

# FACULTY OF AUTOMATION AND COMPUTERS



**Bd. Vasile Pârvan, No. 2**  
**300223 – Timișoara, Romania**  
**Tel: +40-256-403211, +40-256-403212**  
**Fax: +40-256-403214**

**E-mail: [decanat@ac.upt.ro](mailto:decanat@ac.upt.ro)**  
**Web: [www.ac.upt.ro](http://www.ac.upt.ro)**



# RESEARCH GROUP IN AUTOMATION AND COMPUTERS

## GENERAL PRESENTATION

The main aim of the group is to develop high-level research in the fields of automatic control, computer and software engineering and information technology. It offers the research results in these fields to interested companies and organizations all over the world.

Research Group in Automation and Computers is organized in two research centre:

➤ *Automatic Systems Engineering Research Centre*

Head of centre: **Prof. Dr. Eng. Radu-Emil PRECUP**

➤ *Computer Science and Engineering Research Centre*

Head of centre: **Prof. Dr. Eng. Vladimir Crețu**

## AUTOMATIC SYSTEMS ENGINEERING RESEARCH CENTRE

### CONTACT

**Prof. Dr. Eng. Radu-Emil PRECUP**, recipient of the *Grigore Moisil* Prize of the Romanian Academy for his contribution on fuzzy control.

Faculty of Automation and Computers

Department of Automation and Applied Informatics

Bd. Vasile Pârvan, no. 2

300223 Timișoara, Romania

Tel: +40-256-403229, +40-256403226

Fax: +40-256-403214

E-mail: [radu.precup@aut.upt.ro](mailto:radu.precup@aut.upt.ro)

Web: <http://www.aut.upt.ro/~rprecup/>

<http://www.aut.upt.ro/centru-cercetare/index.EN.php>

### Research in *PROCESS CONTROL*

### RESEARCH TEAM

- Prof. dr. eng. Stefan Preitl, head of the team
- Prof. dr. eng. Radu-Emil Precup
- Assoc. prof. dr. eng. Florin Drăgan
- Assist. dr. eng. Daniel Iercan
- Assist. eng. Emil Voișan
- Dr. eng. Claudia-Adina Dragoș
- Dr. eng. Mircea-Bogdan Rădac
- Eng. Lucian Ovidiu Fedorovici, PhD student
- Eng. Alexandra-Iulia Sfînean, PhD student
- Eng. Constantin Purcaru, PhD student

### RESEARCH FIELDS

- Conventional control system structures
- Advanced control systems

- Networked control systems and Programmable Logic Controllers
- Real-time programming and operating systems with applied to control systems and robotics.

### KEYWORDS

Fuzzy logic control; iterative methods; data-based control; sliding mode control; intelligent systems; optimization; nature-inspired algorithms; 2-DOF control; stability analysis; sensitivity analysis; robustness; convergence; robotics; servo systems; mechatronics applications; embedded systems; signal processing; image processing; remote control; real-time programming.

### MAIN ACTIVITIES

- Development of conventional and advanced control systems
- Signal processing in control systems
- Optimization based on nature-inspired algorithms
- Soft computing in industrial applications
- Development of control systems for servo systems, mechatronics applications and mobile robots
- Hard real-time control and remote control
- Image processing

### RESULTS

#### PUBLISHED PAPERS

1. Rădac M.-B., Precup R.-E., Petriu E.M., Preitl St., *Application of IFT and SPSA to Servo System Control*, IEEE Transactions on Neural Networks, ISSN 1045-9227, 2011, vol. 22, no. 12, part 2, pp. 2363-2375. (IF = 2.624)
2. Precup R.-E., Hellendoorn H., *A Survey on Industrial Applications of Fuzzy Control*, Computers in Industry (Elsevier Science), ISSN 0166-3615, 2011, vol. 62, no. 3, pp. 213-226. (IF = 1.620)
3. Precup R.-E., Preitl St., Rădac M.-B., Petriu E.M., Dragoș C.-A., Tar J.K., *Experiment-Based Teaching in Advanced Control Engineering*, IEEE Transactions on Education, ISSN 0018-9359, 2011, vol. 54, no. 3, pp. 345-355. (IF = 1.157)
4. Precup R.-E., Tomescu M.-L., Petriu E.M., Dragomir L.-E., *Stable Fuzzy Logic Control of Generalized Van der Pol Oscillator*, International Journal of Artificial Intelligence (CESER Publications), ISSN 0974-0635, 2011, vol. 7, no. A11, pp. 36-46.

5. Haidegger T., Kovács L., Preitl St., Precup R.-E., Benyó B., Benyó Z., *Controller Design Solutions for Long Distance Telesurgical Applications*, International Journal of Artificial Intelligence (CESER Publications), ISSN 0974-0635, 2011, vol. 6, no. S11, pp. 48-71.
6. Precup R.-E., Tomescu M.-L., Preitl St., Petriu E.M., Fodor J., Paul A.S., *Stable Design of Takagi-Sugeno Fuzzy Controllers for a Laboratory Three-Tank System*, International Journal of Nuclear Knowledge Management (Inderscience Publishers), ISSN 1479-540X, 2011, vol. 5, no. 2, pp. 126-147.
7. Precup R.-E., Tomescu M.-L., Preitl St., Petriu E.M., Dragoş C.A., *Stability Analysis of Fuzzy Logic Control Systems for a Class of Nonlinear SISO Discrete-Time Systems*, Preprints of 18th IFAC World Congress, Milano, Italy, Aug. 2011, pp. 13612-13617.
8. Dragoş C.-A., Preitl St., Precup R.-E., Petriu E.M., Stînean A.-I., *A Comparative Case Study of Position Control Solutions for a Mechatronics Application*, Proc. 2011 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM'11), Budapest, Hungary, ISSN 2159-6247, ISBN 978-1-4577-0838-1, July 2011, pp. 814-819.
9. Rădac M.-B., Grad R.-B., Precup R.-E., Petriu E.M., Preitl St., Dragoş C.-A., *Mixed Virtual Reference Feedback Tuning - Iterative Feedback Tuning: Method and Laboratory Assessment*, Proc. 20th IEEE International Symposium on Industrial Electronics (ISIE 2011), Gdansk, Poland, ISBN 978-1-4244-9310-4, June 2011, pp. 649-654.
10. Rădac M.-B., Precup R.-E., Petriu E.M., Ianc P.A., Preitl St., Dragoş C.-A., *Low-Cost Optimal State Feedback Fuzzy Control of Nonlinear Second-Order Servo Systems*, Proc. 2011 IEEE International Conference on Computational Intelligence for Measurement Systems and Applications (CIMSA 2011), Ottawa, ON, Canada, ISSN 2159-1547, ISBN 978-1-61284-924-9, Sep. 2011, pp. 103-106.
11. Rădac M.-B., Enache F.-C., Precup R.-E., Petriu E.M., Preitl St., Dragoş C.-A., *Previous and Current Cycle Learning Approach to a 3D Crane System Laboratory Equipment*, Proc. 15th International Conference on Intelligent Engineering Systems (INES 2011), Poprad, Slovakia, ISBN 978-1-4244-8954-1, June 2011, pp. 197-202.
12. Stînean A.-I., Preitl St., Precup R.-E., Pozna C., Dragoş C.-A., Rădac M.-B., *Speed and Position Control of BLDC Servo Systems with Low Inertia*, Proc. 2nd International Conference on Cognitive Infocommunications (CogInfoCom 2011), Budapest, Hungary, ISBN 978-1-4577-1806-9, July 2011, pp. 1-10
13. Fedorovici L.-O., Drăgan F., *A Comparison Between a Neural Network and a SVM and Zernike Moments Based Blob Recognition Modules*, Proc. 6th IEEE Int. Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 253-258.
14. Fedorovici L.-O., *A Comparison Between Two Character Recognition Approaches*, Facta Universitatis Series: Automatic Control and Robotics, ISSN 1820-6417, 2011, vol. 10, no 2, pp. 125-140.

## RESEARCH GRANTS AND PROJECTS

### National grants and projects

1. Research Grant of the National Centre for Programme Management (CNMP), Type PN2 Partnerships in Priority R&T Domains, project number 12100 / 01.10.2008. Title: *Real-Time Informatics Technologies for Embedded-System-Control of Power-Train in Automotive Design and Applications (SICONA)*. Period: 2008-2011. Partners: "Politehnica" University of Timisoara (PUT) – P2, "Gh. Asachi" Technical University of Iasi (TUI) – coordinator, Politehnica University of Bucharest – P1, SC Siemens VDO Automotive – P3. Director: Prof. dr. eng. Corneliu Lazăr (TUI), director of PUT partner (P2): Prof. dr. eng. Radu-Emil Precup. Granted value in 2011: 75971 Lei.

