of the original degraded image. The two images to fusion, as well as their associated weight maps, are defined to promote the transfer of edges and color contrast to the output image. To avoid that the sharp weight map transitions create artifacts in the low frequency components of the reconstructed image, we also adapt a multiscale fusion strategy. Our extensive qualitative and quantitative evaluation reveals that our enhanced images and videos are characterized by better exposedness of the dark regions, improved global contrast, and edges sharpness. Our validation also proves that our algorithm is reasonably independent of the camera settings, and improves the accuracy of several image processing applications, such as image segmentation and keypoint matching.

Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2021, 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.

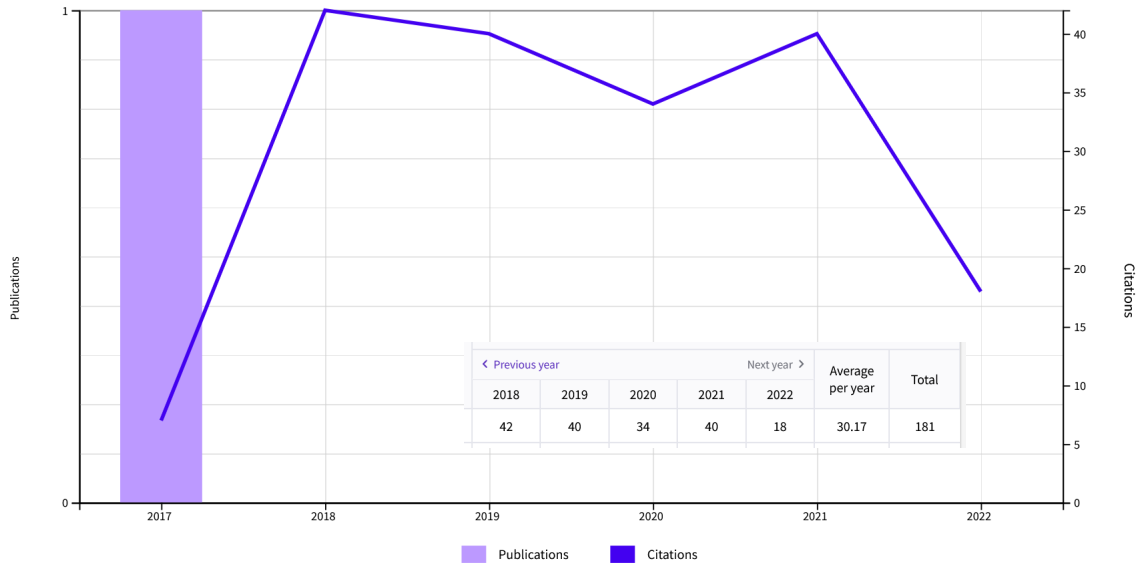


Gheju, M., Balcu, I. Removal of chromium from Cr(VI) polluted wastewaters by reduction with scrap iron and subsequent precipitation of resulted cations, JOURNAL OF HAZARDOUS MATERIALS, Volume: 196, Pages: 131-138, PubMed ID: 21955659, ISSN: 0304-3894, 2011;
Times Cited in Web of Science Core Collection: 198

Abstract: This work presents investigations on the total removal of chromium from Cr(VI) aqueous solutions by reduction with scrap iron and subsequent precipitation of the resulted cations with NaOH. The process was detrimentally affected by a compactly passivation film occurred at scrap iron surface, mainly composed of Cr(III) and Fe(III). Maximum removal efficiency of the Cr(total) and Fe(total) achieved in the clarifier under circumneutral and alkaline (pH 9.1) conditions was 98.5% and 100%, respectively. The optimum precipitation pH range which resulted from this study is 7.6-8.0. Fe(total) and Cr(total) were almost entirely removed in the clarifier as Fe(III) and Cr(III) species: however, after Cr(VI) breakthrough in column effluent, chromium was partially removed in the clarifier also as Cr(VI), by coprecipitation with cationic species. As long the column effluent was free of Cr(VI), the average Cr(total) removal efficiency of the packed column and clarifier was 10.8% and 78.8%, respectively. Our results clearly indicated that Cr(VI) contaminated wastewater can be successfully treated by combining reduction with scrap iron and chemical precipitation with NaOH.

Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2021, 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.

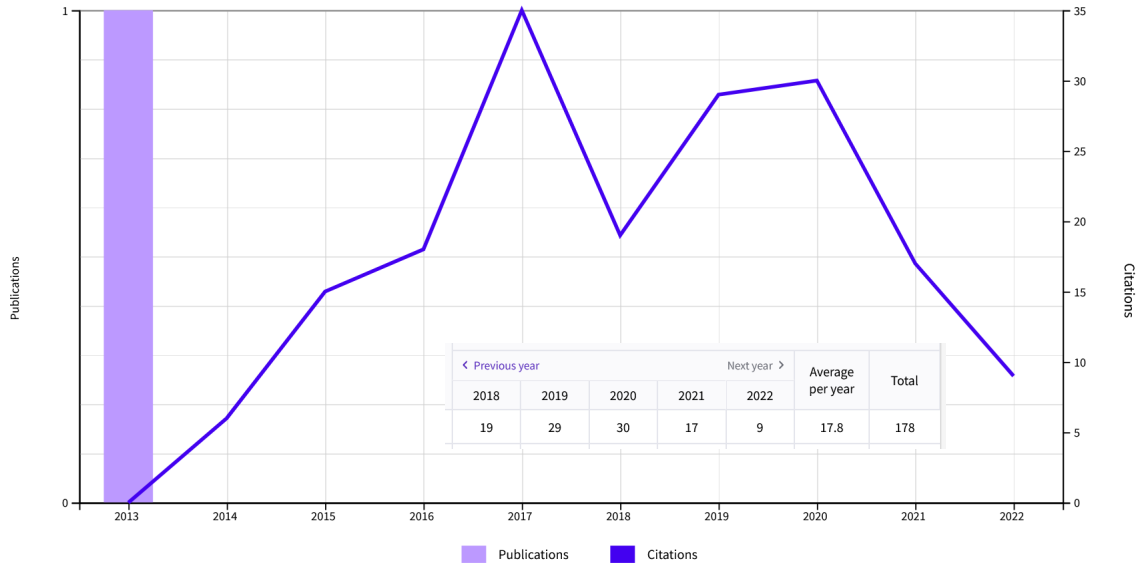


Precup, R.E., David, R.C., Petriu, E.M. Grey Wolf Optimizer Algorithm-Based Tuning of Fuzzy Control Systems With Reduced Parametric Sensitivity, IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, Volume: 64, Issue: 1, Pages: 527-534, ISSN: 0278-0046, eISSN: 1557-9948, 2017;
Times Cited in Web of Science Core Collection: 181

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

As of January/June 2021, 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.

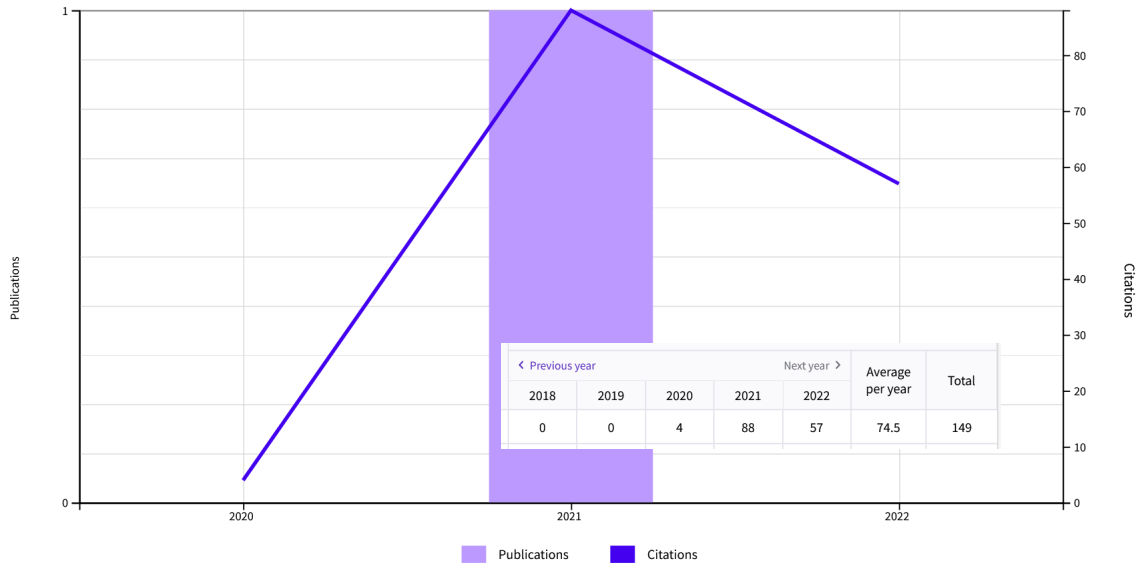


Sarbu, I., Sebarchievici, C. Review of solar refrigeration and cooling systems, ENERGY AND BUILDINGS, Volume: 67, Pages: 286-297, ISSN: 0378-7788, eISSN: 1872-6178, 2013;
Times Cited in Web of Science Core Collection: 178

Abstract: Providing cooling by utilizing renewable energy such as solar energy is a key solution to the energy and environmental issues. This paper provides a detailed review of different solar refrigeration and cooling methods. There are presented theoretical basis and practical applications for cooling systems within various working fluids assisted by solar energy and their recent advances. Thermally powered refrigeration technologies are classified into two categories: sorption technology (open systems or closed systems) and thermo-mechanical technology (ejector system). Solid and liquid desiccant cycles represent the open system. The liquid desiccant system has a higher thermal coefficient of performance (COP) than the solid desiccant system. Absorption and adsorption technologies represent the closed system. The adsorption cooling typically needs lower heat source temperatures than the absorption cooling. Based on COP, the absorption systems are preferred to the adsorption systems, the higher temperature issues can be easily handled with solar adsorption systems. The ejector system represents the thermo-mechanical cooling, and has a higher thermal COP but require a higher heat source temperature than other systems. The study also refers to solar hybrid cooling systems with heterogeneous composite pairs, to a comparison of various solar cooling systems, and to some use suggestions of these systems.

