MECHATRONICS AND ENERGY LABORATORY

Contact details

Name	**Mechatronics and Energy Laboratory**
Acronym	**LME**
Logo	Laboratorul de Mecatronică şi Energie
Site	https://mdm.utcluj.ro/wp-content/uploads/2017/02/Laborator-de-Cercetare-ME.pdf
Address	103-105 Muncii Str., 400641, Cluj-Napoca, Romania
Faculty Department	**Faculty of Automotive, Mechatronics and Mechanical Engineering** **Mechatronics and Machine Dynamics Department**
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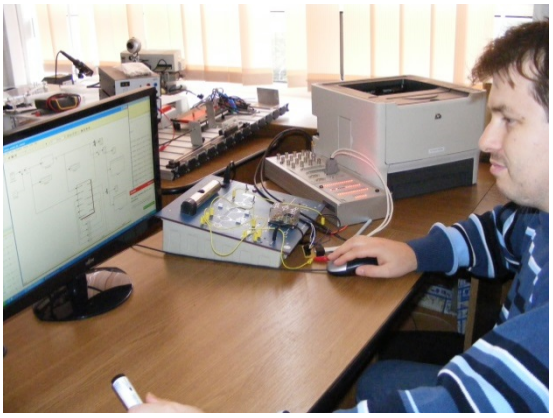

Areas of expertise

Materials, processes and innovative products: Mechatronic systems, advanced industrial process control technologies, high precision mechanical products and technologies, advanced materials, innovative technologies for transportation. **Key words**: mechatronics, intelligent actuators, sensorial systems, advanced control, robotic systems;
Computer science technologies: Technologies for achieving high performance computing applications, opened, heterogeneous, scalable, fault tolerant and with a good connectivity between user and resources, artificial intelligence methods and systems**. Key words**: control algorithms, artificial intelligence, rapid control prototyping, human-machine interface systems**.**
Energy: Concepts, technologies and products that contribute to satisfy the energy needs at the lowest price, use of new energetic sources and improving the decisional process, increase of the technological competence and promotion of the knowledge transfer and technologies in energetic fields. **Key words:** energy efficiency, energy saving, renewable energy, control, sustainability, environment.

Team

Prof. Dr. Eng. Radu Bălan, Prof. Dr. Eng. Vistrian Mătieş, Prof. Dr. Eng. Victor Hodor, Assoc.Prof. Dr. Eng. Olimpiu Hancu, Assoc.Prof Dr. Eng. Ciprian Lăpuşan, Lecturer Dr. Eng. Sorin Besoiu, Lecturer Dr. Eng. Radu Donca, Lecturer. Dr. Eng. Alin Pleşa

Representative projects

MoniCult – "Design, manufacturing and testing of a mechatronic system for multispectral surveillance of crops vegetation status" PN-II-PT-PCCA-2013-4-1629, (2014-2017)
"Design of a mobile multifunctional platform for inner water pipe inspection", (2012)
DEHEMS, **"Digital Environment Home Energy Management System"**, Europen FP7 project, https://cordis.europa.eu/project/id/224609 (2008-2011)
FlexForm, **"Flexible professional forming program on mechatronic platforms"**, POSDRU, http://www.flexform.ro/
EQUATOR, **"Advanced strategies for high performance indoor Environmental Quality in Operating Rooms"**, PN-II-PT-PCCA, (2011)
"Research regarding advanced control in mechatronic applications", PNII-Idei (2007-2010)
"Simulation, Control and Testing Platform with Applications in Mechatronics", CEEX, (2006-2008)
"Numerical analysis and control of the combustion instability using acoustic analogy", IDEI,2007-2010

E-FARM, **"Informatics support system for design, implementation and control for hybrid energy farms"**, http://www.automation.ro/e-farm/index.html (2008)
AMFM," Implementing the shape memory effect in mechatronic systems using advanced materials obtained by powder metallurgy", 2008-2011
MMFEH, **"Design of an innovative hydro-pneumatic system by implementing the shape memory alloy effect using powder metallurgy technology"**, (2008)

Significant results

The most representative publications of the past 5 years:

