

RESEARCH CENTER FOR INDUSTRIAL ROBOTS SIMULATION AND TESTING

Contact details

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Areas of expertise

Innovative development of intelligent robotic systems with complex structures, focused on parallel architectures.
 Intelligent medical robots: development of application based intelligent robotic systems and instrumentation for minimally invasive surgery, targeted diagnosis and treatment of cancer tumors, rehabilitation of patients with neuromotor deficiencies.
 Advanced adaptive control solutions, including tele-robotics.
 Virtual and augmented reality and development of algorithms based on Artificial Intelligence solutions.
 Modeling and Simulation technologies of complex systems.

Team

Senior researchers: Prof. Doina Pisla; Prof. Nicolae Plitea; Prof. Adrian Pisla; Prof. Calin Vaida; Prof. Tiberiu Antal; Assoc. Prof. Bogdan Gherman; Assoc. Prof. Ovidiu Detesan; Assoc. Prof. Radu Morariu.
Postdoctoral researchers: Florin Covaciu, PhD; Paul Tucan, PhD; Eng. Iuliu Nadas, PhD; Eng. Nicoleta Pop, PhD; Eng. Alin Burz, PhD; Eng. Alexandru Banica, PhD; Eng. Ionut Ulinici, PhD.
Doctoral researchers: Alexandru Pusca; Ionut Zima; Jefe Nagy; Alin Horia; Dragos Sebeni; Vasile Bulbucan; Andrei Cailean; Andrei Caprariu; Mariu Miclaus; Stefan Vegh.

Representative projects

ATHENA, "New smart and adaptive robotics solutions for personalized minimally invasive surgery in cancer treatment", PNRR-2023, Code CF 116/15.11.2022, (2023-2026)
ASKLEPIOS, "New frontiers in adaptive modular robotics for patient - centered medical rehabilitation", PNRR-2023, Code CF 121/15.11.2022, (2023-2026)
APOLLO, "Intelligent telerobotic systems for the personalised treatment of neuromotor deficit to increase the patients quality of life", PTI-2022 (Technologic Transfer), MySMIS code 155988, (2023)
MAN-X, "Exoskeleton structure for human augmentation", 1-PSCD/2022, (2022-2025)
CHALLENGE, "New frontiers in robotic assisted single port surgery: a novel robotic system with dexterous instruments", Code PN-III-P4-ID-PCE-2020-0572-PCE-171, (2021-2023)
Enhance, "Innovative safe robotic system for enhanced patient-centered treatment of liver cancers", Code PN-III-P2-2.1-PED2021-2790, (2022-2024)
Hope2Walk, "An innovative modular rehabilitation robot for the efficient therapy of lower limb motor deficit", Code: PN-III-P2-2.1-PED2021-3430, (2022-2024)
Wisdom of Age, "A Seniors Digital Platform for Knowledge Transfer towards Industrial Companies", Code AAL-2020-7-83-CP, (2021-2023)
IMPROVE, "Innovative approach precision on robotic assisted surgical treatment of liver tumors based on integrated diagnostic imaging molecular", Code PN-III-P1-1.2-PCCDI 2018, (2018-2020)
AGEWELL, "Innovative approaches rehabilitation and Assistive Robotics for Healthy Ageing", POC project ID37_215, MySMIS code 103415, (2016-2020)
INNOHEALTH, "An innovative robotic system for upper limb rehabilitation", RIS 2019 Innovation Call, 21540/07.08.2019, EIT Health (2019)
TASUK, "Manipulation Systems for Sample Handling in a Sample Receiving Facility", TASUK/16/11305/NBO/1424, ESA European Space Agency (2015-2020)

Significant results

The most representative publications of the past 5 years (10 selected papers):