Web of Science - Clarivate Analytics Highly Cited Paper

As of March/December 2021, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Economics & Business** based on a highly cited threshold for the field and publication year.

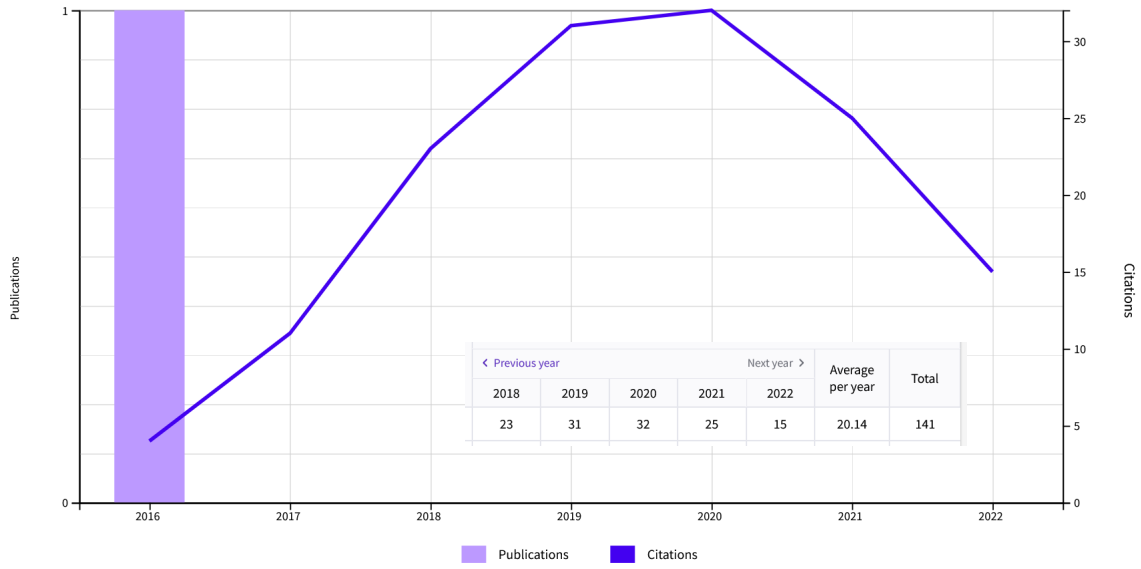


Albulescu, C.T. COVID-19 and the United States financial markets' volatility, FINANCE RESEARCH LETTERS, Volume: 38, Article Number: 101699, PubMed ID: 32837380, ISSN: 1544-6123, eISSN: 1544-6131, 2021;
Times Cited in Web of Science Core Collection: 149

Abstract: We empirically investigate the effect of the official announcements regarding the COVID-19 new cases of infection and fatality ratio, on the financial markets volatility in the United States (US). We consider both COVID-19 global and US figures and show that the sanitary crisis enhances the S&P 500 realized volatility. Our findings are robust to different model specifications and suggest that the prolongation of the coronavirus pandemic is an important source of financial volatility, challenging the risk management activity.

Web of Science - Clarivate Analytics Highly Cited Paper

As of January/December 2021, 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.

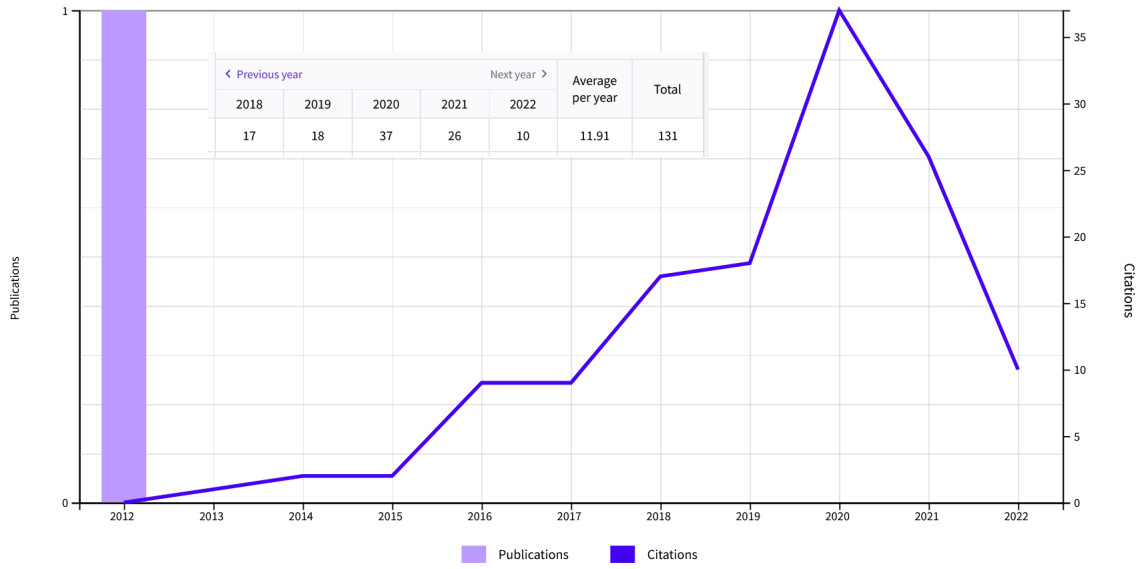


Gheju, M., Balcu, I., Mosoarca, G. Removal of Cr(VI) from aqueous solutions by adsorption on MnO2, JOURNAL OF HAZARDOUS MATERIALS, Volume: 310, Pages: 270-277, PubMed ID: 26947189, ISSN: 0304-3894, eISSN: 1873-3336, 2016;
Times Cited in Web of Science Core Collection: 141

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 2021, 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.

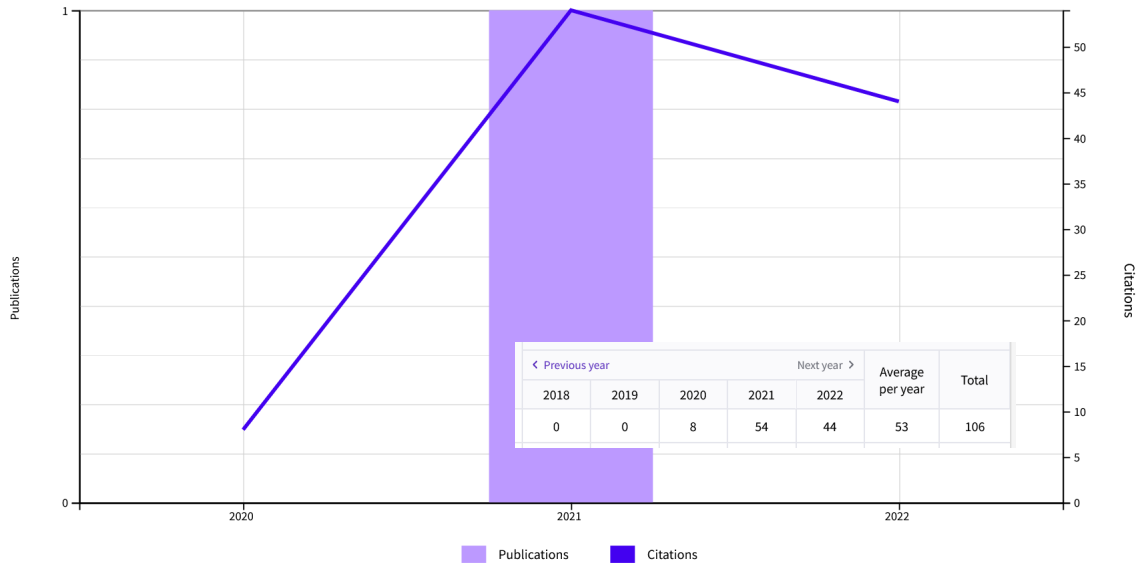


Gavruta, L. Frames for operators, APPLIED AND COMPUTATIONAL HARMONIC ANALYSIS, Volume: 32, Issue: 1, Pages: 139-144, ISSN: 1063-5203, 2012;
Times Cited in Web of Science Core Collection: 131

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 March/December 2021, 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.

