

## NATURE-INSPIRED MODELING AND OPTIMIZATION TECHNIQUES OF FUZZY CONTROL SYSTEMS WITH MECHATRONICS APPLICATIONS

### Goal of the project

The aim of this project is to demonstrate efficiency and prove the viability of an innovative tuning approach for fuzzy control systems using nature-inspired algorithms in control structures modeling and optimization stages. In this framework, combining nature-inspired optimization algorithms with fuzzy control structures, will have a significant impact on the performance of fuzzy control systems.

### Short description of the project

The nature-inspired optimization algorithms will be employed in solving optimization problems that minimize discrete-time objective functions expressed as integral or sum-type quadratic performance indices.

### Project implemented by

Politehnica University Timișoara

### Implementation period

19.10.2018 - 18.10.2020

### Main activities:

The main activities are:

1. Development of efficient control solutions for different processes by bypassing the higher derivative calculations;
2. Takagi-Sugeno fuzzy controllers' optimization through minimization of several objective functions;
3. Development of performant solutions with a reduced implementation cost;
4. Experimental validation of proposed control solutions;
5. Achievements dissemination in high visibility journals and conferences;
6. Successful project management administration.

### Results

The main results are related to development of nature inspired algorithm-based solutions for solving optimization problems of fuzzy systems will be disseminated at national and international levels as: four papers published in Thomson Reuters Web of Science (formerly known as ISI Web of Knowledge) publications and four presentations at international conferences.

### Applicability and transferability of the results

The results obtained during this contract belong exclusively to Politehnica University Timișoara.

### Financed through/by

Executive Agency for Higher Education, Research, Development and Innovation Funding

### Research Centre

Faculty of Automation and Computers

### Research team

Eng. Radu-Codruț DAVID, PhD  
Prof. eng. Stefan PREITL, PhD

### Contact information

Eng. Radu-Codruț DAVID, PhD  
Faculty of Automation and Computers  
Department of Automation and Applied Informatics  
Address: Bd. V. Parvan 2, 300223 Timisoara, Romania  
Phone: (+40) 722 254450  
E-mail: davidradu@gmail.com  
Web: aut.upt.ro