Research team: Prof. Radu-Emil Precup – director of PUT partner (P2), Prof. Stefan Preitl, Assoc. Prof. Florin Drăgan, Lect. Dan Ungureanu-Anghel, Assist. Prof. Daniel Iercan, Assist. Prof. Emil Voişan, Dr. Mircea-Bogdan Rădac, Dr. Claudia-Adina Dragoş, Teaching Assist. Lucian-Ovidiu Fedorovici.

2. Research Grant of the National Authority for Scientific Research (CNCS) – UEFISCDI, Type Ideas, project number PN-II-ID-PCE-2011-3-0109. Title: *New Performance Improvement Techniques of Control Systems Using Experiment-Based Tuning*. Period: 2011-2014. Director: Prof. dr. eng. Radu-Emil Precup. Total granted value: 1461600 Lei, granted value in 2011: 100080 Lei.

Research team: Prof. Radu-Emil Precup – director, Prof. Stefan Preitl, Assoc. Prof. Florin Drăgan, Assist. Prof. Daniel Iercan, Dr. Mircea-Bogdan Rădac, Dr. Claudia-Adina Dragoş, Teaching Assist. Lucian-Ovidiu Fedorovici, PhD student Alexandra-Iulia Stînean.

### PERSPECTIVE DOMAINS

- Methods for the algorithmic design of conventional and intelligent controllers (fuzzy, neural, genetic, sliding mode)
- Methods for signal processing and computer-aided design of control systems
- Analysis and development of intelligent systems
- Solutions for the automatic design of model-free control structures
- Iterative data-based control and nature-inspired optimization
- Control solutions for mechatronics, power systems, electrical drives, general industrial automation, mobile robots

### STRATEGIC PRIORITIES

- Control systems with imposed sensitivity
- Tools for computer-aided design of 2-DOF controllers
- Computer-aided techniques in iterative data-based control
- Low cost solutions for control problems dedicated to mechatronics and mobile robots
- Derivative-free optimization in modeling and control design
- Methods and tools to enable the systematic development of fuzzy control systems



### CONTACT

Prof. dr. eng. Stefan Preitl  
Prof. dr. eng. Radu-Emil Precup

Faculty of Automation and Computers  
Department of Automation and Applied Informatics  
Bd. Vasile Parvan, no. 2  
300223 Timișoara, Romania  
Tel: +40-256-40-3229, -3224  
Fax: +40-256-40-3214  
E-mail: {stefan.preitl, radu.precup}@aut.upt.ro  
Web: <http://www.aut.upt.ro/~spreitl/>,  
<http://www.aut.upt.ro/~rprecup/>

### Researches in RENEWABLE ENERGY, SENSOR NETWORKS, SYSTEM IDENTIFICATION, ADAPTIVE SYSTEMS

#### RESEARCH TEAM

- Prof. dr. eng. Octavian Proștean, head of team
- Prof. dr. eng. Nicolae Budișan
- Prof. dr. eng. Ioan Filip
- Lecturer dr. eng. Iosif Szeidert
- Lecturer dr. eng. Cristian Vașar
- Lecturer dr. eng. Dan Ungureanu
- Assist. eng. Andreea Robu, PhD student
- Assist. eng. Radu Boraci, PhD student
- Eng. Cosmin Koch-Ciobotaru, PhD student
- Eng. Gelu Ovidiu Tirian, PhD student

#### RESEARCH FIELDS

- Unconventional energetic
- Wireless sensor networks
- System modeling, identification and simulation
- Neural networks and fuzzy systems
- Adaptive control systems
- Distributed databases

#### KEYWORDS

Renewable energy; wireless sensor networks; modeling; identification and simulation of systems; neural networks and fuzzy systems; wind energy conversion systems; unconventional energetic; adaptive control; self-tuning; databases.

#### MAIN ACTIVITIES

- Modeling, simulation and development of wind energy conversion systems (WECS)
- Identification and parameter estimation of electrical machines (asynchronous and synchronous)
- Development of new enhanced electrical machines types
- Development of control systems for WECS
- Control software development in industrial applications
- Modeling and simulation of systems with neural networks
- Development of WECS software
- Development of adaptive control structures
- Applications based on wireless sensor networks
- Development of applications based on distributed databases

#### RESULTS

##### PUBLISHED PAPERS

1. Filip I., Szeidert I., Proștean G., Vașar C., *Issues Regarding Mathematical Modeling of Wind Aggregates*, Proc. 9th IEEE Symp. on Applied Machine Intelligence and Informatics

- (SAMI 2011), Smolenice, Slovakia, ISBN 978-1-4244-7429-5, Jan. 2011, pp. 23-26.
2. Tirian G.O., Prostean O., Filip I., Pinca Bretotean C., *Modeling and Simulation of Primary Solidification Process of Steel*, Proc. 9th IEEE Symposium on Applied Machine Intelligence and Informatics (SAMI 2011), Smolenice, Slovakia, ISBN 978-1-4244-7429-5, Jan. 2011, pp. 311-316.
  3. Koch Ciobotaru C., Boraci R., Filip I., Vasar C., *Study of Brake Transient Regimes for a Small Wind Generator*, Proc. IEEE 3rd International Symp. on Exploitation of Renewable Energy Sources (EXPRES 2011), Subotica, Serbia, ISBN 978-1-4577-0097-2, March 2011, pp. 85-89.
  4. Filip I., Prostean O., Ionescu D., Vasar C., Szeidert I., *Study Above an Adaptive Control Structure with Application to a Double-Fed Induction Generator's Excitation*, Proc. IEEE International Conference on Computer as a Tool (EUROCON 2011), Lisabona, Portugalia, ISBN 978-1-4244-7486-8, April 2011, pp. 1-4.
  5. Vasar C., Prostean G., Filip I., Szeidert I., *Above Increasing Autonomy of Wireless Sensor Networks Used for Windmill Monitoring*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, ISBN 978-1-4244-9108-7, May 2011, pp. 607-610.
  6. Szeidert I., Filip I., Borza I., Vasar C., *Numerical Simulation of a Self-Tuning Control Structure Applied on Double Winded Induction Machine's Excitation*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, ISBN 978-1-4244-9108-7, May 2011, pp. 603-606.

## RESEARCH GRANTS AND PROJECTS

### National grants and projects

1. EEA research grants "*Improvement of the Structures and Efficiency of Small Horizontal Axis Wind Generators with Non-Regulated Blades*", Grant Type EEA, Contract no. RO0018, 2008-2011, Director: Prof. Octavian Prostean, Financial value: 1,200,000 EUR

The proposed project has the research theme, goal and objectives associated to the priority research domains at international level, regarding new small wind generators structures. Thus, the presented project is under the following priority sector: "Protection of the environment, including the human environment, through, inter alia, the

reduction of pollution and the promotion of renewable energy", having the focus area on "Developing renewable energy sources, including geothermal energy and hydropower".

Recent documents issued by national and international organizations promote the usage of renewable energy resources Directives of the European Parliament of the Council of the Promotion of Electricity from Renewable Energy Sources in the Internal Electricity Market, Romanian Government Decisions regarding the approval of the renewable energy resources strategies, et. al.

The project has the focus area of developing renewable energy sources, which promote the protection of the environment, by reducing of pollution.

The overall objectives concern the increase of the usage degree of wind-energy conversion systems as a non-pollutant energy source, conducting to the reducing of carbon and pollution, in concordance to the global trend of ecologic energy production.

The project aims the realization of new/improved small wind generators having presently, high cost price of produced energy in comparison with medium and high power aggregates. This is the reason why USA elaborated (by American Wind Energy Association) the "ROADMAP 20-year industry plan for small wind turbine technology" that aims the drastically reduction of the present energy cost. The project has in view all elements of small wind generators. The project's beneficiary is able to organize the research and implementation of the project that will certainly lead to a high efficiency and to the reducing of the cost of such types of wind generators. The beneficiary has relevant experience in the field, and the human resources are specialized in all required domains: wind turbines, mechanical systems, electrical generators, power electronic converters, control systems, project management.

"Politehnica" University of Timisoara has a long-term experience inclusively in the domain of small power wind generators: for a Canadian corporation (vertical axis wind turbine) and for Romanian users (horizontal axis wind turbines). In Timisoara there are factory equipped with necessary technologies for such aggregates.