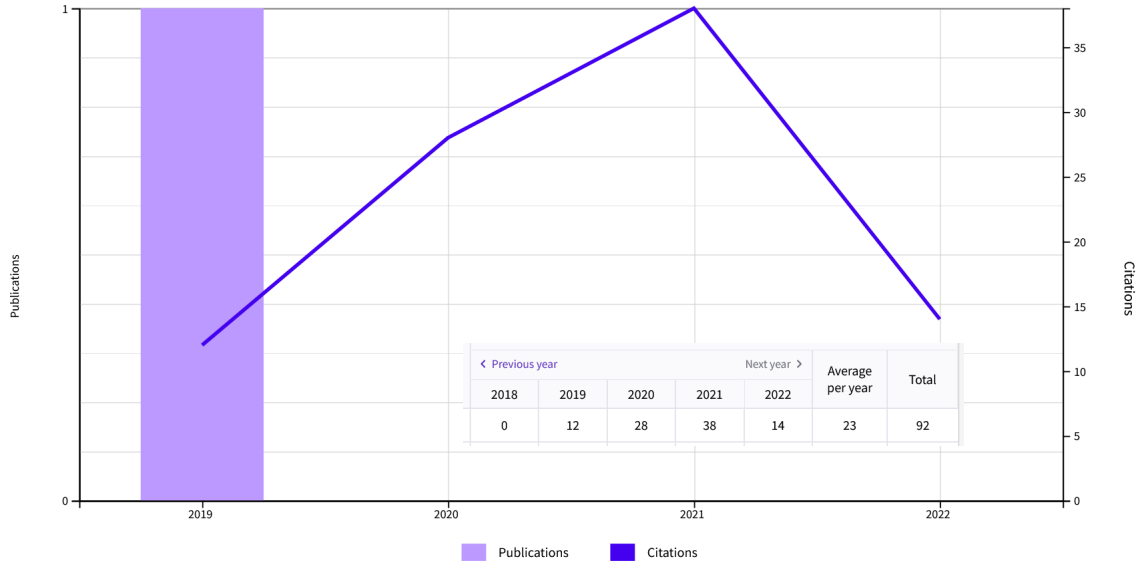


Roman, R.C., Precup, R.E., Petriu, E.M. Hybrid data-driven fuzzy active disturbance rejection control for tower crane systems, EUROPEAN JOURNAL OF CONTROL, Volume: 58, Pages: 373-387, ISSN: 0947-3580, eISSN: 1435-5671, 2021;
Times Cited in Web of Science Core Collection: 106

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 2021, 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.

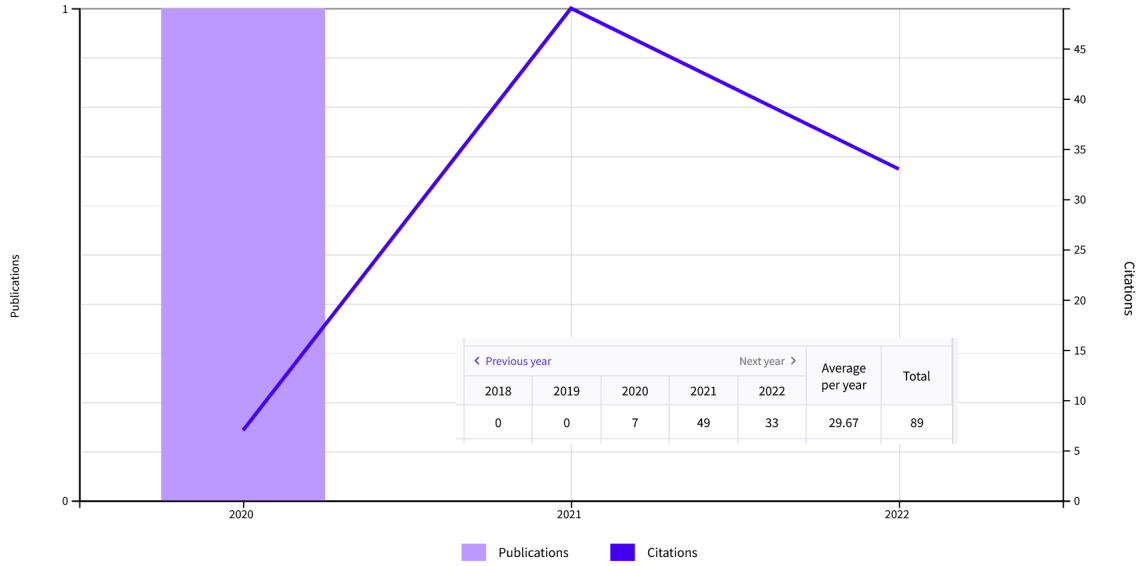


Sarbu, I., Dorca, A. Review on heat transfer analysis in thermal energy storage using latent heat storage systems and phase change materials, INTERNATIONAL JOURNAL OF ENERGY RESEARCH, Volume: 43, Issue: 1, Pages: 29-64, ISSN: 0363-907X, eISSN: 1099-114X, 2019;
Times Cited in Web of Science Core Collection: 92

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 May/December 2021, 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.

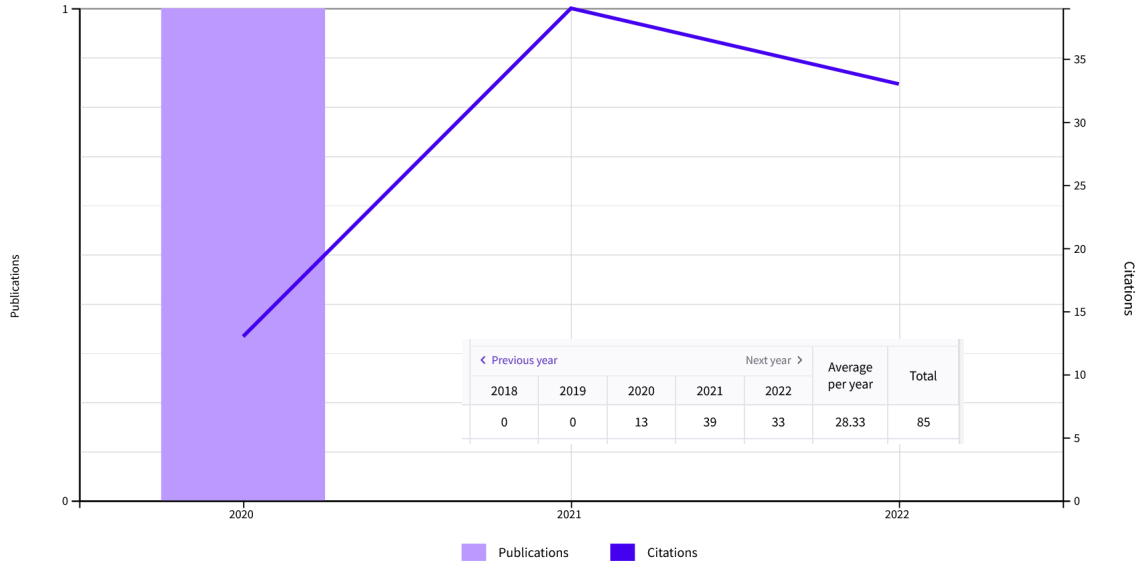


Covaci, C., Gontean, A. Piezoelectric Energy Harvesting Solutions: A Review, SENSORS, Volume: 20, Issue: 12, Article Number: 3512, PubMed ID: 32575888, eISSN: 1424-8220, 2020;
Times Cited in Web of Science Core Collection: 89

Abstract: The goal of this paper is to review current methods of energy harvesting, while focusing on piezoelectric energy harvesting. The piezoelectric energy harvesting technique is based on the materials' property of generating an electric field when a mechanical force is applied. This phenomenon is known as the direct piezoelectric effect. Piezoelectric transducers can be of different shapes and materials, making them suitable for a multitude of applications. To optimize the use of piezoelectric devices in applications, a model is needed to observe the behavior in the time and frequency domain. In addition to different aspects of piezoelectric modeling, this paper also presents several circuits used to maximize the energy harvested.

Web of Science - Clarivate Analytics Highly Cited Paper

As of May/December 2021, 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.

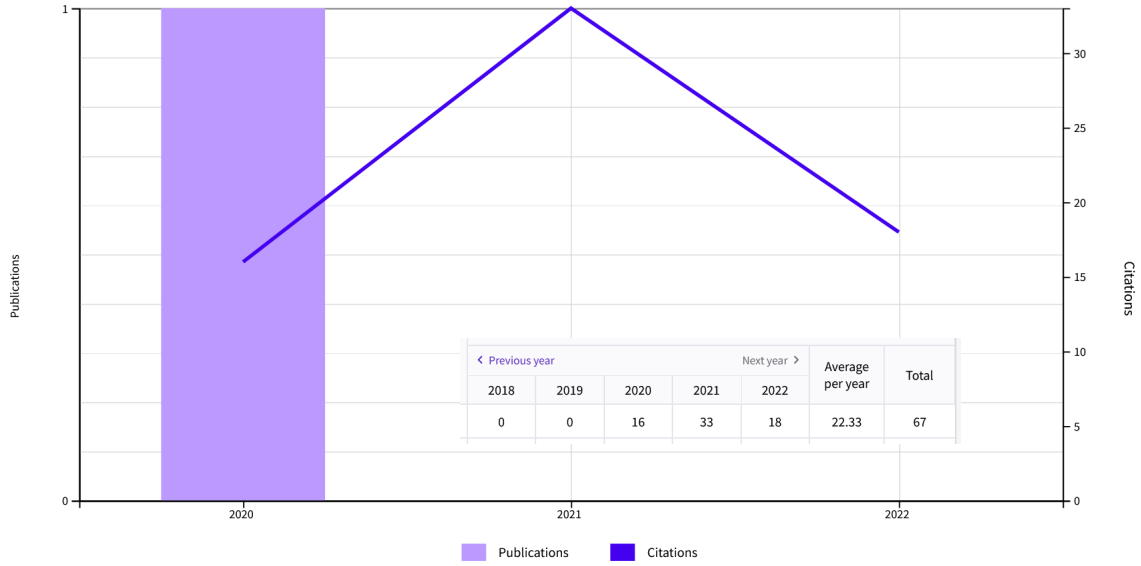


Precup, R.E., Teban, T.A., Albu, A., Borlea, A.B., Zamfirache, I.A., Petriu, E.M. Evolving Fuzzy Models for Prosthetic Hand Myoelectric-Based Control, IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, Volume: 69, Issue: 7, Pages: 4625-4636, ISSN: 0018-9456, eISSN: 1557-9662, 2020;
Times Cited in Web of Science Core Collection: 85

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 2021, 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.

