

FACULTY OF AUTOMATION AND COMPUTERS



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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.

Head of the Research Group: **Prof. dr. eng. Stefan PREITL**, awarded with the *Grigore Moisil* Prize of the Romanian Academy.

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The group is organised in two research divisions:

- *Research Division in Automation and Industrial Informatics*

Head of the division: Prof.dr.eng. R.-E. Precup

- *Research Division in Computer Science and Engineering*

Head of the division: Prof.dr.eng. Marius Crişan

RESEARCH DIVISION IN AUTOMATION AND INDUSTRIAL INFORMATICS

CONTACT

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Researches in *PROCESS CONTROL*

RESEARCH TEAM

- Prof. dr. eng. Stefan Preitl, head of the team
- Prof. dr. eng. Radu-Emil Precup
- Assist. eng. Levente Kovacs, PhD student
- Assist. eng. Zsuzsa Preitl, PhD student
- Assist. eng. Simona Gheju (Vaivoda), PhD student.

RESEARCH FIELDS

- Control systems with conventional controllers
- Advanced control systems.

KEYWORDS

Fuzzy logic control; sliding mode control; intelligent systems; 2-DOF control; stability analysis; sensitivity analysis; mobile robots; servo systems; embedded systems.

MAIN ACTIVITIES

- Development of conventional and advanced control systems
- Development of adaptive control systems
- Soft computing in industrial applications
- Development of control systems for servo systems
- Development of control systems for mobile robots.

RESULTS

PUBLISHED PAPERS

1. Precup, R.-E., Preitl, St., *Stability and Sensitivity Analysis of Fuzzy Control Systems. Mechatronics Applications*, Acta Polytechnica Hungarica, Budapest Tech Polytechnical Institution, Budapest (Hungary), ISSN 1785-8860, vol. 3, no. 1, 2006, pp. 61–76
2. Precup, R.-E., Preitl, St., *PI and PID Controllers Tuning for Integral-type Servo Systems to Ensure Robust Stability and Controller Robustness*, Electrical Engineering (Archiv für Elektrotechnik), Springer-Verlag, ISSN 0948-7921, vol. 88, no. 2, 2006, pp. 149–156
3. Preitl, Zs., Precup, R.-E., Tar, J. K., Takács, M., *Use of Multi-parametric Quadratic Programming in Fuzzy Control Systems*, Acta Polytechnica Hungarica, Budapest Tech Polytechnical Institution, Budapest (Hungary), ISSN 1785-8860, vol. 3, no. 3, 2006, pp. 29–43
4. Preitl, St., Precup, R.-E., Fodor, J., Bede, B., *Iterative Feedback Tuning in Fuzzy Control Systems. Theory and Applications*, Acta Polytechnica Hungarica, Budapest Tech Polytechnical Institution, Budapest (Hungary), ISSN 1785-8860, vol. 3, no. 3, 2006, pp. 81–96
5. Precup, R.-E., Preitl, St., *On a Class of Control Systems with Takagi-Sugeno PI-Fuzzy Controllers*, Studies in Informatics and Control, National Institute for R&D in Informatics – ICI Bucharest, ISSN 1220-1766, vol. 15, no. 3, 2006, pp. 323–332

