RESEARCH CENTER FOR INDUSTRIAL ROBOTS SIMULATION AND TESTING

Contact details

Name	**Center For Simulation And Testing For Industrial Robots**
Acronym	**CESTER**
Logo	CESTER CENTER FOR SIMULATION AND TESTING FOR INDUSTRIAL ROBOTS
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Areas of expertise

First approach. Areas of expertise based on CNCS classification
Research venue 1: **TRIBOLOGICAL, RHEOLOGICAL, MECHANISM, MACHINERY, MECHATRONICS**.
Research venue 2: **INDUSTRIAL ENGINEERING**
Research venue 3: **MECHANICAL SYSTEMS FOR ENERGY CONVERSION AND TRANSMISSION**
Second approach. Areas of expertise based on CESTER activities
Area of expertise 1: **Innovative development of robotic structures**
Area of expertise 2: **Simulation of complex systems**
Area of expertise 3: **Modeling and simulation of mechatronic systems with applications in aerodynamics and fluid flow or fluid modeling and simulation**

Team

Prof. Dr. Eng. Doina Pisla, Prof. Dr. Eng. Nicolae Plitea, Prof. Dr. Eng. Tiberiu Itul, Dr. Eng. Calin Vaida, Prof. Dr. Eng. Tiberiu Antal, Assoc. Prof. Dr. Eng. Bogdan Gherman, Prof. Dr. Eng. Adrian Pisla, Prof. Dr. Eng. Liviu Morar, Assoc. Prof. Dr. Eng. Dan Frunza, Prof. Dr. Eng. Dan Opruta, Prof. Dr. Eng. Liviu Vaida, Assoc. Prof. Dr. Eng. Angela Plesa

Representative projects

"Mathematical modeling and experimental researches for the development of a modular parallel robot for minimally invasive surgery", International (Humboldt), (2007-2010)
PARMIS, **"Multidisciplinary development of surgical robots based on parallel structures"**, PNII, http://www.parmis.utcluj.ro/ (2007 - 2010)
HEPSIM, **"Innovative development of an innovative virtual system for e-learning in hepatic surgery"**, PNII, http://www.granturi.umfcluj.ro/hepsim/ (2008-2011)
SHATEMP, **"Adaptive hydraulic systems for small power wind turbines"**, PNII, http://shatemp.tuiasi.ro/ (2007-2010)
CARE-Robotics, **"Creative Alliance in Research and Education focused on Medical and Service Robotics"**, International, Scopes IP Grant, http://www.pupin.rs/RnDProfile/project-care.html
"New methods in the synthesis of hydraulic motors with variable displacement and electro-hydraulic adjustment", CNCSIS, tip A, 1586 (2007-2009)
"Vortex hydrodynamics and applications", CNCSIS - Consortium, 27688 (2005-2008)
PROINS, **"Development of innovative kinematic and dynamic models for parallel robots in surgical applications",** Capacities, Module III, bilateral cooperation, Austria – Romania, (2011-2013)
SIMCOSURG, **"Simulation and control techniques for robots used in minimally invasive surgery"**, Capacities,

Module III, bilateral cooperation, Slovenia-Romania, (2011-2013)
CHANCE, **"Robotic assisted brachytherapy, an innovative approach of inoperable cancers"**, PNII-PT-PCCA, www.cester.utcluj.ro/chance.html (2012-2015)
IOS, **"Instructor Operation Station designed for space applications"**, RDI, Romanian Space Agency (2014-2015)
ROBOCORE, "Robotic assisted prostate biopsy, a high accuracy innovative method", PN-II-PT-PCCA-2013-4-0647, http://cester.utcluj.ro/robocore/index.html (2013-2017)
ACCURATE, "A multi-purpose needle insertion device for the diagnosis and treatment of cancer", PN-II-RU-TE-2014-4-0992, http://cester.utcluj.ro/accurate/ (2015-2017)