## PERSPECTIVE DOMAINS

- Real time control of induction and synchronous machines using LabView (LabWindowsCVI), the National Instruments Data Acquisition Systems and DSpace hardware
- Advanced control of wind aggregates
- Neural network control systems



### STRATEGIC PRIORITIES

- Study of innovative control systems for wind aggregates: MPPT methods, genetic algorithms
- Tools for statistical wind measurement related data, for short-term forecasting used in wind speed prediction based windmill control systems and for simulation of autonomous wind farms aggregates



### CONTACT

Prof. Dr. Eng. Octavian Proștean  
 Faculty of Automation and Computers  
 Bd. Vasile Pârvan, no. 2  
 300223 Timișoara, Romania  
 Tel.: +40-256-40-3213  
 E-mail: [octavian.prostean@aut.upt.ro](mailto:octavian.prostean@aut.upt.ro)

### Researches in HEALTHCARE NETWORKS AND eHEALTH

#### RESEARCH TEAM

- Prof. dr. eng. Lăcrămioara Stoicu-Tivadar, coordinator
- Prof. dr. eng. Vasile Stoicu-Tivadar,
- Lect. dr. eng. Dorin Berian

- Assist. eng. Romina Pintea, PhD student,
- Assist. eng. Raul Robu, PhD student
- Assist. eng. Andreea Robu, PhD student
- Eng. Vasile Topac, PhD student
- Eng. Mihaela Vida, PhD student
- Eng. Valentin Gomoi, PhD student
- Eng. Norbert Gal, PhD student
- Eng. Daniel Dragu, PhD student
- Eng. Oana Lupșe, PhD student

### RESEARCH FIELDS

- Health Information Systems, E-Health, Telemedicine
- Software architectures
- Distributed and Mobile Applications

### KEYWORDS

Distributed medical informatics; applied informatics; telemedicine; e-Health

### MAIN ACTIVITIES

- Development of mobile applications in medical informatics
- Study and development of different solutions for integrated healthcare networks
- Implementation of standards in healthcare

### RESULTS

#### PUBLISHED PAPERS

1. Stoicu-Tivadar V., Berian D., *Intelligent Features in TELEASIS Telecare System*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, ISBN 978-1-4244-9108-7, May 2011, pp. 583-587.
2. Berian D., Gomoi V., Topac V., *A Hybrid Solution for a Telecare System Server*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, ISBN 978-1-4244-9108-7, May 2011, pp. 589-592.
3. Puscoci S., Stoicu-Tivadar L., Stoicu-Tivadar V., Berian D., Serbanescu F., Ionita S., Bajan F., *Intelligent Integrated Teleassistance Platform with Enhanced Accessibility to Information – TELEASIS*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, ISBN 978-1-4244-9108-7, May 2011, pp. 577-582.
4. Vida M., Lupșe O., Stoicu-Tivadar L., Stoicu-Tivadar V., *ICT Solution Supporting Continuity of Care in Children Healthcare Services*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, ISBN 978-1-4244-9108-7, May 2011, pp. 635-639.

5. Lupșe O., Vida M., Stoicu-Tivadar L., Stoicu-Tivadar V., *Using HL7 CDA and CCD Standards to Improve Communication between Healthcare Information Systems*, Proc. 9th IEEE International Symposium on Intelligent Systems and Informatics (SISY 2011), Subotica, Serbia, ISBN 978-4577-1973-8, Sep. 2011, pp. 453-457.
6. Vida M., Lupșe O., Stoicu-Tivadar L., Stoicu-Tivadar V., *ICT Solution Supporting Continuity of Care in Obstetrics-Gynecology and Pediatrics Department*, Proc. International Conference of Information Communication Technologies in Health, Samos Island, Greece, ISBN 978-960-466-083-4, July 2011, pp. 100-112.
7. Vida M., Stoicu-Tivadar L., *Developing an Integrated Platform to Identify the Risk Factors in Obstetrics Department*, Proc. 15th IEEE International Conference on Intelligent Engineering Systems 2011 (INES 2011), Poprad, Slovakia, ISBN 978-1-4244-8954-1, June 2011, pp. 39-43.
8. Vida M., Stoicu-Tivadar L., Bernad E., Pinte R., Moga V., *Assesing Interoperability Status for Specific Healthcare Information Systems*, Proc. EFMI Special Topic Conference STC 2011, Lasko, Slovenia, April 2011, 6p.
9. Topac V., *Towards a Universal Accessibility for Textual Information*, Proc. International Cross-Disciplinary Conference on Web Accessibility (W4A 2011), India, Hyderabad, ISBN 978-1-4503-0476-4, 2011, 3p.
10. Topac V., Stoicu-Tivadar V., *Patient Empowerment by Increasing Information Accessibility in a Telecare System*, Proc. MIE 2011, Stud Health Technol Inform. 2011, ISBN 978-1-60750-805-2, vol. 169, pp. 681-685.
11. Gal N, Stoicu-Tivadar V., *XML as a Cross-Platform Representation for Medical Imaging with Fuzzy Algorithms*, Proc. EFMI Special Topic Conference STC 2011, Lasko, Slovenia, April 2011, Stud Health Technol Inform. 2011, ISBN 978-1-60750-734-5, vol. 165, pp. 83-87.
12. Gal N., Stoicu-Tivadar V., *Simulation of Medical Image Interpretation*, Proc. 15th IEEE International Conference on Intelligent Engineering Systems (INES 2011), Poprad, Slovakia, ISBN 978-1-4244-8954-1, June 2011, pp. 33-37.
13. Gal N., Stoicu-Tivadar V., *FIS Editor for on-the-Fly Implementation in Software Environment*, Proc. IEEE 9th International Symposium on Intelligent Systems and Informatics (SISY 2011), Subotica, Serbia, ISBN 978-4577-1973-8, Sep. 2011, pp. 141-143.
14. Robu R, Stoicu-Tivadar V., *Regional Medical Data Mining System*, Proc. EFMI Special Topic Conference STC 2011, Lasko, Slovenia, April 2011, Stud Health Technol Inform. 2011, ISBN 978-1-60750-734-5, vol. 165, pp. 117-122.
15. Robu A, Neagu A, Stoicu-Tivadar L., *Cell Seeding of Tissue Engineering Scaffolds Studied by Monte Carlo Simulations*, Stud Health Technol Inform. 2011, ISBN 978-1-60750-805-2, vol. 169, pp. 882-886.
16. Robu A., Neagu A., Stoicu-Tivadar L., *The Influence of Cell-Substrate and Cell-Medium Interfacial Tension on the Cell Spreading*, Proc. 15th IEEE International Conference on Intelligent Engineering Systems (INES 2011), Poprad, Slovakia, June 2011, pp. 29-32.
17. Robu R., Feier F., Stoicu-Tivadar V., Ilie C., Enatescu I., *The Analysis of the New-Borns' Cry Using NEONAT and Data Mining Techniques*, Proc. 15th IEEE International Conference on Intelligent Engineering Systems (INES 2011), Poprad, Slovakia, ISBN 978-1-4244-8954-1, June 2011, pp. 235-238.
18. Robu A., Stoicu-Tivadar L., Neagu A., *Cell Spreading on Biocompatible Materials Studied by Computer Simulations*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, ISBN 978-1-4244-9108-7, May 2011, pp. 641-644.
19. Robu A., Stoicu-Tivadar L., Neagu A., *Simulation of Cellular Aggregate Seeding of Porous Scaffolds*, Proc. 2011 International Conference on Computers and Computing, (ICCC 2011), Lanzarote, Spania, ISBN 978-1-61804-000-8, 2011, pp. 100-105.
20. Gomoi V, Vida M, Stoicu-Tivadar L, Stoicu-Tivadar V., *Extracting Clinical Information to Support Medical Decision Based on Standards*, Proc. EFMI Special Topic Conference STC 2011, Lasko, Slovenia, April 2011, Stud Health Technol Inform. 2011, ISBN 978-1-60750-734-5, vol. 165, pp. 49-54.
21. Dragu D., Gomoi V., Stoicu-Tivadar V., *Automatic Generation of Medical Recommendations Using Topic Maps as Knowledge Source*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, ISBN 978-1-4244-9108-7, May 2011, pp. 593-597.



22. Dragu D., Gomoi V., Stoicu-Tivadar V., *Topic Maps as Knowledge Base to Automatically Generate Medical Recommendations*, Proc. IEEE 9th International Symposium on Intelligent Systems and Informatics (SISY 2011), Subotica, Serbia, ISBN 978-4577-1973-8, Sep. 2011, pp. 459-464.

#### PERSPECTIVE DOMAINS

- Distributed architectures and appropriate technological solutions
- Mobile applications and related technologies
- Interoperability standards in distributed medical informatics
- Solutions for integrated healthcare networks and interoperability

#### STRATEGIC PRIORITIES

The group intends to develop strategic researches on the directions specified in the domain by the European Community:

- The Education and Training of high level healthcare managers and policy makers on the strategic role of ICT in Healthcare and change management
- To implement programs on education and training, and other actions to promote awareness and to reduce resistance to change of healthcare professionals
- To set up specific awareness actions addressing sensitive groups, such as: academic circles, high reputation specialists at university hospitals and other local medical opinion leaders, clinical research groups, medicine and nursing students
- To improve mutual learning through information interchange, particularly to avoid cultural mismatches, to promote and encourage cross-border cooperation on e-Health topics and applications.