6. Tar, J. K., Rudas, I. J., Preitl, St., Precup, R.-E., *Robust, Potential Limited Control for an Indirectly Driven Saturated System*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Automatic Control and Computer Science, Politehnica Publishing House, Timișoara, ISSN 1224-600X, vol. 51 (65), no. 1, 2006, pp. 25–30
7. Tar, J. K., Bito, J. F., Preitl, St., Precup, R.-E., *Two Degree of Freedom Takagi-Sugeno Fuzzy Controllers in Trajectory Tracking*, 15th International Workshop on Robotics in Alpe-Adria-Danube Region RAAD 2006, Balatonfured (Hungary), Proceedings, ISBN 963-7154-48-5, 2006, CD-ROM, paper index 5, 6 pages
8. Preitl, St., Precup, R.-E., *Experiments in Fuzzy Control of a Class of Servo Systems for Mobile Robots*, 15th International Workshop on Robotics in Alpe-Adria-Danube Region RAAD 2006, Balatonfured (Hungary), Proceedings, ISBN 963-7154-48-5, 2006, CD-ROM, paper index 51, 7 pages
9. Precup, R.-E., Preitl, St., Preitl, Zs., *Fuzzy Control Solution for a Class of Tricycle Mobile Robots*, 3rd IEEE International Conference on Mechatronics ICM 2006, Budapest (Hungary), Proceedings, ISBN 1-4244-9713-4, 2006, CD-ROM, paper index BPA_037, pp. 208–213
10. Precup, R.-E., Preitl, St., *A Genetic Iterative Feedback Tuning (GIFT) Method for Fuzzy Control System Development*, 2006 International Symposium on Evolving Fuzzy Systems, Ambleside, Lake District (UK), Proceedings, ISBN 0-7803-9719-3, 2006, pp. 144–149
11. Precup, R.-E., Preitl, St., *Low Cost Fuzzy Controlled Servo Systems in Mechatronic Systems*, 4th IFAC Symposium on Mechatronic Systems MECHATRONICS 2006, Heidelberg (Germany), Preprints, 2006, CD-ROM, paper index 40, pp. 247–252
12. Precup, R.-E., Preitl, St., *Development Method for Low Cost Fuzzy Controlled Servosystems*, 2006 IEEE International Symposium on Intelligent Control ISIC, Munchen (Germany), Proceedings, 2006, CD-ROM, paper index 125, pp. 2707–2712
13. Precup, R.-E., Preitl, St., Rudas, I. J., Tar, J. K., *On the Use of Iterative Learning Control in Fuzzy Control System Structures*, 7th International Symposium of Hungarian Researchers on Computational Intelligence, Budapest (Hungary), Proceedings, ISBN 963-7154-54-X, 2006, pp. 69–82
14. Precup, R.-E., Preitl, St., Ardelean, C., *On a Two-Degree-of-Freedom Iterative Feedback Tuning Approach*, 7th International Conference on Technical Informatics CONTI'2006, Timișoara, editors: O. Proștean, St. Preitl, M. Crișan, R.-E. Precup, D. Andreescu, D. Pescaru, M. Stratulat, Proceedings, Politehnica Publishing House, Timișoara, ISBN 973-625-320-1, 2006, vol. 1, pp. 19–24
15. Gaudia, A., Korondi, P., Preitl, St., Precup, R.-E., *Recognizing Unusual Behaviour in Distributed Environment*, 7th International Conference on Technical Informatics CONTI'2006, Timișoara, editors: O. Proștean, St. Preitl, M. Crișan, R.-E. Precup, D. Andreescu, D. Pescaru, M. Stratulat, Proceedings, Politehnica Publishing House, Timișoara, ISBN 973-625-320-1, 2006, vol. 1, pp. 55–60

RESEARCH GRANTS AND PROJECTS

National grants and projects

1. Research Grant of the National University Research Council (CNCSIS), Type A, no. 2739 / 2006, CNCSIS code 366, Title: *Development of new fuzzy controller structures for embedded systems using Iterative Feedback Tuning algorithms*. Director: Prof.dr.eng. Radu-Emil Precup (grant value for 2006: 29,400 RON)

Fuzzy control is one particular case of nonlinear control techniques, however it is convenient and relatively easily understandable. Fuzzy controllers are usually developed heuristically, and the evident necessity for systematic development methods of these controllers has not been covered till now. The Iterative Feedback Tuning (IFT) technique must not be connected to the modeling phase, present in the majority of controller tuning techniques, making it usable in control of complex plants in embedded and mechatronic systems applications. The project aim, development of new fuzzy controller structures using IFT algorithms accompanied by the development of dedicated software, contributes to offer systematic approaches. The developed controller structures and software will be tested generally in control of servo systems with focus on different categories of plants where the problem of adaptation to the environment is set. The experiments performed highlight the control system performance enhancement. The project is backed up by the previous experience of the research team in the development of control systems meant for several classes of plants and in the derivation of some theoretical and practical issues in fuzzy control. Part of project results is obtained in close cooperation with well acknowledged research teams from Hungary.

More than 10 papers were presented at Conferences and published in Proceedings and Journals.

