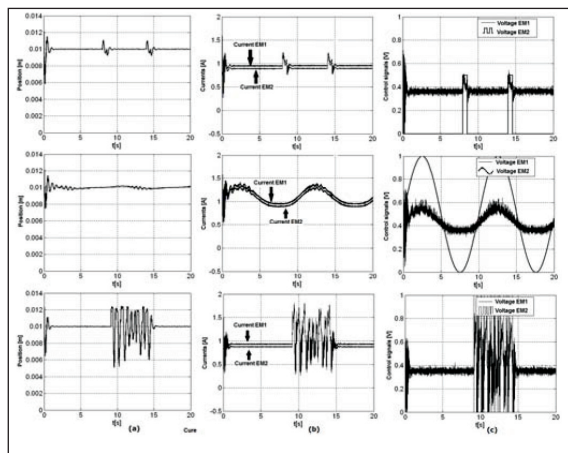


Goal of the project: Development of control structures and algorithms and optimal tuning of fuzzy models for a wide range of industrial processes, mechatronics, mobile robots and automotive applications.

Short description of the project:

The project aims at:

- Advanced control structures for automotive and mechatronics applications.
- Improvement and development of new Takagi Sugeno (T-S) fuzzy models and control solutions for a wide range of industrial processes.
- Optimal tuning of fuzzy models for automotive and mechatronics applications.
- Improvement and development of control algorithms for mobile robots.



Project implemented by:

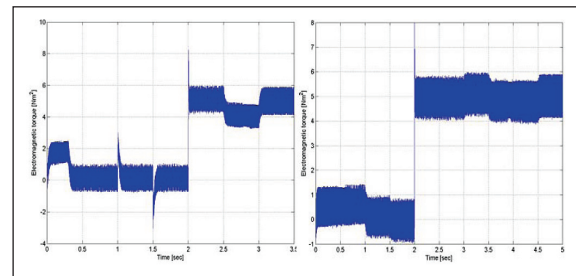
- Department of Automation and Applied Informatics as the P1 partner, coordinator: "Gheorghe Asachi"
 - Technical University of Iasi (TUIASI), P2 partner:
 - S.C. ROMUS Trading & Development SRL, director: Prof. Dr. Eng. Silvia Curteanu (TUIASI).
- http://www.romus.com/proiecte/asachi/pages/pages/phpsite_index.php

Implementation period: 2012-2015.

Main activities: Design of low-cost T-S state feedback fuzzy controllers for the position control of a class of nonlinear servo systems.

Sensitivity analysis with respect to the process parametric variations in the low-cost controller designs for vehicle power train systems with spark-ignition engine and continuously variable transmission.

Modelling, simulation, analysis and design of linear, fuzzy and variable structure control solutions for direct current electric drive systems with continuously variable reference input, variable moment of inertia and variable load disturbance input, applicable to rolling mills and to strip winding systems.



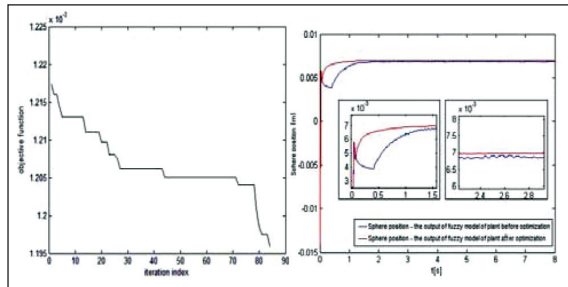
Development and experimental validation of simple T-S fuzzy models for several processes in automotive and mechatronics: anti-lock braking systems, nonlinear DC drive servo systems, magnetic levitation systems, electromagnetic actuated clutch systems, inverted pendulums.

Development of two-degree-of-freedom linear and fuzzy controllers, of hybrid T-S fuzzy controllers, of hybrid PI neuro-fuzzy controllers and of adaptive sliding mode fuzzy controllers for speed and position control of brushless DC drives with variable parameters.

"Research consists in seeing what everyone else has seen, but thinking what no one else has thought."

Albert Szent-Gyorgyi

Optimal tuning of parameters of T-S fuzzy models using nature-inspired algorithms: simulated annealing, particle swarm optimization, gravitational search algorithms.

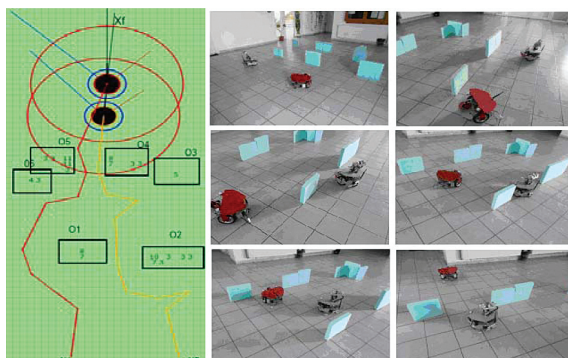


Continuous development of the nRobotic platform in the framework of path planning and collision avoidance for mobile robots in missions.

Derivation and testing of a new path planning algorithm as an extension of the vector field histogram algorithm.

Results:

- 4 papers published in ISI journals with impact factors.
- 2 papers published in journals indexed by international databases.
- 13 papers published in conference proceedings indexed by international databases.
- more than 50 independent citations in 2012.



Fields of interest:

control algorithms, optimal tuning, fuzzy models, automotive, mechatronics, mobile robots, networked control systems, Programmable Logic Controllers, real-time programming, image processing.

Financed through/by:

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

Research team: Prof. Dr. Eng. Radu-Emil Precup - director, Prof. Dr. Eng. Stefan Preitl, Prof. Dr. Eng. Ioan Filip, Assoc. Prof. Dr. Eng. Florin Drăgan, Assist. Prof. Dr. Eng. Adriana Albu, Assist. Prof. Dr. Eng. Ovidiu Baniaş, Assist. Prof. Dr. Eng. Daniel Iercan, Assist. Prof. Dr. Eng. Claudia-Adina Dragoş, Assist. Assist. Prof. Dr. Eng. Mircea-Bogdan Rădac, PhD student M.Sc. Eng. Alexandra-Iulia Stinean, PhD student M.Sc. Eng. Lucian-Ovidiu Fedorovici, PhD student M.Sc. Eng. Constantin Purcaru.

Research centre: Research Centre for AutomaticSystems Engineering (CCISA).

<http://www.aut.upt.ro/centrucercetare/index.EN.php>

Applicability and transferability of the results:

Nature-inspired optimization algorithms in modelling and control design, low-cost solutions for control problems in mechatronics, electrical drives, automotive and robotics, tools for the modelling, optimization and design of fuzzy control systems, real-time programming and operating systems for control and robotics.

Contact information:

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