#### CONTACT

Prof. dr. eng. Lăcrămioara Stoicu-Tivadar  
 Faculty of Automation and Computers  
 Bd. Vasile Pârvan, no. 2  
 300223 Timișoara, Romania  
 Tel: +40-256-403234  
 Fax: +40-256-403214  
 E-mail: [lacramioara.stoicu-tivadar@aut.upt.ro](mailto:lacramioara.stoicu-tivadar@aut.upt.ro)

#### Researches in REAL-TIME CONTROL SYSTEMS

#### RESEARCH TEAM

- Prof. dr. eng. Nicolae Robu, head of the team
- Prof. dr. eng. Gheorghe-Daniel Andreescu
- Prof. dr. eng. Toma-Leonida Dragomir

- Prof. dr. eng. Ioan Silea
- Lecturer dr. eng. Sorin Nanu
- Assist. eng. Ana-Maria Dan
- Assist. eng. Tiberiu Ionică
- Eng. Mihai Iacob, PhD student
- Eng. Coman Cristina Elena, PhD student
- Eng. Gurban Eugen Horațiu, PhD student

#### RESEARCH FIELDS

- Advanced Control of AC drives: Sensorless Control of PMSM; Fault-tolerant Control
- Automotive Electric Actuation Technologies
- Applications to Electric and Hybrid Vehicles
- Boiler-Turbine Control System
- Solar Energy
- Informatics Systems, SCADA

#### KEYWORDS

- Advanced control; Electric drives; Automotive electric actuation; Sensorless control; State and disturbance observers; Signal injection; Active flux observer; Fault-tolerance; Boiler-turbine control; Hardware-in-the-Loop, Fuzzy-interpolating implementation, Wind energy; Solar energy, Informatics systems, SCADA, Real-time implementations.

#### MAIN ACTIVITIES

- Control systems in Automotive electric actuation technologies
- SCADA system and Hardware-in-the-loop for central heating and power plants
- Boiler-turbine control system with real-time implementation using LabView
- Stable U/f control system with two feedback corrections for PMSM drives
- Active-flux based motion sensorless control
- Real-time implementation and testing using DSpace for Sensorless control of AC drives
- Informatics systems
- Solar energy using Fresnel lens

#### RESULTS

#### PUBLISHED PAPERS

- Coroban-Schramel V., Boldea I., Andreescu G.-D., Blaabjerg F., *Active-Flux-Based Motion-Sensorless Vector Control of Biaxial Excitation Generator/Motor for Automobiles*, IEEE Transactions on Industry Applications, ISSN 0093-9994, vol. 47, no. 2, Mar./Apr. 2011, pp. 812-819 (IF = 1.23)
- Iacob M., Andreescu G.-D., Muntean N., *SCADA System for a Central Heating and Power Plant*, (in book chapter 8: Process Control and Automation Applications), in *Instrument Engineers' Handbook, vol. 3: Process Software and Digital Networks*, 4th Edition, Eds.: B.G. Liptak, H. Eren, CRC

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3. Iacob M., Andreescu G.-D., *Drum-boiler control system employing shrink and swell effect remission in thermal power plants*, Proc. 3rd International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT 2011), Budapest, Hungary, ISSN 2157-0221, ISBN 978-1-4577-0682-0, Sep. 2011, pp. 1-8.
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  8. Moldovan A., Boldea I., Andreescu G.-D., *V/f Control with Active Flux and Power Stabilizing Corrections for IPMSM Drives*, Proc. 6th Int. Conf. "Zilele ASTR-2011": Industrie, energie, mediu, prosperitate PRO-PROSPERITAS 2011, Timisoara, Romania, Sept. 2011, pp. 1-6.
  9. Andone D., VasIU R., Robu N., *Building a Virtual Campus for Digital Students*, Proc. IEEE Global Engineering Education Conference (EDUCON 2011), ISBN 978-1-61284-642-2, April 2011, pp. 1069-1073.
  10. Stefan O., Codrean A., Dragomir T.L., Silea I., *Time Delay and Information Loss Compensation in a Network Control System for a DC Motor*, Proc. 6th IEEE Int. Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISSN 978-1-4244-9108-7, May 2011, pp. 131-135.
  11. Lie I., Beschiu C., Nanu S., *FPGA Based Signal Processing Structures*, Proc. 6th IEEE Int. Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISSN 978-1-4244-9108-7, May 2011, pp. 439-444.
  12. Nanu S., Nanu A., Dragomir T.L., Dragomir L.E., *Models for Do-Check-Act Subcycle for Development Processes*, Proc. 6th IEEE Int. Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISSN 978-1-4244-9108-7, May 2011, pp. 511-516.

## RESEARCH GRANTS AND PROJECTS

### International grants and projects

1. Research EU Grant within 7th Framework Programme (FP7 tip STREP), Project title: *Energy Efficient Vehicles for Road Transport (EE-VERT)*; Grant no. 218598/ Nov. 2008, period 2009-2011; partners: Volvo, FIAT, Bosch,...; Director of UPT partner: Prof. Ion Boldea; member Prof. Gheorghe-Daniel Andreescu; value for UPT in 2011: 38.000 EUR.

### National grants and projects

1. Research Grant in 2nd Romanian National Research Program PN2, Section: Ideas Programme; Project title: *Research in Design and Implementation of Modern Solutions for Secured Information in Distributed Systems, SCADA, DCS and Remote Control with Applications in Gases Distribution*, Project no. 15492/14.09.2007, period 2007-2011; Director: Prof. Ioan Silea (total financial value 254.000 Lei)

## PERSPECTIVE DOMAINS

- Automotive control
- Advanced control of electric drives, Robotics
- Solar energy
- Green-house control system with Hardware-in-the-Loop
- SCADA system applications
- Real-time control using LabView
- Applications with FPGA using VHDL, Xilinx

## STRATEGIC PRIORITIES

- Advanced control of electric drives
- Automotive electric actuator technologies
- Solar energy
- SCADA systems
- DSpace platform, LabView real-time platform

**CONTACT**

Prof. dr. eng. Gheorghe-Daniel Andreescu

Faculty of Automation and Computers  
Department of Automation and Applied Informatics  
Bd. Vasile Parvan, no. 2  
300223 Timisoara, Romania  
Tel.: +40-256-40-3243; +40-256-40-3118  
Fax: +40-256-40-3214  
E-mail: [daniel.andreescu@aut.upt.ro](mailto:daniel.andreescu@aut.upt.ro)  
Web: [www.aut.upt.ro/~dandre](http://www.aut.upt.ro/~dandre)

**RESEARCH DIVISION IN COMPUTER AND SOFTWARE ENGINEERING****CONTACT**

**Assoc. Prof. Dr. Eng. Mihai V. MICEA**

Faculty of Automation and Computers  
Department of Computer and Software Engineering  
2, Vasile Pârvan Blvd.  
300223 Timișoara, Romania  
Tel: +40-256-403271  
Email: [mihai.micea@cs.upt.ro](mailto:mihai.micea@cs.upt.ro)

**Researches in ADVANCED COMPUTING ARCHITECTURES AND SYSTEMS****RESEARCH TEAM**

- Prof. dr. eng. Mircea Vlăduțiu
- Lect. dr. eng. Lucian Prodan
- Lect. dr. eng. Mihai Udrescu-Milosav
- Assist. dr. eng. Versavia Ancușă
- Assist. dr. eng. Flavius Oprîțoiu
- Eng. Liviu Agnola, PhD Student
- Eng. Patrik Mezo, PhD Student
- Eng. Septimiu Fabian Mare, PhD Student
- Eng. Andreea Bozeșan, PhD Student
- Eng. Alexandru Iovanovici, PhD Student
- Eng. Cristian Coșariu, PhD Student

**MAIN ACTIVITIES**

- Computer Arithmetic
- Self testing development concepts
- Self checking development tools
- Digital system testing based on data compression (transitions counting syndrome, linear feedback shift register)
- Equipment structures with fault tolerant capability (error detecting and correcting codes, triple modular redundancy)
- Bio-Inspired Design of Applications on Reconfigurable Platforms
- Quantum Computing
- Networks-on-Chips
- Hardware-Software Co-Design
- Electronic Design Automation