International grants and projects

1. Bilateral research contract, 2006-2007, between "Politehnica" University of Timisoara (U.P.T.), Romania and *Budapest Tech* Polytechnical Institution (B.M.F.), Hungary. Theme: *Analysis and development of Intelligent Systems*. Directors: Prof. dr. eng. Ștefan PREITL (U.P.T., Romanian partner) and Prof.dr. Janos FODOR (B.M.F., Hungarian partner) (*The Agreement of the Third Romanian-Hungarian Session of Scientific and Technologic Co-operation, signed in Budapest, nov. 2005, Appendix II, crt.nb. 35 ID nb.17*)

Nowadays Intelligent Systems are in the focus of research interest of scientists. The co-operation during 2006 has embraced and oriented on new Intelligent and fuzzy control solutions and new fuzzy – mathematic solutions. The Intelligent Control solutions represent particular cases of nonlinear control techniques, which are often developed heuristically. There is a necessity for systematic analysis and development methods of fuzzy and intelligent controllers, necessity that needs to be covered. The domain refers to the development of new fuzzy and intelligent control structures and design techniques that employ also the parametric sensitivity analysis of certain classes of fuzzy control systems. The field has shortcomings with respect to the Mamdani and Takagi-Sugeno fuzzy controllers and to the intelligent controllers containing fuzzy information processing techniques. This justifies the efforts of the two research teams to contribute to a better systematic application oriented approach to the field.

The original fuzzy and intelligent control structures to be developed within the framework of this co-operation are based on the experience of the two teams, unified through this project. The obtained results will be tested in several control applications.

The project is based on previous experiences of the two research teams in both the development of fuzzy control structures dedicated to several classes of plants and the theoretical and practical developments in the field of fuzzy systems. Since the behaviour of such systems depend highly on the underlying logical and/or aggregation operators, the related and internationally appreciated results of some team members provide an essential and sound basis for the planned studies.

The two teams co-organize annually the Romanian-Hungarian Symposiums on Applied Computational Intelligence (SACI), in Timisoara, destined to the change of research results in the field.

PERSPECTIVE DOMAINS

- New methods for the algorithmic design of conventional and intelligent controllers (fuzzy, neural, genetic, sliding mode)
- Methods for computer-aided design of control systems

- Analysis and development of Intelligent Systems
- Control solutions in the fields of power systems, electrical drives, general industrial automation, mobile robots

STRATEGIC PRIORITIES

- Control systems ensuring low sensitivity
- Tools for computer-aided design of 2-DOF controllers
- Computer-aided techniques in Iterative Feedback Tuning and Iterative Learning Control
- Low cost solutions for control problems dedicated to mobile robots
- Methods and tools to enable the systematic development of fuzzy control systems.



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Researches in SYSTEM IDENTIFICATION, ADAPTIVE SYSTEMS

RESEARCH TEAM

- Prof.dr.eng. Octavian Proștean, head of team
- Prof.dr.eng. Nicolae Budișan, awarded with the *Aurel Vlaicu* Prize of the Romanian Academy
- Assoc. prof. dr. eng. Ioan Filip
- Assist. eng. Iosif Szeidert, PhD student
- Assist. eng. Cristian Vașar, PhD student

RESEARCH FIELDS

- System's modeling, identification and simulation
- Unconventional energetic
- Neural networks and fuzzy systems
- Adaptive control systems

KEYWORDS

Modeling, identification and simulation of systems, neural networks and fuzzy systems, wind energy conversion systems, unconventional energetic, adaptive control, self-tuning.

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
- Development of data acquisition systems.