1. Diudea H., Baldogi T., Balan R., A comparative analysis of model-based control methods applied for the active suspension system, IEEE 2021 9th International Conference on Modern Power Systems (MPS)
2. Baldogi T., Diudea H., Balan R., Improving the vibration reliability testing process, IEEE 2021 9th International Conference on Modern Power Systems (MPS)
3. Brai L., Bolchiş M., Blidar O., Balan R., Munteanu R., Active Filtering in Beamforming Circuit: Design, Calculation and Simulation. 2021 16th IEEE International Conference on Engineering of Modern Electric Systems (EMES).
4. Sandru,Vasile, Balan, Radu, A model-based approach to develop a mechatronic system, 2020 IEEE INTERNATIONAL CONFERENCE ON AUTOMATION, QUALITY AND TESTING, ROBOTICS (AQTR)
5. Macavei, Sergiu; Rada, Marius; Zagrai, Mioara;Balan, Radu et al., Spectroscopic Characterization of a Lead-Lead Dioxide Automobile Battery ANALYTICAL LETTERS Volume: 51 Issue: 17 Pages: 2671-2681 Published: 2018
6. Macavei, Sergiu; Toloman, Dana; Stefan, Maria; Balan Radu et al., Characterization of Cu2ZnSnS4 Thin Film Deposited by Pulse Laser Deposition 11TH INTERNATIONAL CONFERENCE OF PROCESSES IN ISOTOPES AND MOLECULES (PIM 2017) Book Series: AIP Conference Proceedings Volume: 1917 Article Number: UNSP 040010 Published: 2017
7. Rad, Ciprian-Radu; Hancu, Olimpiu, An improved nonlinear modelling and identification methodology of a servo-pneumatic actuating system with complex internal design for high-accuracy motion control applications SIMULATION MODELLING PRACTICE AND THEORY Volume: 75 Pages: 29-47 Published: JUN 2017
8. Lapusan, Ciprian; Balan, Radu; Hancu, Olimpiu; et al., Development of a Multi-Room Building Thermodynamic Model Using Simscape Library Conference on Sustainable Solutions for Energy and Environment (EENVIRO - YRC) Location: Bucharest, ROMANIA Date: NOV 18-20, 2015 EENVIRO-YRC 2015 - BUCHAREST Book Series: Energy Procedia Volume: 85 Pages: 320-328 Published: 2016
9. Lapusan, Ciprian; Hancu, Olimpiu; Rad, Ciprian; et al., Integrated learning platform based on Lego NXT and Matlab for teaching mechatronics 8th International Conference on Electronics, Computers and Artificial Intelligence (ECAI) Location: Ploiesti, ROMANIA Date: JUN 30-JUL 02, 2016 Book Series: International Conference on Electronics Computers and Artificial Intelligence Published: 2016

Significant solutions:
The development of the Matlab-dSpace research platforms with HIL-Hardware in the Loop, SIL-Software in The Loop, RCP-Rapid Control Prototyping applications
The implementation, testing and optimization of the modern/innovative control technics (state feedback control, optimal control, predictive control);
The optimization of the motion laws (elimination of shocks)-Cartesian robot with pneumatic action, industrial control technology (SPC201, FPC101)
Research on modelling and control of the energy consumption in buildings
Patents: 2

The offer addressed to the economic environment

Research & development	Fundamental research in mechatronics, energy, renewable energy, integronics, trans-disciplinary as well as related fields Team members have great knowledge in mechatronics, energy, renewable energy and related fields. Thus the research base in process control, electronic parts and components design, software design (microcontrollers, DSP, FPGA, PLC etc.), embedded systems, mechanical design, energy efficiency, energy audit, energetic management, sensor network, management and control of industrial processes etc. is assured.
Consulting	Consulting in any of the fields above mentioned may be done Due to a close collaboration with the productive sector, the research team is capable of collaboration with various industrial partners in order to subcontract any applied engineering services and products.
Training	The members of the team are accredited trainers and have a vast experience in the educational field (academics). Also, the team has experience in the development of the professional formation and reorientation trainings for adults.