**RESULTS****PUBLISHED PAPERS**

1. Agnola L., Vladutiu M., Udrescu M., Prodan L., *Improving Performance of Robust Self Adaptive Caches by Optimizing the Switching Algorithm*, Proc. IEEE 14th International Symposium on Design and Diagnostics of Electronic Circuits & Systems (DDECS 2011), Cottbus, Germany, ISBN 978-1-4244-9753-9, April 2011, pp. 297-300.
2. Agnola L., Vladutiu M., Udrescu M., Prodan L., *Improving Performance and Area Overhead by Reducing the Switching Table for Self Adaptive Cache Memories*. Proc. 17th International Symposium for Design and Technology in Electronic Packaging (SIITME 2011), Timisoara, Romania, ISBN 978-1-4577-1277-7/11, Oct. 2011, pp. 173-178.
3. Ancușă V., Bogdan R., Udrescu M., *A Framework for Studying Output data Flow in a Corporate Environment*, Proc. 2nd International Conference on Networking and Information Technology (IPCSIT 2011), Hong-Kong, ISSN 2010-460X, Nov. 2011, vol. 17, pp. 66-71.
4. Mare S., Vladutiu M., Prodan L., *HDR-Based Steganographic Algorithm*, Proc. 17th International Symposium for Design and Technology in Electronic Packaging (SIITME 2011), Timisoara, Romania, ISBN 978-1-4577-1277-7/11, Oct. 2011, pp. 333-338.
5. Mare S., Vladutiu M., Prodan L., *Secret Data Communication System Using Steganography, AES and RSA*, Proc. 17th International Symposium for Design and Technology in Electronic Packaging (SIITME 2011), Timisoara, Romania, ISBN 978-1-4577-1277-7/11, Oct. 2011, pp. 339-344.
6. Mezo P., Vladutiu M., Prodan L., *Interoperability Solution between Peer-To-Peer and Client-Server Based Mailing Systems*, Proc. 17th International Symposium for Design and Technology in Electronic Packaging (SIITME 2011), Timisoara, Romania, ISBN 978-1-4577-1277-7/11, Oct. 2011, pp. 45-48.
7. Mezo P., Vladutiu M., Prodan L., *A Distributed Mailing System*, Proc. 17th International Symposium for Design and Technology in Electronic Packaging (SIITME 2011), Timisoara, Romania, ISBN 978-1-4577-1277-7/11, Oct. 2011, pp. 349-354.
8. Opritoiu F., Vladutiu M., Prodan L., Udrescu M., *AES Encryption-Decryption Optimized Datapath*, Proc. 17th International Symposium for Design and Technology in Electronic Packaging (SIITME 2011), Timisoara,

Romania, ISBN 978-1-4577-1277-7/11, Oct. 2011, pp. 355-360.

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10. Mare S., Vladutiu M., Prodan L., *Decreasing Change Impact Using Smart LSB Pixel Mapping and Data Rearrangement*, Proc. 11th IEEE International Conference on Computer and Information Technology (CIT 2011), Paphos, Cyprus, ISBN 978-0-7695-4388-8/11, Aug./Sep. 2011, pp. 269-276.
11. Mare S., Vladutiu M., Prodan L., *Design of a Hierarchical based DHT Overlay P2P Routing Algorithm*, Proc. 11th IEEE International Conference on Computer and Information Technology (CIT 2011), Paphos, Cyprus, ISBN 978-0-7695-4388-8/11, Aug./Sep. 2011, pp. 415-420.

#### CONTACT

##### Prof. Dr. Eng. Mircea Vladutiu

Computer and Software Engineering Department  
2, Vasile Pârvan Blvd.  
300223 Timișoara, Romania  
Tel: +40-256-403258  
E-mail: [mvlad@cs.upt.ro](mailto:mvlad@cs.upt.ro)

#### Research in EMBEDDED, REAL-TIME SYSTEMS AND DIGITAL SIGNAL PROCESSING

#### RESEARCH TEAM

- Prof. dr. eng. Vladimir Crețu, head of the team
- Prof. dr. eng. Mircea Stratulat
- Prof. dr. eng. Mircea Popa
- Prof. dr. eng. Horia Ciocârlie
- Assoc. Prof. dr. eng. Mihai Micea
- Assoc. Prof. dr. eng. Ioana Șora
- Assoc. Prof. dr. eng. Doru Todincă
- Assoc. Prof. dr. eng. Marius Marcu
- Lect. dr. eng. Sorin Babii
- Assist. dr. eng. Amăricăi-Boncalo Alexandru
- Assist. dr. eng. Amăricăi-Boncalo Oana
- Assist. eng. Dan Chiciudean
- Assist. eng. Răzvan Cioargă
- Assist. eng. Carmen Holotescu
- Assist. dr. eng. Daniela Stănescu
- MSc. eng. Cristina Stângaciu, PhD. Student
- MSc. eng. Valentin Stângaciu, PhD. Student
- MSc. eng. Andrei Stancovici, PhD. Student

#### MAIN ACTIVITIES

- Methods of Temperature and Power Reduction in Embedded Systems and their Applications
- Modeling, Design and Development of Real-Time Systems for Critical Applications of Data Acquisition, Signal Processing and Embedded Control
- Development of unconventional computer architectures
- Study and development of intelligent sensor networks and robotic environments
- Data communication in wireless networks

#### RESULTS

#### PUBLISHED PAPERS

1. Macariu G., Crețu V.I., *Enabling Parallelism and Resource Sharing in Multi-core Component-Based Systems*, Proc. 14th IEEE International Symposium on Object /Component/ Service-Oriented Real-Time Distributed Computing (ISORC 2011), Newport Beach, CA, ISSN 1555-0885, ISBN 978-1-61284-433-6, March 2011, pp. 269-277.
2. Macariu G., Crețu V.I., *Limited Blocking Resource Sharing for Global Multiprocessor Scheduling*, Proc. 23rd Euromicro Conference on Real-Time Systems (ECRTS 2011), ISSN 1068-3070, ISBN 978-1-4577-0643-1, July 2011, pp. 262-271.
3. Anton A., Crețu V.I., *Fast Algorithm for the Extraction of a Space-Time Window in Finite Volume Meshes*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 327-330.
4. Popa M., Girban G., *On the Energy Constraint in Wireless Sensor Networks*, Carpathian Journal of Electronic and Computer Engineering, ISSN 1844-9689, vol. 4, no. 1, 2011, 6p.
5. Popa M., *Smart Meters Reading Through Power Line Communications*, Journal of Next Generation Information Technology, ISSN 2092-8637, vol. 2, no. 3, Aug. 2011, pp. 92-100.
6. Bogdan R., Ancusa V., Popa M., *Teaching Microcontrollers by Means of Industrial Processes*, Proc. 2nd International Conference on Networking and Information Technology (ICNIT 2011), Hong Kong, ISBN 978-981-07-0680-7, Nov. 2011, vol. 17, pp. 60-65.
7. Popa M., Iapa C., *Embedded Weather Station with Remote Wireless Control*, Proc. 19th Telecommunications Forum (TELFOR 2011),