PUBLICATIONS**PUBLISHED PAPERS**

1. Filip, I., Prostean, O., Szeidert, I., Balas, V., Prostean, G., *Comparative Study Regarding an Adaptive Fuzzy Controller and a Self-Tuning Controller with Application to the Excitation Control of a Synchronous Generator*, WSEAS Transaction on Systems, Issue 7, Vol. 5, July 2006, ISSN 1109-2777 (<http://www.wseas.org>), pp. 1587-1692
2. Filip, I., Prostean, O., Szeidert, I., Prostean, G., Vasar, C., *Self-tuning Control Using External Integrator Loop for a Synchronous Generator Excitation System*, 11th IEEE International Conference on Emerging Technologies and Factory Automation, ETFA2006, Prague, September 20-22, 2006, IEEE Catalog Number: 06TH8897C, ISBN: 1-4244-0681-1, Library of Congress: 006927951, pp. 997-1000
3. Szeidert, I., Prostean, O., Filip, I., Vasar, C., *Above Flux Estimation Issues in Induction Generators with Application at Energy Conversion Systems*, Acta Polytechnica Hungarica, Journal of Applied Sciences, Volume 3, Issue Number 3, 2006, Special Issue on Applied Computational Intelligence, ISSN 1785-8860, pp. 137-148
4. Filip, I., *Adaptive Self-Tuning Controllers Design based on Minimum Variance Strategies*, Scientific Bulletin of the "Politehnica" University of Timisoara, vol. 51 (65), 2006, No.3, ISSN 1224-600X, pp. 17-22
5. Filip, I., Prostean, O., Balas, V., Prostean, G., *Design and Simulation of a Neural Controller for Excitation Control of a Synchronous Generator*, Proceedings of the 6th International Conference on Recent Advances in Soft Computing (RASC 2006), Canterbury, UK, July 10-12, 2006, ISBN 978-1-902671-43-7, 1-902671-43-0, pp. 361-366
6. Filip, I., Prostean, O., Szeidert, I., Balas, V., Prostean, G., *Adaptive Fuzzy Controller and Adaptive Self-Tuning Controller: Comparative Analysis for the Excitation Control of a Synchronous Generator*, Proceedings of the 7th WSEAS International Conference on Automation & Information (ICAI'06), Cavtat, Croatia, June 12-15, 2006, CD-ROM, ISSN 1790-5109, ISBN 960-8457-46-7, pp.89-94
7. Prostean, G., Prostean, O., Szeidert, I., Filip, I., *Scheduling Intelligent System for Time Shortening*, Proceedings of the Management International Conference MIC 2006, Slovenia, ISBN 961-6573-43-8, ISSN 1854-4312, pp.1873- 1882
8. Prostean, O., Vasar, C., Szeidert, I., Filip, I., *Comparative Study Regarding Classic PI and Fuzzy Control Solutions Applied at Electrical Drives Equipped with Permanent Magnet Synchronous Machine*, Proceedings of the 7th International Conference on Technical Informatics (CONTI'2006), Timisoara, June 8-9, 2006, Vol.1, ISBN (10) 973-625-319-8, pp. 51-54
9. Filip, I., Prostean, O., Vasar, C., Szeidert, I., *Adaptive Fuzzy Controller for Synchronous Generator*, SACI 2006, 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, Timisoara, May 25-26, 2006, ISBN 963 7154 46 9, pp. 154-163
10. Szeidert, I., Prostean, O., Filip, I., Vasar, C., *Considerations regarding the flux estimation in induction generator with application at the control of unconventional energetic conversion systems*, SACI 2006, 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, Timisoara, May 25-26, 2006, ISBN 963 7154 46 9, pp. 77-86
11. Szeidert, I., *Comparative Study Regarding Control of Wind Energy Conversion Systems Based on the Usage of Classical and Adaptive Neuro Fuzzy Controllers*, SACI 2006, 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, Timisoara, May 25-26, 2006, ISBN 963 7154 46 9, pp. 614-620

RESEARCH GRANTS AND PROJECTS

National grants and projects

1. National University Research Council (CNCSIS), research grant "*Researches regarding new electromechanical energy conversion automatic systems, with induction machines, with application to wind aggregates*", Grant Type A, Theme no. 29, code 628, Contract no. 2738/19.05.2006, Director: Prof.dr.eng. Octavian Prostean, Financial value: 16,000 RON

The grant has the aim, goal and objectives related to the CNCSIS priority research domain, researches regarding increasing the rate of WECS usage as a "green" energy resource leading to the reduction of carbon emissions and of the pollution, due the usage of non-ecological resources, highly polluting, according to the global ecological tendency of energy production. The aim will be fulfilled by novel renewable resources energy electromechanical conversion automatic systems based on squirrel cage induction machines, with physical decoupling of the active and reactive current components, used in variable speed wind energy conversion systems (WECS) with advanced control. There will be elaborated methods and control structures for the considered WECS. The factors that determine the WECS performances are mainly the type, construction, generator's usage method and the control system. The proposed project will certainly contribute to the scientific development in this field; reported to the most competitive solutions resulted from the technical literature.

2. National University Research Council (CNCSIS), research grant "*Researches regarding the synthesis and implementation on digital signal processors of fuzzy control strategies with application to the excitation's command of synchronous generators*", Grant Type A, theme no. 6, code 349, Director: Assoc.prof.dr.eng. Ioan Filip, Financial value: 15,000 RON

Design and synthesis of new fuzzy control strategies to assure high quality indicators to the classic solutions existing now on the market, as their software implementation, in the context of complexity raising of the controlled processes, constitutes an important part of the technologic growth imposed by a new informational society, with a straight impact in the automatic control field. The synthesis of fuzzy control solutions, with particularization at the excitation system of the synchronous generators, as the realization of researches regarding the problem solving specific to a software implementation integrated on a hardware support represented by a digital signal processor, constitutes the main aim of the present project. The

designing and synthesis of PI and PID fuzzy control strategies and advanced structures of adaptive control based on fuzzy logic would be realized starting from these models, followed by their validation with specific simulations of the operating regimes of the synchronous generator. The last stage consists in solving the typical problems of software implementation on a hardware support offered by a digital signal processor, regarding the development of a programs library in Matlab, implementing modularly and flexibly the functionalities offered by a fuzzy controlled structure, assuring in this way an increased portability of the obtained code in a high level programming language that can be integrated on a hardware support.