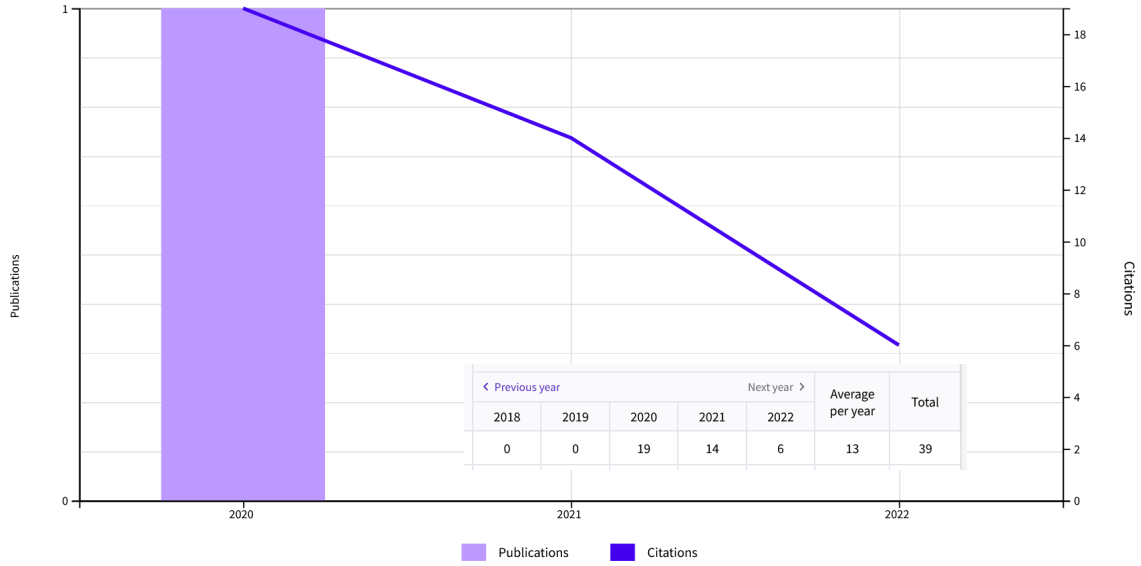


Tmusic, G., Manfreda, S., Aasen, H., James, M.R., Goncalves, G., Ben-Dor, E., Brook, A., Polinova, M., Arranz, J.J., Meszaros, J., Zhuang, R.D., Johansen, K., Malbeteau, Y., de Lima, I.P., Davids, C., Herban, S., McCabe, M.F. Current Practices in UAS-based Environmental Monitoring, REMOTE SENSING, Volume: 12, Issue: 6, Article Number: 1001, eISSN: 2072-4292, 2020;
Times Cited in Web of Science Core Collection: 67

Abstract: With the increasing role that unmanned aerial systems (UAS) are playing in data collection for environmental studies, two key challenges relate to harmonizing and providing standardized guidance for data collection, and also establishing protocols that are applicable across a broad range of environments and conditions. In this context, a network of scientists are cooperating within the framework of the Harmonious Project to develop and promote harmonized mapping strategies and disseminate operational guidance to ensure best practice for data collection and interpretation. The culmination of these efforts is summarized in the present manuscript. Through this synthesis study, we identify the many interdependencies of each step in the collection and processing chain, and outline approaches to formalize and ensure a successful workflow and product development. Given the number of environmental conditions, constraints, and variables that could possibly be explored from UAS platforms, it is impractical to provide protocols that can be applied universally under all scenarios. However, it is possible to collate and systematically order the fragmented knowledge on UAS collection and analysis to identify the best practices that can best ensure the streamlined and rigorous development of scientific products.

Web of Science - Clarivate Analytics Highly Cited Paper

As of January/February 2021, this highly cited paper received enough citations to place it in the top 1% of the academic field of **Materials Science** based on a highly cited threshold for the field and publication year.

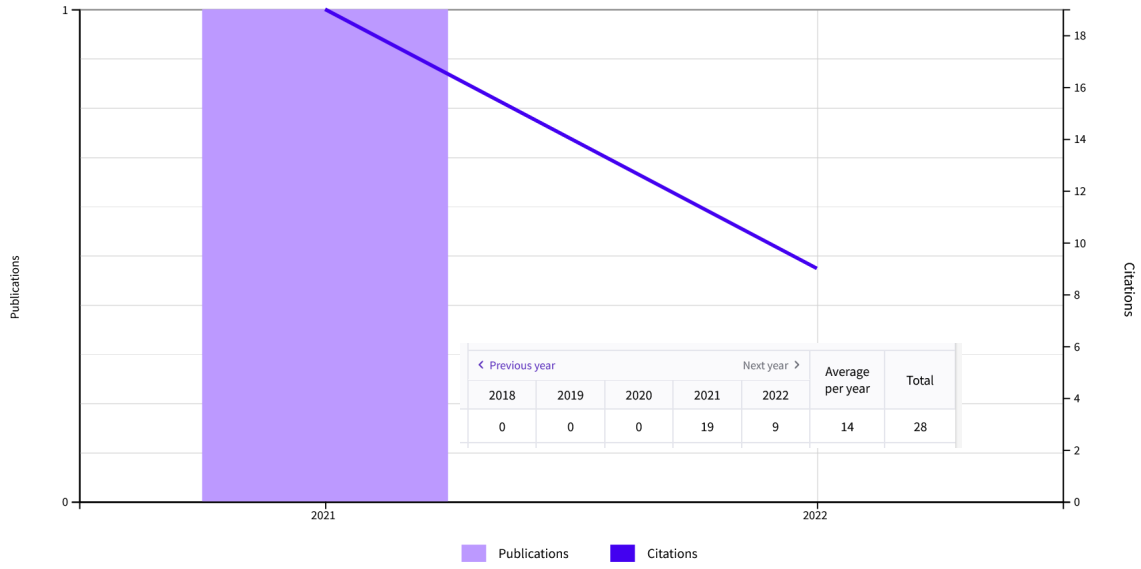


Fiedler, T., Al-Sahlani, K., Linul, P.A., Linul, E. Mechanical properties of A356 and ZA27 metallic syntactic foams at cryogenic temperature, JOURNAL OF ALLOYS AND COMPOUNDS, Volume: 813, Article Number: 152181, ISSN: 0925-8388, eISSN: 1873-4669, 2020;
Times Cited in Web of Science Core Collection: 39

Abstract: This work presents compressions tests of metallic foams at cryogenic temperature. The investigated syntactic foams were manufactured by combining a packed bed of expanded glass particles with either an aluminium or a zinc matrix using infiltration casting. Uni-axial compressions tests were performed after submerging samples in a bath of liquid nitrogen with an equilibrium temperature of -196 degrees C. Both the solid matrix material and syntactic foam samples were tested. For comparison, room temperature reference data from the literature was obtained. In addition, the effect of thermal treatment on the mechanical behaviour of both alloys and their foams at cryogenic temperature was addressed. The results indicate significant embrittlement at cryogenic temperature; however, aluminium and its foams are less susceptible to this effect.

Web of Science - Clarivate Analytics Highly Cited Paper

As of September/December 2021, 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.