- Belgrade, Serbia, ISBN 978-1-4577-1498-6, Nov. 2011, pp. 297-300.
8. Popa M., Suta B., *A Solution for Tracking a Fleet of Vehicles*, Proc. 19th Telecommunications Forum (TELFOR 2011), Belgrade, Serbia, ISBN 978-1-4577-1498-6, Nov. 2011, pp. 1558-1561.
  9. Girban G., Popa M., *WSN Testing Environment with Energy Consumption Monitoring and Simulation of Sensed Data*, Proc. 6th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS 2011), Prague, Czech Republic, ISBN 978-1-4577-1424-5, Sep. 2011, pp. 842-847.
  10. Popa M., Codrean A., *Environment Monitoring in Closed Spaces Using a Mobile Sensor Platform*, Proc. 9th IEEE International Symposium on Intelligent Systems and Informatics (SISY 2011), Subotica, Serbia, ISBN 978-1-4577-1973-8, Sep. 2011, pp. 287-291.
  11. Popa M., Popa A.S., *Optimizing Car's Starting with Acceleration Control System*, Proc. 9th IEEE International Symposium on Intelligent Systems and Informatics (SISY 2011), Subotica, Serbia, ISBN 978-1-4577-1973-8, Sep. 2011, pp. 281-285.
  12. Popa M., *Data Collecting from Smart Meters in an Advanced Metering Infrastructure*, Proc. 15th International Conference on Intelligent Engineering Systems (INES 2011), Poprad, Slovakia, ISBN 978-1-4244-8955-8, June 2011, pp. 137-142.
  13. Popa M., *A Launch Control System for Cars*, Proc. 15th International Conference on Intelligent Engineering Systems (INES 2011), Poprad, Slovakia, ISBN 978-1-4244-8955-8, June 2011, pp. 131-135.
  14. Popa M., *Hand Gesture Recognition based on Accelerometer Sensors*, Proc. 7th International Conference on Networked Computing and Advanced Information Management (NCM 2011), Gyeongju, Korea, ISBN 978-89-88678-36-7, June 2011, pp. 295-298.
  15. Popa M., *Gateway Design and Implementation in an Automatic Meter Reading System based on Power Line Communications*, Proc. 7th International Conference on Networked Computing and Advanced Information Management (NCM 2011), Gyeongju, Korea, ISBN 978-89-88678-36-7, June 2011, pp. 115-120.
  16. Caprita H.V., Popa M., *Design Methods of Multithreaded Architectures for Multicore Microcontrollers*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 427-432.
  17. Girban G., Popa M., *On-line Software Solution for Power Consumption Monitoring on WSN Nodes*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 181-185.
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  19. Popa M., Ciocarlie H., *An Access System for Buildings Based on Smart Cards*, Proc. 9th IEEE International Symposium on Applied Machine Intelligence and Informatics (SAMI 2011), Smolenice, Slovakia, ISBN 978-1-4244-7428-8, Jan. 2011, pp. 285-290.
  20. Popa M., Ciocarlie H., *Distributed Intelligent Climate System for Indoor Locations*, Proc. 9th IEEE International Symposium on Applied Machine Intelligence and Informatics (SAMI 2011), Smolenice, Slovakia, ISBN 978-1-4244-7428-8, Jan. 2011, pp. 291-296.
  21. Tomoiaga R., Stratulat M., *Acceleration Solution Proposal of AES Using a Graphic Processor*, Advances in Electrical and Computer Engineering, Suceava, Romania, ISSN 1582-7445, vol. 11, no. 4, 2011, pp. 99-105.
  22. Tomoiaga R., Stratulat M., *AES Algorithm adapted on GPU Using CUDA for Small Data and Large Data Volume Encryption*, International Journal of Applied Mathematics and Informatics, UK, ISSN 2074-1278, vol. 5, issue 2, 2011, pp. 71-81.
  23. Marcu M., *Power-Thermal Profiling of Software Applications*, Microelectronics Journal, ISSN 0026-2692, vol. 42, no. 4, Apr. 2011, pp. 601-608.
  24. Ghiata N., Marcu M., *Measurement Methods for QoS in VoIP Review*, Proc. 3rd International Congress on Ultra Modern Telecommunications and Control Systems and Workshops (ICUMT 2011), Budapest, Hungary, ISSN 2157-0221, ISBN 978-1-4577-0682-0, Oct. 2011, pp. 1-6.
  25. Marcu M., Tudor D., *Energy Consumption Model for Mobile Wireless Communication*,

- Proc. 9th ACM International Symposium on Mobility Management and Wireless Access (MobiWac 2011), New York, NY, USA, ISBN 978-1-4503-0901-1, Nov. 2011, pp. 191-194.
26. Marcu M., Milos C., *Energy Monitoring of Mobile Voice Communications*, Carpathian Journal of Electronic and Computer Engineering, ISSN 1844-9689, vol. 4, no. 1, 2011, pp. 69-74.
  27. Stancovici A., Szanto O., Ardelean V., Barbatei R., Marcu M., *IQube: A Cube for Learning*, Proc. IEEE International Games Innovation Conference (IGIC 2011), City of Orange, California, USA, ISBN 978-1-4577-0258-7, Nov. 2011, pp. 89-92.
  28. Marcu M., Tudor D., *Energy Efficiency Measurements of Mobile Virtualization Systems*, Proc. 3rd International ICST Conference on Security and Privacy in Mobile Information and Communication Systems (MobiSec 2011), Aalborg, Denmark, May 2011, 6p.
  29. Marcu M., Tudor D., *Power Consumption Measurements of Virtual Machines*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 445-449.
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  31. Marcu M., Tudor D., Fuicu S., *Power Consumption and Temperature Measurement of Virtualization Solutions*, Proc. 17th International Workshop on Thermal investigations of ICs and Systems (THERMINIC 2011), Paris, France, ISBN 978-1-4577-0778-0, Sep. 2011, pp. 1-6.
  32. Marcu M., Tudor D., *Execution Framework Model for Power-Aware Applications*, Proc. 17th International Workshop on Thermal investigations of ICs and Systems (THERMINIC 2011), Paris, France, ISBN 978-1-4577-0778-0, Sep. 2011, pp. 1-6.
  33. Micea M.V., Ungurean L., Carstoiu G.N., Groza V., *Online State-of-Health Assessment for Battery Management Systems*, IEEE Trans. Instrumentation and Measurement, ISSN 0018-9456, vol. 60, no. 6, Jun. 2011, pp. 1997-2006.
  34. Cioarga R.D., Micea M.V., Cretu V.I., Banc A., Groza V., *Football: Emergent Resource Gathering in Collective Robotic Environments*, Proc. IEEE International Symposium on Robotic and Sensors Environments (ROSE 2011), Montreal, Canada, ISBN 978-1-4577-0819-0, Sep. 2011, pp. 184-189.
  35. Stangaciu V., Macariu G., Micea M.V., Muresan V., Barry B., *Requirements of a Real-Time Multiprocessor Operating System for Multimedia Applications*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 209-215.
  36. Amaricai A., Dobre A., Boncalo O., Tanase A., Valuch C., *Models and Implementations of Hardware Interface Modules in a Multi-Processor System-on-Chip Simulator*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 433-437.

#### BOOKS

1. Teodorescu R.O., Crețu V.I., Racoceanu D., *Diagnosis and Prognosis on Parkinson's disease Using an Automatic Image-Based Approach*, in Biomedical Engineering, Trends in "Electronics, Communications and Software", InTech, Rijeka, Croatia, ISBN 978-953-307-475-7, 2011, Chapter 17, pp. 319-346.
2. Crețu V.I., *Dezvoltarea aplicațiilor timp-real. Concepte avansate*, Editura Universității din Oradea, ISBN 978-606-10-0475-1, 2011, 409p.
3. Crețu V.I., *Structuri de date și algoritmi*, Editura "Orizonturi Universitare"-Mirton, ISBN 978-973-638-500-1, 2011, 460p.
4. Crețu V.I., *Proiectarea și analiza algoritmilor*, Editura "Orizonturi Universitare"-Mirton, ISBN 978-973-683-501-8, 2011.
5. Micea M.V., Stancovici A., Indreica S., *Distance Measurement for Indoor Robotic Collectives*, in "Mobile Robots - Control Architectures, Bio-Interfacing, Navigation, Multi Robot Motion Planning and Operator Training", J. Bedkowski (Eds.), InTech, Rijeka, Croatia, ISBN 978-953-307-842-7, Dec. 2011, Sect. 16, pp. 353-372.
6. Boncalo O., Amaricai A., *Proiectarea circuitelor digitale în limbajul Verilog HDL: Analiza și sinteza*, Ed. Politehnica, ISBN 978-606-554-331-7, 218p.

#### RESEARCH GRANTS AND PROJECTS

1. *FILOLET Innovative System for Electrical Energy Monitoring Based on Wavelet Transformation for Industrial Consumers*, director Micea M.V., team: Cretu V.I.,

Stratulat M., Micea C., Miclea F., Cioarga R., Chidiucean D., Stanescu D., Stratulat B., Stratulat I., Contract No PDP\_4339, Contract No. 22-137/01.10.2008; financed by: UEFISCSU, MEdCI; UPT value 6.500 RON.

2. *MERLIN: Platforma IT de Modelare, Simulare, Planificare si Optimizare a Productiei Automatizate in Industria Semiconductorilor*, Crețu V., Micea M.V., Contract No. PDP\_1262, Contract No. 198/12.09.2008; financed by: UEFISCSU, MEdCI; UPT value 23.580 RON.
3. *FALX DACIAE: Unelte si Procese de Dezvoltare SW pentru Aplicatii Multimedia Avansate pe Arhitecturi Multi-Core pentru Telefoane Mobile*, proiect manager: Micea M.V., team: Crețu V.I., Vladutiu M., Ciocarlie H., Todinca D., Prodan L., Udrescu Milosav M., R&D Grant POSCCE-499-11844/2010-2012, EU - Structural Instruments, ANCS Contract 133/04.06.2010. Total value: 2126766 RON (~ 506400 EUR). Value, PUT Partner: 1143416 RON (~ 272300 EUR).
4. *FLAG - Arhitecturi de virgula flotanta pentru aplicatii grafice pe platforme FPGA* project manager : Amaricai A., Team: Popa M., Marcu M., Chiciudean D.; CNCS PN-II-RU-TE-2011-3-0186, Total value : 616000 RON; 2011 Value : 33000 RON.