3. National University Research Council (CNCSIS), research grant "*Researches regarding identification and control methods of systems with induction generators for ecological energetics resources* ", Grant Type TD, Theme no. 11, code 97, Contract no. 2739/19.05.2006, Director: Assist.eng. Iosif Szeidert, PhD student, Financial value: 13,000 RON

The aim of this project is the identification and automatic control of ecological energy conversion systems, particularised on wind energy conversion systems. This project proposes researches of advanced control systems for wind energy conversion systems, the research being focused to the issues of control/command, reactive power/voltage and of frequency/rotation, using modern control methods. The project promotes the development of scientific knowledge in the domain of Systems with Induction Generators through contributions at the increases of induction generator's competitiveness, through the adoption of optimized automatic control structures such as: original conceptions regarding the structure and organization of electrogen systems with induction generators; contributions at the identification, parameter estimation and the simulation of the induction generator's functioning and of systems with induction generators; the study of advanced control methods and strategies for the rotation and voltage in the electrogen systems with induction generators; advanced control strategies for electrogen systems with induction generators: field oriented control, neuro-fuzzy, based on chaotic systems theory, with wind speed prediction (at wind aggregates systems). The synthesized control structures will be simulated on computers and on small power laboratory models having the generators's drive elements, analogical modeled with electrical machines. The proposed project thematic is framed within the CNCSIS's proprietary research domains.

PERSPECTIVE DOMAINS

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

STRATEGIC PRIORITIES

- Study of innovative control systems for wind aggregates: improved adaptive step Hill climbing method (HCC)
- Tools for statistical wind measurement related data, for short-term forecasting used in wind speed prediction based windmill's control systems and for simulation of autonomous wind farms aggregates (new Matlab tools)

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Researches in APPLIED INFORMATICS

RESEARCH TEAM

- Prof.dr.eng. Vasile Stoicu-Tivadar, head of the team
- Prof.dr.eng. Lăcrămioara Stoicu-Tivadar
- Assist.eng. Ioan-Daniel Ardelian
- Assist.eng. Bogdan Solga
- Eng. Dorin Berian, PhD student

RESEARCH FIELDS

- Health Information Systems, E-Health, Telemedicine
- Embedded and Real-time Systems
- Distributed and Mobile Applications.

KEYWORDS

Distributed medical informatics; applied informatics; telemedicine; e-administration.

MAIN ACTIVITIES

- Implementation of a telemedicine application between the Timis County Hospital and Italian Hospitals
- Improvement of a distributed document flow-based software for the Timis County Council administration
- Development of mobile applications in medical informatics
- Study and development of different solutions for integrated healthcare networks.

RESULTS

PUBLISHED PAPERS

1. Stoicu-Tivadar, V., Stoicu-Tivadar, L., Sicurello, F., Moga, V., Moga, M., Pellicano, G., Ronco, G., *A bridge between projects: interoperability with General Practitioners and Hospitals*, Integrating Biomedical Information: From e-Cell to e-Patient. Proceedings of the EFMI STC, April 6-8 2006, Timisoara, IOS Press, ISBN 1-58603-614-9, pp. 64-68
2. Stoicu-Tivadar, L., Sicurello, F., Stoicu-Tivadar, V., Moga, V., Moga, M., Pellicano, G., Ronco, G., *Teleconsultations As A Step Towards Hospital Interoperability*, Studies in Health Technology and Informatics, Ubiquity: Technologies for Better Health in Aging Societies, IOS Press, Technology and Informatics, Vol. 124, 2006, ISBN 1-58603-647-5, ISSN 0926-9630, pp. 455-460
3. Stoicu-Tivadar, L., Stoicu-Tivadar, V., *Human-Computer Interaction Reflected in the Design of User Interfaces for General Practitioners*, International Journal of Medical Informatics, Vol. 75 (3-4), March-April 2006, ISSN 1386-5056, pp. 335-342
4. Stoicu-Tivadar, V., *Genericity, and Customisation in a Lotus-based solution for communication between local public institutions*, Proceedings of SACI2006, 3^d Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, Timișoara, 2006, ISBN 963 7154 46 9, pp. 268-277