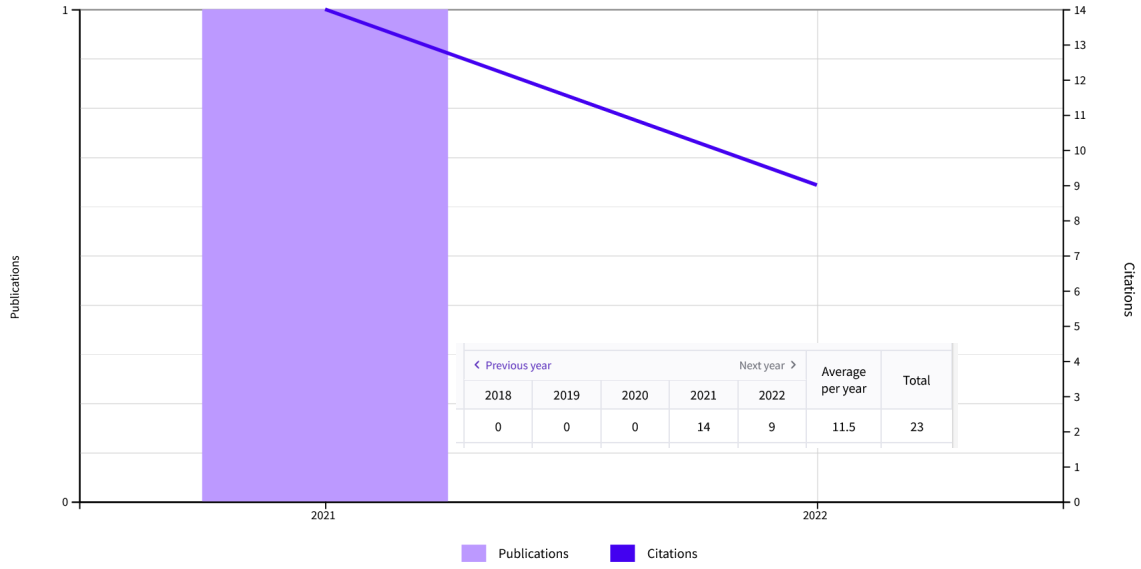


Precup, R.E., David, R.C., Roman, R.C., Petriu, E.M., Szedlak-Stinean, A.I. Slime Mould Algorithm-Based Tuning of Cost-Effective Fuzzy Controllers for Servo Systems, INTERNATIONAL JOURNAL OF COMPUTATIONAL INTELLIGENCE SYSTEMS, Volume: 14, Issue: 1, Pages: 1042-1052, ISSN: 1875-6891, eISSN: 1875-6883, 2021;
Times Cited in Web of Science Core Collection: 28

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 September/October 2021, 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.



Gherhes, V., Stoian, C.E., Farcasiu, M.A., Stanici, M. E-Learning vs. Face-To-Face Learning: Analyzing Students' Preferences and Behaviors, SUSTAINABILITY, Volume: 13, Issue: 8, Article Number: 4381, eISSN: 2071-1050, 2021;
Times Cited in Web of Science Core Collection: 23

Abstract: Educational life worldwide has been shaken by the closure of schools due to the outbreak of the coronavirus pandemic. The ripple effects have been felt in the way both teachers and students have adapted to the constraints imposed by the new online form of education. The present study focuses exclusively on the beneficiaries of the educational process and aims to find out their perceptions of face-to-face and e-learning and their desire to return, or not, to the traditional form of education. These perceptions are represented by 604 students of the Politehnica University Timisoara, who were asked to respond anonymously to an 8-question questionnaire between December 2020 and February 2021. The results show the respondents' levels of desire to return to school (especially of those who have only benefited from e-learning) and their degree of involvement during online classes. The results also specify the advantages and disadvantages of the two forms of education from a double perspective, namely that of first-year students (beneficiaries of e-learning exclusively), and of upper-year students (beneficiaries of both face-to-face and e-learning). The study points out key information about e-learning from the students' perspectives, which should be considered to understand the ongoing changes of the educational process and to solve its specific problems, thus ensuring its sustainability.

No.	2021 UPT Awards	2020 Impact Factor / Quartile in Category
1.	Aamir, M., Sarfraz, M., Khawaja, K.F., Usman, H., Hu, Z.H. Signifying the Effect of Relational and Experiential Cognitive Styles on Entrepreneurial Behavior: A Mediated Moderated Model, FRONTIERS IN PSYCHOLOGY, Volume: 12, Article Number: 762403, PubMed ID: 34721243, ISSN: 1664-1078, 2021;	2.988 / Q2
2.	ul Ain, Q., Jie, Y., Ivascu, L., Shah, S.G.M., Yousaf, T. Whether rising tide has lifted all the boats? Effect of inter-governmental transfers on household income inequality in Pakistan, INTERNATIONAL JOURNAL OF FINANCE & ECONOMICS, ISSN: 1076-9307, eISSN: 1099-1158, 2021;	3.07 / Q2
3.	Albulescu, C.T., Ajmi, A.N. Oil price and US dollar exchange rate: Change detection of bi-directional causal impact, ENERGY ECONOMICS, Volume: 100, Article Number: 105385, ISSN: 0140-9883, eISSN: 1873-6181, 2021;	7.042 / Q1
4.	Albulescu, C.T., Tiwari, A.K., Kyophilavong, P. Nonlinearities and Chaos: A New Analysis of CEE Stock Markets, MATHEMATICS, Volume: 9, Issue: 7, Article Number: 707, eISSN: 2227-7390, 2021;	2.258 / Q1
5.	Albulescu, C.T., Mutascu, M.I. Fuel price co-movements among France, Germany and Italy: A time-frequency investigation, ENERGY, Volume: 225, Article Number: 120236, ISSN: 0360-5442, eISSN: 1873-6785, 2021;	7.147 / Q1
6.	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;	5.596 / Q1
7.	Anistoroaei, A., Berdich, A., Iosif, P., Groza, B. Secure Audio-Visual Data Exchange for Android In-Vehicle Ecosystems, APPLIED SCIENCES-BASEL, Volume: 11, Issue: 19, Article Number: 9276, eISSN: 2076-3417, 2021;	2.679 / Q2
8.	Ardean, C., Davidescu, C.M., Nemes, N.S., Negrea, A., Ciopec, M., Duteanu, N., Negrea, P., Duda-Seiman, D., Muntean, D. Antimicrobial Activities of Chitosan Derivatives, PHARMACEUTICS, Volume: 13, Issue: 10, Article Number: 1639, PubMed ID: 34683932, eISSN: 1999-4923, 2021;	6.321 / Q1
9.	Ardean, C., Davidescu, C.M., Nemes, N.S., Negrea, A., Ciopec, M., Duteanu, N., Negrea, P., Duda-Seiman, D., Musta, V. Factors Influencing the Antibacterial Activity of Chitosan and Chitosan Modified by Functionalization, INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES, Volume: 22, Issue: 14, Article Number: 7449, PubMed ID: 34299068, eISSN: 1422-0067, 2021;	5.923 / Q1
10.	Arvinti, B., Iacob, E.R., Isar, A., Iacob, D., Costache, M. Automated Medical Care: Bradycardia Detection and Cardiac Monitoring of Preterm Infants, MEDICINA-LITHUANIA, Volume: 57, Issue: 11, Article Number: 1199, PubMed ID: 34833417, ISSN: 1010-660X, eISSN: 1648-9144, 2021;	2.43 / Q2
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12.	Bajas, D., Vlase, G., Mateescu, M., Grad, O.A., Bunoiu, M., Vlase, T., Avram, C. Formulation and Characterization of Alginate-Based Membranes for the Potential Transdermal Delivery of Methotrexate, POLYMERS, Volume: 13, Issue: 1, Article Number: 161, PubMed ID: 33406773, eISSN: 2073-4360, 2021;	4.329 / Q1
13.	Banias, O., Florea, D., Gyalai, R., Curiac, D.I. Automated Specification-Based Testing of REST APIs, SENSORS, Volume: 21, Issue: 16, Article Number: 5375, PubMed ID: 34450820, eISSN: 1424-8220, 2021;	3.576 / Q1
14.	Banica, R., Taranu, B., Ladasiu, C., Hulka, I., Linul, P. Three-dimensional porous electrode based on silver nanowires for hydrogen sulfide detection, MATERIALS LETTERS, Volume: 304, Article Number: 130720, ISSN: 0167-577X, eISSN: 1873-4979, 2021;	3.423 / Q2
15.	Barb, G., Alexa, F., Otesteanu, M. Dynamic Spectrum Sharing for Future LTE-NR Networks, SENSORS, Volume: 21, Issue: 12, Article Number: 4215, PubMed ID: 34205459, eISSN: 1424-8220, 2021;	3.576 / Q1

