

## NEW PERFORMANCE IMPROVEMENT TECHNIQUES OF CONTROL SYSTEMS USING EXPERIMENT-BASED TUNING

### Goal of the project

Enhance the existing techniques and develop new techniques dedicated to the improvement of control system performance using experimental data.

### Short description of the project

The project aims:

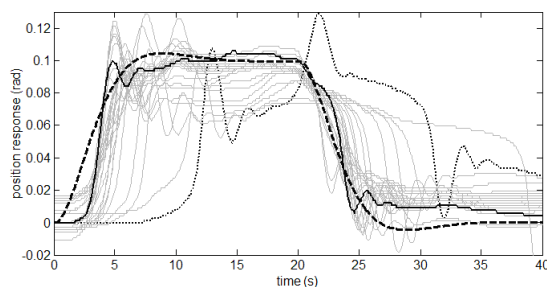
- Enhancement and development of data-based (datadriven) techniques and algorithms for the improvement of control system performance using experimental data.
- Enhancement and development of nature-inspired algorithms in optimization of control system performance.
- Development of Optical Character Recognition (OCR) applications.
- Development of new fuzzy control solutions for a wide range of industrial processes.

### Project implemented by

Department of Automation and Applied Informatics  
<http://www.aut.upt.ro/~rprecup/grant2011.htm>

### Implementation period

2011-2014



### Main activities

Experiment-based approaches to Reference Trajectory Tracking optimal control problems with constraints.

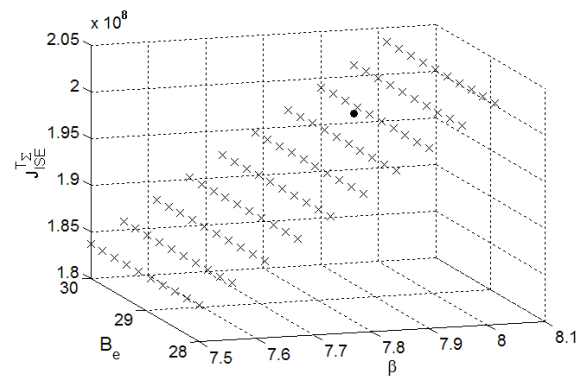
Validation of iterative techniques on laboratory equipment by speed and position control of nonlinear servo systems, and of aerodynamic systems.

Enhancement of control system performance by fuzzy control and Iterative Feedback Tuning.

Enhancement of nature-inspired algorithms such as Charged System Search and Gravitational Search Algorithms by adaptation.

Proportional-integral and fuzzy controller tuning to ensure a reduced sensitivity with respect to process parametric variations.

Enhancement of training algorithms of neural networks by Iterative Learning Control and by mixed Back-Propagation and nature-inspired approaches applied to automatic control and Optical Character Recognition.

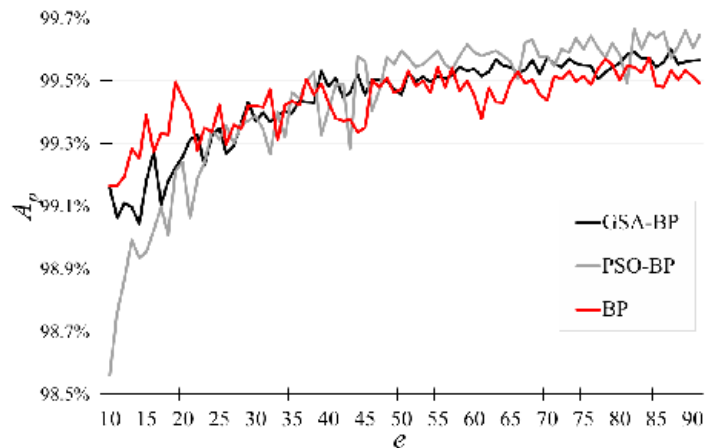
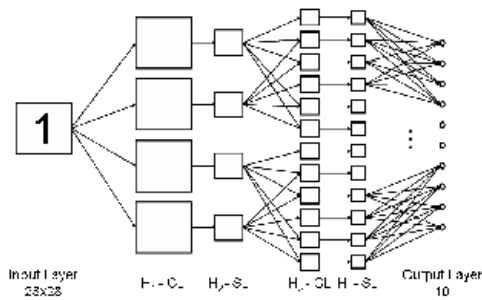


### Results

- Please visit <http://www.aut.upt.ro/~rprecup/grant2011.html>.
- 7 papers (ISI) published in journals with impact factors in 2013 (out of 21 reported for the research contract in 2012).
- 1 journal paper indexed by international database (Zentralblatt Math)
- 2 book chapters published in Springer-Verlag volumes.
- 11 papers published in conference proceedings indexed by international databases.
- 29 independent citations received in 2013 for the papers reported in the research contract in 2011-2013.

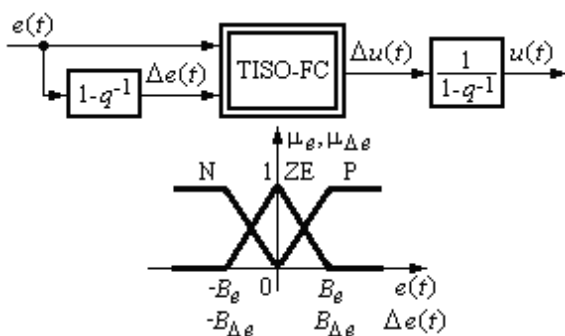
## Applicability and transferability of the results

Control systems with a reduced parametric sensitivity, tools for the computer-aided design of controllers, computer-aided techniques in iterative data-based control, nature-inspired optimization algorithms in control design and image processing, tools for the systematic development of fuzzy control systems.



## Fields of interest

Control systems, optimization, motion control, data-driven control, robotics, nature-inspired algorithms, optical character recognition, fuzzy control.



## Research centre

Research Centre for Automatic Systems Engineering (CCISA)

## Financed through/by

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## Research team

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