#### CONTACT

##### Prof. dr. eng. Vladimir Ioan Crețu

Director of the Computer and Software Engineering Department

2, Vasile Pârvan Blvd.

300223 Timișoara, Romania

Tel: +40-256-403 255

Fax: +40-256-403 214

Email: [vladimir.cretu@cs.upt.ro](mailto:vladimir.cretu@cs.upt.ro)

Web: [www.cs.upt.ro/~vcretu/](http://www.cs.upt.ro/~vcretu/)

#### Research in SOFTWARE ENGINEERING

#### RESEARCH TEAM

- Prof. dr. eng. Ioan Jurca, head of the team
- Assoc. Prof. dr. eng. Marius Minea
- Assoc. Prof. dr. eng. Radu Marinescu
- Lect. dr. eng. Petru Mihancea
- Assist. dr. eng. Cristina Marinescu
- Assist. dr. eng. Dan Cosma
- Assist. eng. Adrian Petru Mierluțiu
- Assist. dr. eng. Ciprian-Bogdan Chirilă

#### MAIN ACTIVITIES

- Development of Integrated Evolving Environments for Software System Analysis
- Design of object-oriented software systems
- Engineering of complex software systems

- System modeling, verification and validation

#### RESULTS

##### PUBLISHED PAPERS

1. Chirila C., Juratoni D., Tudor D., Crețu V.I., *Towards a Software Quality Assessment Model Based on Open-Source Static Code Analyzers*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 341-346.
2. Chirila C.B., Crețu V.I., *A Suite of Java Specific Metrics for Software Quality Assessment Based on Static Code Analyzers*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 347-352.
3. Marinescu Cristina, *Are the Classes That Use Exceptions Defect Prone?*, Proc. 12th International Workshop on Principles of Software Evolution and 7th Annual ERCIM Workshop on Software Evolution (IWPSE-EVOL 2011), Szeged, Hungary, ISBN 978-1-4503-0848-9, Sep. 2011, pp. 56-60.
4. Marinescu R., Marinescu Cristina, *Are the Clients of Flawed Classes (also) Defect Prone?* Proc. 11th IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM 2011), Williamsburg, VI, ISBN 978-1-4577-0932-6, Sep. 2011, pp. 65-74.
5. Codoban M., Marinescu Cristina, Marinescu Radu, *IProblems - An Integrated Instrument for Reporting Design Flaws, Vulnerabilities and Defects (Tool Demo)*, Proc. 18th Working Conference on Reverse Engineering (WCRE 2011), Lero, Limerick, Ireland, ISSN 1095-1350, ISBN 978-1-4577-1948-6. Oct. 2011, pp. 437-438.
6. Balint M., Minea M., *Automatic Inference of Model Fields and their Representation*, Proc. 13th Workshop on Formal Techniques for Java-like Programs (FTfJP 2011), Lancaster, UK, ISBN 978-1-4503-0893-9, July 2011, 6p.
7. Groza B., Minea M., *Formal Modelling and Automatic Detection of Resource Exhaustion Attacks*, Proc. 6th ACM Symposium on Information, Computer and Communications Security (ASIACCS 2011), Hong Kong. ISBN 978-1-4503-0564-8, March 2011, pp. 326-333.
8. Groza B., Minea M., *Customizing Protocol Specifications for Detecting Resource Exhaustion and Guessing Attacks*, Proc. 9th

International Symposium on Formal Methods for Components and Objects, revised papers, Lecture Notes in Computer Science, ISSN 0302-9743, vol. 6957, Springer, 2011, pp. 45-60.

9. Carbone R., Minea M., Mödersheim S.A., Ponta S.E., Turuani M., Viganò L., *Towards Formal Validation of Trust and Security in the Internet of Services*, Future Internet Assembly: Achievements and Technological Promises, Lecture Notes in Computer Science, ISBN 978-3-642-20897-3, vol. 6656, Springer, 2011, pp. 193-207.

#### BOOKS

1. Marinescu Cristina, Mihancea P.-F., *Programare Java. Mecanisme Fundamentale*, Editura Politehnica, ISBN 978-606-554-284-6, 2011.
2. Mihancea P.-F., Marinescu Cristina, *Programare Java. Mecanisme Avansate*, Editura Politehnica, ISBN 978-606-554-285-3, 2011.

#### CONTACT

##### Prof. dr. eng. Ioan Jurca

Department of Computer and Software Engineering  
2, Vasile Pârvan Blvd.  
300223 Timișoara, Romania  
Tel: +40-256-403256  
Email: [ionel@cs.upt.ro](mailto:ionel@cs.upt.ro)

#### Research in DISTRIBUTED DATA BASES AND ARTIFICIAL INTELLIGENCE

#### RESEARCH TEAM

- Prof. dr. eng. Ștefan Holban
- Prof. dr. eng. Ionel Jian
- Prof. dr. eng. Marius Crișan
- Assoc. Prof. dr. eng. Dan Pescaru
- Lect. dr. eng. Sorin Babii
- Assist. dr. eng. Cosmin Cernazanu
- Eng. Ovidiu Parvu, PhD. Student

#### MAIN ACTIVITIES

- Designing and implementing relational databases with complex network structures
- Pattern recognition in medicine and chemistry
- Development of hybrid expert systems for research in medical IT
- Cyber-Physical Systems and Wireless Sensor Networks design and implementation
- Developing complex distributed databases and Internet access to databases in companies, banks and local administration
- Interdisciplinary cooperation for expert and cognitive systems development

- E-Learning Application-Oriented Intelligent Agent with Pedagogic Functions

#### PUBLISHED PAPERS

1. Istin C., Pescaru D., Doboli A., *Stochastic Model-based Heuristics for Fast Field of View Loss Recovery in Urban Traffic Management Through Networks of Video Cameras*, IEEE Trans. Intelligent Traffic Systems, ISSN 1524-9050, Sep. 2011, vol. 12, Issue 3, pp. 895-907. [ISI, IF 2.3]
2. Gavrilesu M., Magureanu G., Pescaru D., Doboli A., *Time Models for PSoC Based Cyber Physical Systems Simulation*, Scientific Bulletin of "Politehnica" University of Timisoara, Transactions on Automatic Control and Computer Science, ISSN 1224-600X, vol. 56(70), no. 1, March 2011, pp. 27-34.
3. Magureanu G., Gavrilesu M., Tal I., Toma A., Pescaru D., Jian I., *Generating OMNeT++ Specifications from UML Models for PSoC Distributed Applications*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 85-90.
4. Basarabă L., Pescaru D., *Using Decision Tree for Efficient Data Classification in Cyber-physical Systems*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 385-390.
5. Gavrilesu M., Magureanu G., Pescaru D., Jian I., *Handling Event-Driven Scenarios in CPS Application Simulations*, Carpathian Journal of Electronic and Computer Engineering, ISSN 1844-9689, vol. 4, no. 1, 2011, pp. 49-54.
6. Crisan M., *Upon Phoneme Synthesis Based on Chaotic Modeling*, Proc. 5th International Conference on New Trends in Information Science and Service Science (NISS 2011), Macao, ISBN 978-1-4577-0665-3, Oct. 2011, pp. 134-139.
7. Crisan M., *New Aspects of Phoneme Synthesis Based on Chaotic Modeling*, Advances in Intelligent and Soft Computing-Instrumentation, Measurement, Circuits and Systems II (T. Zhang ed.), Springer, ISBN 978-3-642-27334-6, 2011, pp. 605-614.
8. Popa C., Cernazanu-Glavan C., *Pattern Neural Networks: A Case Study*, Proc. 2nd Workshop on Software Services: Cloud Computing and Applications based on Software Services, Timisoara, June 2011, 6p.



**BOOKS**

1. Cernazanu-Glavan C., Jebelean C., *Artificial Intelligence. Programming in Prolog*, Ed. Politehnica, Timisoara, ISBN 978-606-554-092-7, 2011.

**CONTACT**

**Prof. dr. eng. Marius Crişan**

Department of Computer and Software Engineering  
2, Vasile Pârvan Blvd.