No.	2021 UPT Awards	2020 Impact Factor / Quartile in Category
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17.	Baron, R.I., Biliuta, G., Socoliuc, V., Coseri, S. Affordable Magnetic Hydrogels Prepared from Biocompatible and Biodegradable Sources, POLYMERS, Volume: 13, Issue: 11, Article Number: 1693, PubMed ID: 34067311, eISSN: 2073-4360, 2021;	4.329 / Q1
18.	Belc, A.L., Ciutina, A., Buzatu, R., Belc, F., Costescu, C. Environmental Impact Assessment of Different Warm Mix Asphalts, SUSTAINABILITY, Volume: 13, Issue: 21, Article Number: 11869, eISSN: 2071-1050, 2021;	3.251 / Q2
19.	Belc, A.L., Coleri, E., Belc, F., Costescu, C. Influence of Different Warm Mix Additives on Characteristics of Warm Mix Asphalt, MATERIALS, Volume: 14, Issue: 13, Article Number: 3534, PubMed ID: 34202774, eISSN: 1996-1944, 2021;	3.623 / Q1
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21.	Belega, D., Petri, D. Fast procedures for accurate parameter estimation of sine-waves affected by noise and harmonic distortion, DIGITAL SIGNAL PROCESSING, Volume: 114, Article Number: 103035, ISSN: 1051-2004, eISSN: 1095-4333, 2021;	3.381 / Q2
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26.	Bogdan, R., Tatu, A., Crisan-Vida, M.M., Popa, M., Stoicu-Tivadar, L. A Practical Experience on the Amazon Alexa Integration in Smart Offices, SENSORS, Volume: 21, Issue: 3, Article Number: 734, PubMed ID: 33499092, eISSN: 1424-8220, 2021;	3.576 / Q1
27.	Bolborea, B., Baera, C., Dan, S.R., Gruin, A., Burduhos-Nergis, D.D., Vasile, V. Concrete Compressive Strength by Means of Ultrasonic Pulse Velocity and Moduli of Elasticity, MATERIALS, Volume: 14, Issue: 22, Article Number: 7018, PubMed ID: 34832417, eISSN: 1996-1944, 2021;	3.623 / Q1
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No.	2021 UPT Awards	2020 Impact Factor / Quartile in Category
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30.	Boscornea-Puscu, A.S., Orel, L., Velea-Barta, O.A., Horhat, R.M., Negrutiu, M.L., Nica, L.M., Duma, V.F., Stoia, D.I., Opris, C., Sinescu, C. Experimental Study of the Effects of Torsional Loading on Three Types of Nickel-Titanium Endodontic Instruments, APPLIED SCIENCES-BASEL, Volume: 11, Issue: 16, Article Number: 7224, eISSN: 2076-3417, 2021;	2.679 / Q2
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32.	Brighenti, R., Cosma, M.P., Marsavina, L., Spagnoli, A., Terzano, M. Multiphysics modelling of the mechanical properties in polymers obtained via photo-induced polymerization, INTERNATIONAL JOURNAL OF ADVANCED MANUFACTURING TECHNOLOGY, Volume: 117, Issue: 1-2, Pages: 481-499, ISSN: 0268-3768, eISSN: 1433-3015, 2021;	3.226 / Q2
33.	Caleanu, C.D., Sirbu, C.L., Simion, G. Deep Neural Architectures for Contrast Enhanced Ultrasound (CEUS) Focal Liver Lesions Automated Diagnosis, SENSORS, Volume: 21, Issue: 12, Article Number: 4126, PubMed ID: 34208548, eISSN: 1424-8220, 2021;	3.576 / Q1
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35.	Caruntu, B. Approximate Analytical Solutions for Systems of Fractional Nonlinear Integro-Differential Equations Using the Polynomial Least Squares Method, FRACTAL AND FRACTIONAL, Volume: 5, Issue: 4, Article Number: 198, eISSN: 2504-3110, 2021;	3.313 / Q1
36.	Caruntu, B., Pasca, M.S. Approximate Solutions for a Class of Nonlinear Fredholm and Volterra Integro-Differential Equations Using the Polynomial Least Squares Method, MATHEMATICS, Volume: 9, Issue: 21, Article Number: 2692, eISSN: 2227-7390, 2021;	2.258 / Q1
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39.	Cepan, C., Segneanu, A.E., Grad, O., Mihailescu, M., Cepan, M., Grozescu, I. Assessment of the Different Type of Materials Used for Removing Phosphorus from Wastewater, MATERIALS, Volume: 14, Issue: 16, Article Number: 4371, PubMed ID: 34442892, eISSN: 1996-1944, 2021;	3.623 / Q1
40.	Cernicova-Buca, M., Dragomir, G.M. Romanian Students' Appraisal of the Emergency Remote Assessment due to the COVID-19 Pandemic, SUSTAINABILITY, Volume: 13, Issue: 11, Article Number: 6110, eISSN: 2071-1050, 2021;	3.251 / Q2
41.	Cernicova-Buca, M., Palea, A. An Appraisal of Communication Practices Demonstrated by Romanian District Public Health Authorities at the Outbreak of the COVID-19 Pandemic, SUSTAINABILITY, Volume: 13, Issue: 5, Article Number: 2500, eISSN: 2071-1050, 2021;	3.251 / Q2

No.	2021 UPT Awards	2020 Impact Factor / Quartile in Category
42.	Chieffo, N., Fasan, M., Romanelli, F., Formisano, A., Mochi, G. Physics-Based Ground Motion Simulations for the Prediction of the Seismic Vulnerability of Masonry Building Compounds in Mirandola (Italy), BUILDINGS, Volume: 11, Issue: 12, Article Number: 667, eISSN: 2075-5309, 2021;	2.648 / Q2
43.	Chieffo, N., Mosoarca, M., Formisano, A., Lourenco, P.B., Milani, G. The effect of ground motion vertical component on the seismic response of historical masonry buildings: The case study of the Banloc Castle in Romania, ENGINEERING STRUCTURES, Volume: 249, Article Number: 113346, ISSN: 0141-0296, eISSN: 1873-7323, 2021;	4.471 / Q1
44.	Chirca, O., Biclesanu, C., Florescu, A., Stoia, D.I., Pangica, A.M., Burcea, A., Vasilescu, M., Antoniac, I.V. Adhesive-Ceramic Interface Behavior in Dental Restorations. FEM Study and SEM Investigation, MATERIALS, Volume: 14, Issue: 17, Article Number: 5048, PubMed ID: 34501143, eISSN: 1996-1944, 2021;	3.623 / Q1
45.	Ciopec, M., Grad, O., Negrea, A., Duteanu, N., Negrea, P., Paul, C., Ianasi, C., Mosoarca, G., Vancea, C. A New Perspective on Adsorbent Materials Based Impregnated MgSiO3 with Crown Ethers for Palladium Recovery, INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES, Volume: 22, Issue: 19, Article Number: 10718, PubMed ID: 34639061, eISSN: 1422-0067, 2021;	5.923 / Q1
46.	Ciopec, M., Biliuta, G., Negrea, A., Duteanu, N., Coseri, S., Negrea, P., Ghangrekar, M. Testing of Chemically Activated Cellulose Fibers as Adsorbents for Treatment of Arsenic Contaminated Water, MATERIALS, Volume: 14, Issue: 13, Article Number: 3731, PubMed ID: 34279302, eISSN: 1996-1944, 2021;	3.623 / Q1
47.	Covaciu, F., Pisla, A., Iordan, A.E. Development of a Virtual Reality Simulator for an Intelligent Robotic System Used in Ankle Rehabilitation, SENSORS, Volume: 21, Issue: 4, Article Number: 1537, PubMed ID: 33672161, eISSN: 1424-8220, 2021;	3.576 / Q1
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201.	Zamfirache, I.A., Precup, R.E., Roman, R.C., Petriu, E.M. Policy Iteration Reinforcement Learning-based control using a Grey Wolf Optimizer algorithm, INFORMATION SCIENCES, Volume: 585, Pages: 162-175, ISSN: 0020-0255, eISSN: 1872-6291, 2021;	6.795 / Q1
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* The data was obtained from Web of Science - Clarivate Analytics in 14 June 2022

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5.	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;	9.848 / Q1
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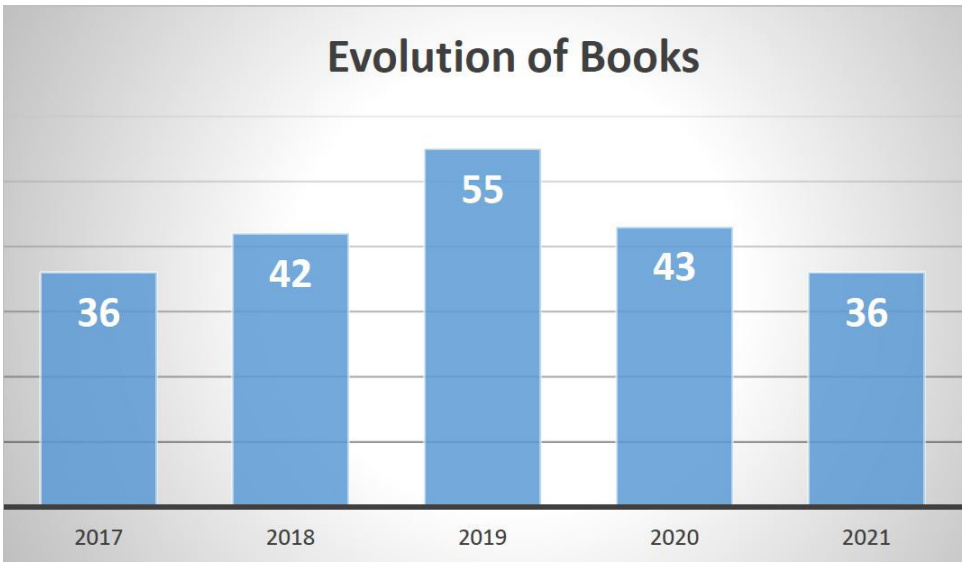
* The data was obtained from Web of Science - Clarivate Analytics in 14 July 2022

BOOKS

EVOLUTION OF BOOKS UNDER AFFILIATIONS OF UPT 2017 - 2021

A published book is indisputable evidence of research that has been performed, completed, and accepted by peers. Book is also an indicator of achievement of a certain academic standard. Besides communication of a finalised piece of research, the book is the basis for further opinions, views and critiques from fellow professionals and academics separated by time and distance. Most importantly, it represents the only permanent record of scientific work that has been completed.



In this chapter we present the books written by our professors and researchers, published at Romanian publishers as well as at international prestigious publishers.