1. Pisla, D.; Pusca, A.; Gherman, B.; Pisla, A.; Birlescu, I.; Tucan, P.; Vaida, C.; Chablat, D. Modeling and Simulation of a Novel Parallel Robotic System for Minimally Invasive Pancreatic Surgery. *Journal of Mechanisms and Robotics*, 18(2), 024501, 2026, (IF:3.2).
2. Pisla, D.; Popa, C.; Pusca, A.; Ciocan, A.; Gherman, B.; Mois, E.; Cailean, A.-D.; Vaida, C.; Radu, C.; Chablat, D. On the Control and Validation of the PARA-SILSROB Surgical Parallel Robot. *Appl. Sci.*, 14, 7925, 2024, (IF: 2.5)
3. Pisla, D.; Bulbucan, V.; Hedesiu, M.; Vaida, C.; Zima, I.; Mocan, R.; Tucan, P.; Dinu, C.; Pisla, D.; TEAM Project Group. A Vision-Guided Robotic System for Safe Dental Implant Surgery. *J. Clin. Med.*, 13, 6326, 2024, (IF: 3)
4. Vaida, C.; Rus, G.; Tucan, P.; Machado, J.; Pisla, A.; Zima, I.; Birlescu, I.; Pisla, D. Enhancing Robotic-Assisted Lower Limb Rehabilitation Using Augmented Reality and Serious Gaming. *Appl. Sci.* 2024; 14(24):12029, (IF: 2.5).
5. Birlescu, I.; Tohanean, N.; Vaida, C.; Gherman, B.; Neguran, D.; Horsia, A.; Tucan, P.; Condurache, D.; Pisla, D.; Modeling and analysis of a parallel robotic system for lower limb rehabilitation with predefined operational workspace. *Mechanism and Machine Theory*, 198, 105674, 2024, (IF: 4.5).
6. Pisla, D.; Hajjar, N.A.; Gherman, B.; Radu, C.; Antal, T.; Tucan, P.; Literat, R.; Vaida, C. Development of a 6-DOF Parallel Robot for Potential Single-Incision Laparoscopic Surgery Application. *Mach.* 2023; 11(10):978, (IF: 2.1).
7. Pisla, D.; Crisan, N.; Gherman, B.; Andras, I.; Tucan, P.; Radu, C.; Pusca, A.; Vaida, C.; Al Hajjar N. Safety Issues in the Development of an Innovative Medical Parallel Robot Used in Renal Single-Incision Laparoscopic Surgery. *Journal of Clinical Medicine.* 2023; 12(14):4617, (IF: 3).
8. Tucan, P.; Vaida, C.; Horvath, D.; Caprariu, A.; Burz, A.; Gherman, B.; Iakab, S.; Pisla, D. Design and Experimental Setup of a Robotic Medical Instrument for Brachytherapy in Non-Resectable Liver Tumors. *Cancers.* 2022; 14(23):5841, (IF: 4.5).
9. Tucan, P.; Vaida, C.; Horvath, D.; Caprariu, A.; Burz, A.; Gherman, B.; Iakab, S.; Pisla, D. (c.a.) Design and Experimental Setup of a Robotic Medical Instrument for Brachytherapy in Non-Resectable Liver Tumors. *Cancers* 2022, 14, 5841, 2022, (IF: 6.575)
10. Tucan, P.; Vaida, C.; Ulinici, I.; Banica, A.; Burz, A.; Pop, N.; Birlescu, I.; Gherman, B.; Plitea, N.; Antal, T.; Carbone, G.; Pisla, D. Optimization of the ASPIRE Spherical Parallel Rehabilitation Robot Based on Its Clinical Evaluation. *Int. J. Environ. Res. Public Health* 2021, 18, 3281. (IF 4.614)
11. Vaida, C.; Birlescu, I.; Pisla, A.; Ulinici I.; Tarnita, D.; Carbone, G.; Pisla, D. "Systematic Design of a Parallel Robotic System for Lower Limb Rehabilitation", *IEEE ACCESS*, vol. 8, 34522(15), 2020 (IF: 4.098)
12. Husty, M.; Birlescu, I.; Tucan, P.; Vaida, C.; & Pisla, D. An algebraic parameterization approach for parallel robots analysis. *Mechanism and Machine Theory*, 140, 245–257, 2019, (IF: 4.93)

Patents:

1. Gherman, B., Birlescu, I., Burz, A., Pisla, D.: Automated medical instrument for the insertion of multiple needles on trajectories in the treatment of cancer by interstitial brachytherapy, RO-134941 (2024)
2. Pisla, D., Vaida, C., Gherman, B., Tucan, P.: Parallel robot for the laparoscopic treatment of liver cancer, RO-134189 (2024)
3. Pisla, D., Birlescu, I., Vaida, C., Gherman, B., Tucan, P., Carbone, G., Plitea, N.: Parallel robot for lower limb rehabilitation, Decision No. 4.3/163 from 28/05/2021
4. Pisla D., Gherman B., Nadas I., Pop N., Craciun F., Tucan P., Vaida C., Carbone G.: Innovative paralel robot for lower limb rehabilitation, Decision No. 4.3/164 from 28/05/2021
5. Vaida, C., Plitea, N., Pisla, D., Carbone, G., Gherman, B., Ulinici, I., Pisla, A., Spherical robot for medical rehabilitation of proximal area of upper limb, RO-132233 (2020)
6. Gherman, B., Pisla, D., Plitea, N., Vaida, C., Carbone, G., Pisla A., Parallel robotic system for medical rehabilitation of upper limb, RO-132234 (2020)

Significant products:

1. Innovative parallel robotic system for pancreatic cancer – Athena parallel robot, 2025
2. Innovative robotic system for lower limb rehabilitation – LegUp, 2024
3. Innovative robotic system for single incision laparoscopic surgery – PARASILS-ROB, 2023
4. Intelligent medical parallel robot for lower limb rehabilitation – RECOVER, 2022
5. Innovative safe robotic system for enhanced patient-centered treatment of liver cancers – PROHEP-LCT, 2020
6. Intelligent medical parallel robot for lower limb spatial rehabilitation – RAISE, 2020
7. Intelligent medical parallel robot for upper limb rehabilitation – ASPIRE, ParReEx, 2019 (validated clinically in two hospitals)

The offer addressed to the economic environment

Research & development	<p>Medical Robotics Development, testing validation and technological transfer of intelligent, application oriented robotic systems and instrumentation</p> <p>Adaptive control solutions including AR/VR/AI integration Development of intelligent control solutions, including human-centered approaches and multi-modal</p> <p>Precision Robotics and Micro-robotics The development of innovative solutions for parallel robots, micro-robots and reconfigurable structures with parallel architecture for industrial applications interactive interfaces</p> <p>Mechanisms synthesis Advanced studies in the field of synthesis of new conceptual models of mechanisms with complex structure, focused on parallel architectures, modelling, design, digital twin validation, numeric and generative design optimizations</p>
Consulting	Product Lifecycle Management. Consultancy in product and process development using competitive tools and the new concepts of Design for X, IoT, Digital Twin
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