300223 Timișoara, Romania

Tel: +40-256-403254

Email: [marius.crisan@cs.upt.ro](mailto:marius.crisan@cs.upt.ro)

**AUTONOMOUS RESEARCH GROUPS****DEPARTMENT OF AUTOMATION AND APPLIED INFORMATICS****MAIN RESEARCH FIELDS**

- System theory applications in fault detection and diagnosis
- System analysis using sensitivities
- Development of control system devices
- Interpolative, fuzzy and neural systems
- Virtual instrumentation in control
- Control of electrical drives
- Time-delay systems
- Biomedical modeling
- Quality Management

**Research group in APPLIED SYSTEMS THEORY****RESEARCH TEAM**

- Prof. dr. eng. Toma-Leonida Dragomir, head of the team
- Prof. dr. eng. Constantin Voloşencu
- Lecturer dr. eng. Dorina Popescu
- Lecturer dr. eng. Sorin Nanu
- Assist. eng. Ana Maria Dan
- Lecturer dr. eng. Adrian Korodi
- Eng. Flavius M. Petcuț, PhD Student
- Eng. Alexandru Codrean
- Eng. Vlad Ceregan
- Student Ioana Jiveț
- Student Angela Timofte

**MAIN RESEARCH FIELDS**

- System theory applications in fault detection and diagnosis
- System analysis using sensitivities
- Development of control system devices
- Interpolative, fuzzy and neural systems
- Virtual instrumentation in control
- Control of electrical drives
- Time-delay systems
- Management of the innovation and creativeness

- Sensor networks
- System identification
- Modeling the cardiovascular system with its nervous control
- Modeling of photovoltaic systems

**KEYWORDS**

Fault detection; identification and diagnosis; modeling; system safety and availability; controller design; process control; interpolating strategies; fuzzy logic; neural networks; control of electrical drives; virtual instruments; sensor networks; system identification; time-delay systems; cardiovascular system; nervous control.

**RESULTS****PUBLISHED PAPERS**

1. Korodi A., Petcut F.-M., Dragomir T.-L., *Interpolative Based Implementation of a Photovoltaic Panel*, Proc. 19th Mediterranean Conference on Control & Automation (MED 2011), Corfu, Greece, ISBN 978-1-4577-0124-5, June 2011, pp. 345-350.
2. Korodi A., Dragomir T.L., *Availability Studies and Solutions for Wheeled Mobile Robots*, Lecture Notes in Electrical Engineering, ISBN 18761100, Jan. 2011, vol. 70, pp. 47-57.
3. Codrean A., Korodi A., Dragomir T.L., Ceregan V., *Modeling the Vestibular Nucleus*, Lecture Notes in Electrical Engineering, ISBN 18761100, Jan. 2011, vol. 70, pp. 293-306.
4. Stefan O., Codrean A., Dragomir T.L., Silea I., *Time Delay and Information Loss Compensation in a Network Control System for a DC Motor*, Proc. 6th IEEE Int. Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISSN 978-1-4244-9108-7, May 2011, pp. 131-135.

5. Lie I., Beschiu C., Nanu S., *FPGA Based Signal Processing Structures*, Proc. 6th IEEE Int. Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISSN 978-1-4244-9108-7, May 2011, pp. 439-444.
6. Nanu S., Nanu A., Dragomir T.L., Dragomir L.E., *Models for Do-Check-Act Subcycle for Development Processes*, Proc. 6th IEEE Int. Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISSN 978-1-4244-9108-7, May 2011, pp. 511-516.

### Research group in **CRYPTOLOGY AND INFORMATION SECURITY**

#### RESEARCH TEAM

- PhD. Eng. Bogdan Groza, head of the team
- PhD. Eng. Dorina Petrică
- Assist. Eng. Lavinia Dragomir
- Assist. Eng. Căiman Dadiana
- Eng. Murvay Pal-Ştefan
- Eng. Cristea Marius

#### RESEARCH FIELDS

- Authentication protocols
- Public-key cryptography
- Provable security
- Foundations of cryptology
- Number theory
- Applied cryptography

#### KEYWORDS

Authentication protocols; digital signatures; public-key cryptography; entity authentication; message authentication; cryptography; cryptanalysis; one-way functions; trapdoor one-way functions; number theory; complexity theory.

#### PUBLISHED PAPERS

1. Cristea M., Groza B., *Augmenting a Webmail Application with Cryptographic Puzzles to Deflect Spam*, Proc. 4th IFIP International Conference on New Technologies, Mobility and Security (NTMS 2011), Paris, Franta, ISSN 2157-4952, ISBN 978-1-4244-8705-9, Feb. 2011, pp. 1-5.
2. Cristea M., Groza B., Iacob M., *Some Security Issues in SCALANCE Wireless Industrial Networks*, Proc. 6-th International Conference on Availability, Reliability and Security (ARES 2011), Viena, Austria, ISBN 978-0-7695-4485-4, Aug. 2011, pp. 493-498.
3. Groza B., *Protocol Vulnerabilities in Practice: Causes, Modeling and Automatic*

*Detection*, Proc. Romanian Cryptology Days (organized by the Romanian Foreign Intelligence Service - SIE), Bucharest, Romania, (Invited Talk), 2011, 6p.

4. Groza B., Murvay P.S., *Higher Layer Authentication for Broadcast in Controller Area Networks*, Proc. 6th International Conference on Security and Cryptography (SECRYPT 2011), Seville, Spain, July, 2011, 6p.
5. Groza B., Murvay P.S., *Secure Broadcast with One-Time Signatures in Controller Area Networks*, Proc. 6th International Conference on Availability, Reliability and Security (ARES 2011), Viena, Austria, ISBN 978-0-7695-4485-4, Aug. 2011, pp. 371-376.
6. Murvay P.S., Groza B., *Performance Improvements for SHA-3 Finalists by Exploiting Microcontroller on-Chip Parallelism*, Proc. 6th International Conference on Risks and Security of Internet and Systems (CRiSIS 2011), ISBN 978-1-4577-1890-8 Sep. 2011, pp. 1-7.
7. Murvay P.S., Silea I., *Design and Implementation of a Reliable Gas Leak Detection System for Domestic Environments*, Proc. 15th International Conference on System Theory, Control and Computing (ICSTCC 2011), Sinaia, Romania, ISBN 978-1-4577-1173-2, Oct. 2011, pp. 1-6.
8. Murvay P.S., *Cryptography on Embedded Devices with Application to in-Vehicle Communication*, Proc. Advanced Computer Architecture and Compilation for High-Performance and Embedded Systems (ACACES 2011), Fiuggi, Italy, ISBN 978-90-382-1798-7, July 2011, 6p.

#### RESEARCH GRANTS AND PROJECTS

##### National grants and projects

1. Research Grant in 2nd Romanian National Research Program PN2; Project title: *Research in Design and Implementation of Modern Solutions for Secured Information in Distributed Systems, SCADA, DCS and Remote Control with Applications in Gas Distribution*, Project no. 15492/14.09.2007, period 2007-2011; Director: Prof. Ioan Silea (total financial value for 2011: 130.695 Lei)

#### CONTACT

PhD. Eng. Bogdan Groza  
Department of Automation and Applied Informatics

Tel.: +40-256-40-3242

Email: [bogdan.groza@aut.upt.ro](mailto:bogdan.groza@aut.upt.ro)

**Research group in *BIOMEDICAL  
ENGINEERING***

**RESEARCH TEAM**

- Lect. dr. eng. Antonius N. Stanciu
- Lect. dr. eng. Adriana Albu
- Lect. dr. eng. Loredana M. Stanciu

**RESEARCH FIELDS**

- Friability of Medical Equipments
- Bionics
- Medical Diagnosis and Medical Informatics
- Artificial Intelligence (Expert Systems, Artificial Neural Networks)
- Medical Image Processing
- Human Hand Prosthesis
- Prehension

**KEYWORDS**

Cochlear implantation; medical diagnosis; expert systems; human hand prosthesis; prehension

**ACTIVITIES**

- Testing protocols for patients with cochlear implants
- Development of decisional systems
- Development of an artificial hand hydraulically actuated

**PUBLISHED PAPERS**

1. Albu A., Stanciu L., Belgiu G., *An Approach of Artificial Intelligent Machining Process*, Proc. 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara,

Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 123-126.

2. Stanciu L., Albu A., Belgiu G., *The Behavioral Study of a Human Hand Artificial Model*, 6th IEEE International Symposium on Applied Computational Intelligence and Informatics (SACI 2011), Timisoara, Romania, ISBN 978-1-4244-9108-7, May 2011, pp. 127-130.
3. Carausu C., Albu A., Stanciu L., Belgiu G., *Management of Intelligent Machining - An Artificial Intelligence Approach*, Proc. 15th International Conference Modern Technologies, Quality and Innovation - New face of TMCR (ModTech 2011), Vadu lui Voda - Chisinau, Rep. Moldova, ISSN 2066-3919, May 2011, 6p.

**STRATEGIC PRIORITIES**

- Testing protocols for cochlear implantation
- The communication interface between a hand prosthesis and the human body
- Decision-making using Bayesian Networks and Markov Chains

**CONTACT**

Lect. dr. eng. Loredana M. Stanciu  
Department of Automation and Applied Informatics

2, Vasile Pârvan Blvd.

300223 Timișoara

Tel.: +40-256-403253

Email: [loredana.stanciu@aut.upt.ro](mailto:loredana.stanciu@aut.upt.ro)