Books in highlight

TINERII POLITEHNIȘTI. VALORI CULTURALE ȘI INTENȚII MIGRAȚIONALE

CERNICOVA- BUCĂ Mariana, CISMARIU Liliana, CIUREL Daniel, DRAGOMIR Gabriel-Mugurel, GHERHEŞ Vasile
Published by: Tritonic,
Editura Politehnica, 2021,
Pages: 234,
ISBN: 978-606-749-524-9; 978-606-35-0402-0

Short description of the context

The research presented in this book is a portrait of a generation: Romanian engineering students stepping into the third decade of the 21st century. It was guided by two main research questions: (1) what are the values engineers-to-be cherish and consider relevant for their lives and (2) what their plans for life after graduation are.

Purpose and Motivation of the book

The book is an important pedagogical tool, to help engineering students consider whether they are conscious of their values, chances and choices as emerging adults and professionals-to-be. It fuels the public debate on the future of the engineering profession in Romania, on retaining and return policies, to reduce the migration wave and the loss of highly skilled labor, vital for the country's sustainable development.

Summary

Tinerii politehniști. Valori culturale și intenții migraționale
(ROMANIAN ENGINEERING STUDENTS: CULTURAL VALUES AND MIGRATION INTENTIONS)

The book contains the following chapters:
(1) The (poli)technical education in the context of higher education in Romania
(2) Research design
(3) Students' personal values and social sustainability
(4) The ideal job, employer's brand, and projections on the reality of the labor market
(5) At Home or "Abroad"? Diagnosis of the emigration intentions of students from Romanian technical institutions after graduation
The results and conclusions of the book are useful to university managers and policy makers alike in proposing and adopting strategies to reduce the migration phenomenon among engineers.

O ISTORIE A TRADUCERILOR ÎN LIMBA ROMÂNĂ

CONSTANTINESCU Muguraș, DEJICA Daniel, VÎLCEANU Titela
Published by: Editura Academiei Române, 2021,
Pages: 1416
ISBN: 978-973-27-3438-4

Short description of the context

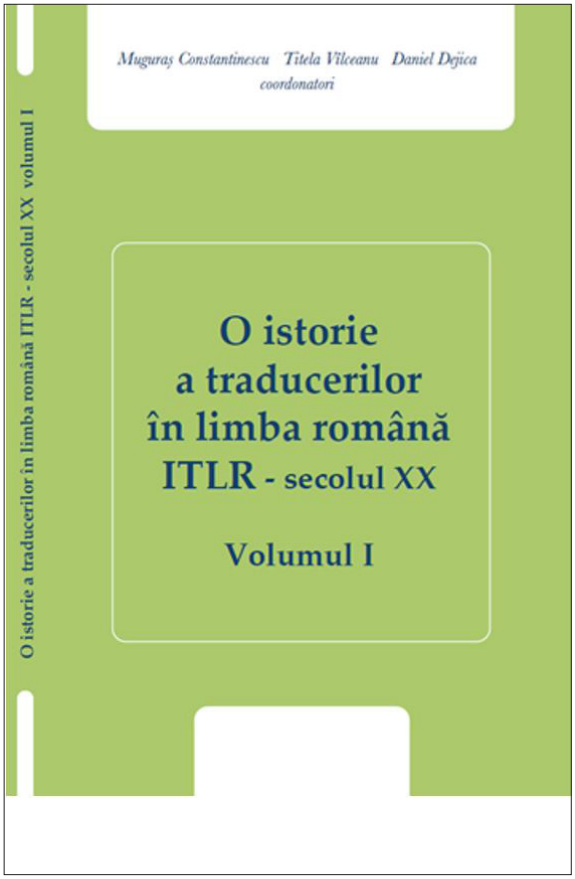
Coordinated by Muguraș Constantinescu (University of Suceava), **Daniel Dejica (Politehnica University Timisoara)**, and Titela Vîlceanu (University of Craiova), and published by Editura Academiei Române, this volume gathers the contributions of more than 100 authors and highlights the complexity of the translation phenomenon, in direct connection with the status and condition of the translator, the publishing landscape and its continuous evolution, the enrichment and shaping of the language through translations, and everything that implies the production context of a translation.

Purpose and Motivation of the book

A History of Translations in the Romanian Language the 20th century focuses on translations from various languages, from most fields of intellectual life, published throughout the century, with some references to the translations published in periodicals, as well. The time limits established for the 20th century, with a margin of five to six years before and after the calendar boundaries, in order not to interrupt the presentation of ongoing phenomena at the border between centuries, are with very few exceptions, respected. The volume is intended to be useful and interesting both for the specialized public, to whom it provides a working tool, and for the general public, curious to learn more about translations and translators and their potential to serve, protect and grow the Romanian language.

Summary

- **Chapter 1.** Linguistic, literary, historical, geopolitical, social and cultural contexts;
- **Chapter 2.** The statute and the condition of the translator;
- **Chapter 3.** Publications, collections and magazines ;
- **Chapter 4.** Perspectives on translation;



Chapter 5. Antiquity and the Middle Ages;
Chapter 6. Poetry (I), Overall perspective;
Chapter 7. Poetry (II). Landmarks in the translation of poetic discourse

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NEW ADVANCES IN MECHANISMS, MECHANICAL TRANSMISSIONS AND ROBOTICS

Erwin-Christian LOVASZ, Inocentiu MANIU, Ioan DOROFTEI, Mircea IVANESCU, Corina-Mihaela GRUESCU
Published by: Springer Nature Switzerland AG 2021, Pages: 558
ISBN: 978-3-030-60075-4; ISBN 978-3-030-60076-1 (eBook)

Short description of the context

The aim of the Joint International Conference of the XIII International Conference on Mechanisms and Mechanical Transmissions (MTM) and the XXIV International Conference on Robotics (Robotics) is to bring together researchers, scientists, industry experts and Ph.D students involved in the general area of mechanisms, mechanical transmissions, robotics and mechatronics.

Purpose and Motivation of the book

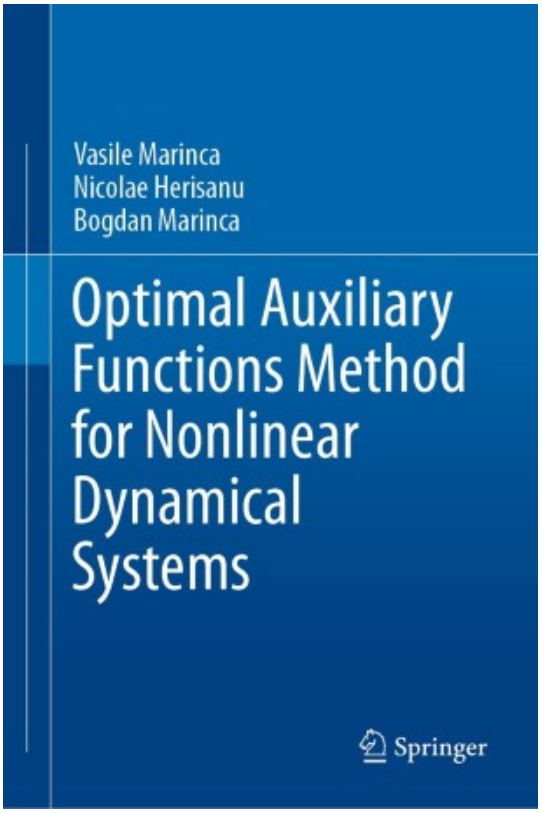
The book publishes the proceedings of the international conference MTM&Robotics 2020.

Summary

The book contains the following chapters:
MTM: Mechanisms – analysis and synthesis; Dynamics of mechanisms and machines; Mechanical Transmissions; Biomechanics; Precision mechanics; Mechatronics; Micromechanisms and Microactuators; Computational and Experimental Methods; CAD in mechanism and machine design.
Robotics: Mechanical design of robot architecture; Parallel robots; Mobile robots; Micro and Nano robots; Sensors and actuators in robotics; Intelligent control systems; Biomedical engineering; Teleoperation, haptics, virtual reality.

OPTIMAL AUXILIARY FUNCTIONS METHOD FOR NONLINEAR DYNAMICAL SYSTEMS

Vasile MARINCA, Nicolae HERISANU, Bogdan MARINCA
Published by: SPRINGER, 2021,
Pages: 477
ISBN: 978-3-030-75652-9



Short description of the context

The analytical technique presented in this book is an analytical approximation method applicable for highly nonlinear systems independent of the presence of small or large parameters into the governing equations or in the initial/boundary conditions.
The work is based on the results obtained by the authors in the last years of research in the field of nonlinear dynamical systems. New results are illustrated by numerical examples. The book is divided into 31 chapters. Here are treated models from various fields of engineering such as mechanical vibration, thermodynamics, fluid mechanics, astronomy, electrical machines.

Purpose and Motivation of the book

The success of the present method is an important milestone in any field of exact sciences and techniques. Besides a wide field of applications, the proposed procedure can often be used to provide comparisons with the results obtained by other procedures. The intended readers of this book include undergraduate students, graduate students doing projects on doctoral research in the field of nonlinear dynamical systems; researchers, engineers and teachers will also find this book useful. It is assumed that the reader already has minimal knowledge on how to differentiate and integrate elementary functions. Also, computer skills would be essential because computer simulation is a powerful tool for examination, confirmation and sometimes for refutation of the obtained results.