Significant results

The most representative publications of the past 5 years:

1. N. Plitea, A. Szilaghyi, D. Pisla, "Kinematic Analysis of a new 5-DOF Modular Parallel Robot for Brachytherapy", *Robotics and Computer Integrated Manufacturing,* vol. 31, 2015
2. N. Plitea, D. Pisla, C. Vaida, B. Gherman, A. Szilaghyi, B. Galdau, D. Cocorean, F. Covaciu "On the kinematics of a new parallel robot for brachytherapy", *Proceedings of the Romanian Academy, Series A,* vol. 15, no. 4, 2014
3. C. Vaida, N. Plitea, D. Cocorean, D. Pisla "*Modeling of new spatial parallel structures with constant platform orientation using planar parallel modules*", vol. 15, no. 1, 2014
4. N. Plitea, D. Lese, D. Pisla, C. Vaida, "Structural design and kinematics of a new parallel reconfigurable robot", *Robotics and Computer Integrated Manufacturing*, vol. 29, no. 1, 2013
5. D. Pisla, B. Gherman, C. Vaida, M. Suciu, N. Plitea, "An active hybrid parallel robot for minimally invasive surgery", *Robotics and Computer-Integrated Manufacturing*, vol. 29, no. 4, 2013
6. C. Vaida, N. Plitea, D. Pisla, B. Gherman, "Orientation module for surgical instruments - A systematical approach", in *Meccanica*, vol. 48, no. 1, 2013
7. D. Pisla, A. Szilaghyi, C. Vaida, N. Plitea, "Kinematics and Workspace Modeling of a New Hybrid Robot Used in Minimally Invasive Surgery", in *Robotics and Computer Integrated Manufacturing*, vol. 29, no. 2, 2013
8. D. Pisla, B. Gherman, C. Vaida, N. Plitea, "Kinematic modelling of a 5-DOF hybrid parallel robot for laparoscopic surgery", in *Robotica, Cambridge University Press*, 2012, pp.1-13
9. L. Vaida, D. Banyai, P. A. O. Adegbuyi, J. O. Uhomoibhi, "Engineering Studies of The Control Structure of Electro-Hydraulic Pumps And Variable Axial Pistons", in *International Journal of Scientific & Technology Research*, vol. 1, no. 8, 2012

Patents:
1. Plitea, N., Pîslă, D., Vaida, C., Gherman, B.: „Robot chirurgical", Brevet RO 126271, 2012

The offer addressed to the economic environment

Research & development	**Mechanisms synthesis** Through its specialists, CESTER research center develops advanced studies in the field of synthesis of new conceptual models of mechanisms with complex structure, focused on parallel architectures. **Fluid Flow Modeling** CESTER Research Center has experience in modeling classical fluid flow and non-Newtonian fluids **Medical Robotics** With over 7 years of experience in the field of invasive medical robotics CESTER is expressing interest in further cooperation in this field, of developing of optimized robotic systems for a given application. **Precision Robotics and Micro-robotics** The development of innovative solutions for robots, micro-robots and reconfigurable structures with parallel architecture with applications in various fields including.
Consulting	**Competitive Design** Through its collective experience, CESTER provides advice in designing competitive products. **Management of production systems** Production planning and new product developments are major challenges in nowadays industrial setup and often a wrong decision can lead to disastrous results. CESTER experts provide advice to streamline these activities. **High power drives** High power drives are achieved almost exclusively hydraulically. CESTER specialists have experience embodied in numerous collaborative projects with industrial partners to develop applications on this subject. **Renewable Energy** One of the modern approaches in the field of renewable energies is based on the development of micro and mini-hydraulic plants on rivers, where the kinetic component of the mechanical energy of the water flow is exploited. The specialists from CESTER offer consultancy in the design and development of such solutions.
Training	Through its **training center**, CESTER offers those interested in advanced training Solid Edge and Siemens NX courses as well as basic courses in control systems with the B & R Automation Platform.