Summary

• The analytical investigation of nonlinear dynamical systems is one of the most important but difficult tasks, and the present book consists of numerous examples from various domains of engineering and applied sciences. Any problem of motion in nonlinear dynamical systems can be assimilated only by working with differential equations which are applied in concrete examples.
• All examples presented here and treated from an analytical point of view are accompanied by comparisons with numerical results and sometimes with exact solutions, or with other known results in the literature. In contrast to the other known techniques, our approach provides us with a simple way to control and adjust the convergence regions of solutions corresponding to nonlinear dynamical systems.
• The methodology proposed in this book is totally different from all other known analytical techniques, especially regarding the choice of the linear operators and optimal auxiliary functions, as well as the determination of the optimal convergence-control parameters.
• The book is divided into 31 chapters. The Chap. 1 is the introduction and the Chap. 2 is devoted to the basic ideas of our procedure. The Chaps. 3–28 deals with the first alternative of the optimal auxiliary functions method, solving the first approximate equation. The Chap. 29 treats the second alternative but without solving the equation in the first approximation. The Chap. 31 is devoted to finding the exact solutions and in the Chap. 30, the optimal auxiliary functions method is applied piecewise.

DATA-DRIVEN MODEL-FREE CONTROLLERS

Radu-Emil PRECUP, Raul-Cristian ROMAN, Ali SAFAEI
Published by: CRC Press,
2021, Pages: 402
ISBN: 9781003143444

Short description of the context

The book is addressed to students, industrial and academic researchers that study data-driven algorithms.

Purpose and Motivation of the book

The book is vital for students and researchers who are interested in the development and implementation of data-driven control applications. The textbook illuminates different aspects and features of the model-free controllers.

Summary

The book categorizes the wide area of data-driven model-free controllers, reveals the benefits of such controllers, gives the in-depth theory and mathematical proofs behind them, and discusses their applications. Each chapter includes a section for presenting the theory and mathematical definitions of one of the algorithms followed by examples and applications of the corresponding control algorithms in practical engineering problems. The book proposes to avoid complex mathematical equations, being generic as it includes several types of data-driven model-free controllers.

ADVANCES IN BUILDING SERVICES ENGINEERING: STUDIES, RESEARCHES AND APPLICATIONS

Ioan SARBU
Published by: SPRINGER, 2021,
Pages: 921
ISBN: 978-3-030-64780-3

Short description of the context

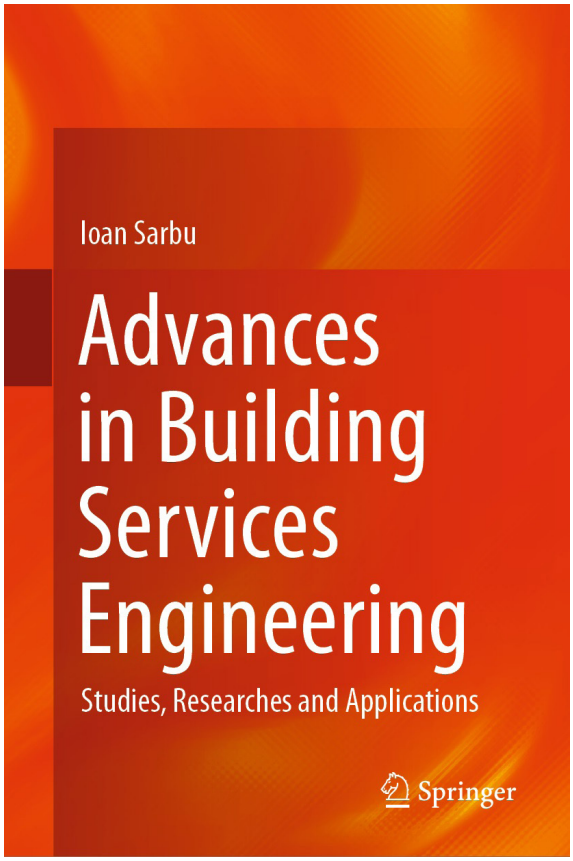
This book published in 2021 by the famous Springer provides a comprehensive, systematic overview of original theoretical, experimental, and numerical studies in the building services engineering domain.

Purpose and Motivation of the book

The book brings together different strand of the topic, guided by the two key features of the energy savings and reduction of the pollutant emissions. Technical, economic, and energy efficiency aspects related to design, modelling, optimisation, and operation of diverse building services systems are explored.

Summary

The book is structured into eleven chapters:
1. Introduction;
2. Assurance of Indoor Environment Quality in Buildings;
3. Modelling, Optimisation and Modernisation of Heating Systems;
4. Efficient Refrigeration and Air-Conditioning Systems;
5. Solar Heating and Cooling Systems;
6. Heat Pumps for Sustainable Heating and Cooling;
7. Thermal Energy Storage;
8. Hydraulic Simulation and Optimisation of Water Transmission and Distribution Systems;
9. Sewage Treatment Plants;
10. Hydraulic Calculation of Open Channels and Sewer Columns in Buildings;
11. Numerical Modelling of Heat Transfer



With 11 pedagogically structured chapters, containing numerous illustrations, tables, and examples, this book provides researchers, lecturers, engineers, and graduate students with a thorough guide to building services engineering.

REFRIGERATION SYSTEMS AND EQUIPMENT: FUNDAMENTALS, APPLICATIONS AND NUMERICAL EXAMPLES

Ioan SARBU
Published by: MATRIX ROM, 2021,
Pages: 616
ISBN: 978-606-25-0664-3

Short description of the context

This book published in 2021 by the Matrix Rom is the result of the experience gained by the author both in the activity of guiding students and in scientific research. It is based on a vast bibliographic material, completed with some original works of the author, representing a comprehensive and consistent monograph with aspects of novelty in the field.

Purpose and Motivation of the book

Given the applicative purpose of the book, each chapter includes examples and numerical applications for a variety of representative problems that can be encountered in practice, which facilitates the understanding of the theoretical presentation, describes a series of computer programs, developed based on models exposed, to solve specialised problems, in the activity of design, research and operating prescriptions are given for these installations.

Summary

The book is structured in 15 chapters:
- Chapter 1. Introduction;
- Chapter 2. Elements of thermodynamics used in refrigeration;
- Chapter 3. Refrigerants and intermediates;
- Chapter 4. Refrigeration systems with mechanical vapor compression;
- Chapter 5. Mechanical refrigeration compressors;
- Chapter 6. Refrigeration systems with absorption (thermochemical compression);
- Chapter 7. Thermochemical refrigerating compressors (generator-absorbent group);
- Chapter 8. Refrigeration systems with steam ejection;
- Chapter 9. Thermoelectric refrigeration systems;
- Chapter 10. Solar thermal cooling systems;
- Chapter 11. Solar electric cooling systems;
- Chapter 12. Refrigeration equipment;
- Chapter 13. Pipes, fittings and refrigeration insulation;

- Chapter 14. Applications of artificial cold;
- Chapter 15. Automation, testing and operation of refrigeration systems

- Through the complexity of the approached subjects and through the original presentation way, the book becomes a very useful instrument for the teachers, PhD-students and students in the universities with this profile, as well as for designers, scientific researchers, engineers, industrialists or other specialists working in the field of refrigeration technology.

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2020

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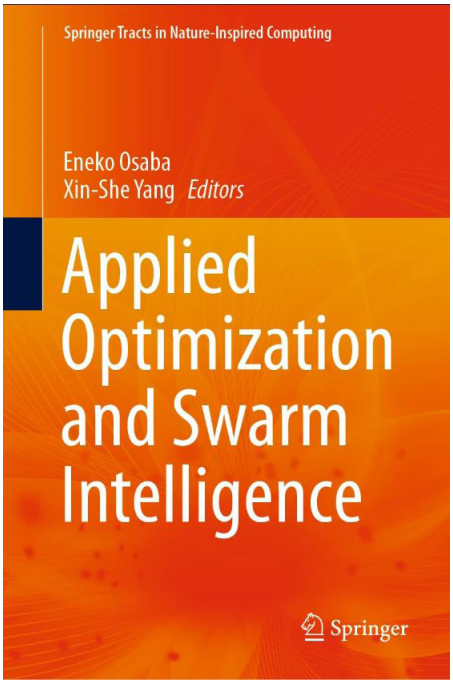

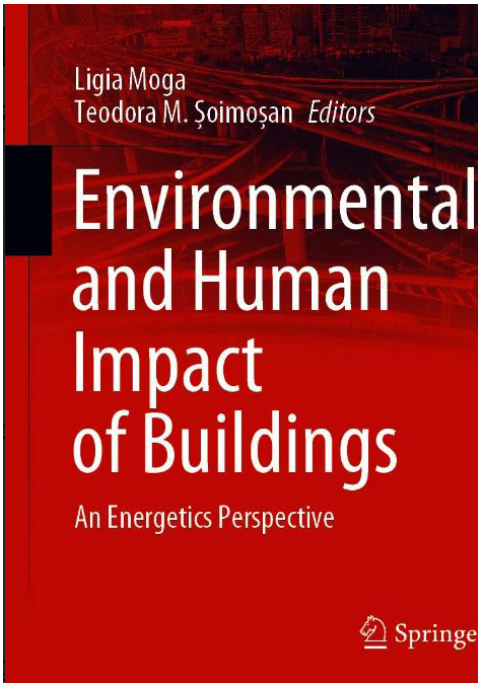

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Editura **POLITEHNICA**

ISSN 1841-2769
ISSN-L 1841-2769