RESEARCH GRANTS AND PROJECTS

1. Bilateral project Italy-Romania: *System for teleconsultation between hospitals*.

Participants: Francesco Sicurello (@ITIM Associazione Italiana di Telemedicina e Informatica Medica, University Milano-Bicocca), Lăcrămioara Stoicu-Tivadar and Vasile Stoicu-Tivadar ("Politehnica" University of Timisoara), Gianni Pellicano (Hospital Careggi Florence), Victor Moga (County Hospital Timisoara), Mariana Moga (County Hospital Timisoara), Gianluca Ronco (Sirse Italy).

The goal of the project was to interconnect two hospitals, one from Timisoara (County Hospital) and one from Italy (Carreggi, Florence) in order to provide communication support between doctors from several departments. The benefit of the project was the development of a community of Romanian and Italian doctors exchanging experience and starting the building a communication platform between the doctors regarding health problems of the Italian residents in Timisoara.

The role of the team from UPT was to coordinate the activities in Timisoara: connection with the hospital personell, design of the communication structure, technical assistance, installation of software, training of medical personell. The Italian party supplied hardware, hospital equipment and software. The project was financed by the Italian Foreign Ministry.

2. IBM Central/Eastern Europe, Middle East, and Africa (CEMA) Faculty Awards Cycle 3 Program, *A generic Lotus-based solution for communication between local public institutions*

Participants: Vasile Stoicu-Tivadar, Lacramioara Stoicu-Tivadar, Dorin Berian, Adriana Albu ("Politehnica" University of Timisoara), Vajda Csaba (MD)

The objectives include: studies and contributions to the genericity of the information systems used in local administration, modelling of this kind of systems, improvement of interfaces (related to the customization and to the other information systems), and development of new models and methodologies for customization

Developed R&D activities:

- analysis of the previous project & generalization (new User Cases, scenarios, roles, functions, UML Model); for this, a Master Student issued the Master dissertation "*Searching for patterns in SICIRAP. System analysis - study*" (Author: Vajda Csaba, scientific coordinator: Stoicu-Tivadar Vasile), defended in June, 2006
- development of new models and methodologies for customization; in this respect, we studied and issued interfaces for customization in the previously developed Lotus based solution and we used our former customer (The County Council and the Development Agency of Timis County) for testing the new solutions.

The project allowed us to develop a basic cluster of computers appropriate to study and to experiment with Lotus-based technologies. This cluster contains only a Server and a workstation (this is the results of partially cut-off from the initial list of equipment). We added to this a small server previously available and in this way we have 3 computers for the activities related to Lotus technology: one used as Domino Server, other, as Database server, and the workstation, for development (with Lotus Designer).

The project was financed by IBM Company, as a result of a competition from 2005.

PERSPECTIVE DOMAINS

- a. Distributed architectures and appropriate technological solutions

- b. Mobile applications and related technologies
- c. Interoperability standards in distributed medical informatics
- d. Tools for statistical processing of the medical data and for rapid development of embedded applications
- e. Solutions for integrated healthcare networks and interoperability and for e-administration (document flow and data collecting).

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 programmes 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 for the transferring part too, particularly to avoid cultural mismatches.

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Researches in REAL-TIME CONTROL SYSTEMS

RESEARCH TEAM

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- Prof.dr.eng. Toma-Leonida Dragomir
- Lecturer eng. Sorin Nanu
- Assist.eng. Tiberiu Ionică
- Assist.eng. Ana-Maria Dan

RESEARCH FIELDS

- Advanced Control of AC drives: Sensorless Control of IPMSM; Fault-tolerant Control
- Automotive Electric Actuation Technologies
- Applications to Electric and Hybrid Vehicles.

KEYWORDS

Sensorless direct torque and flux control; State and disturbance observers; Variable structure flux-observer, Fault-tolerance; Fuzzy-interpolating implementation, Signal injection; Real-time implementation; AC drives; Electric and hybrid vehicles (EHV).

MAIN ACTIVITIES

- Control systems in Automotive electric actuation technologies
- Development of Sensorless control system from zero speed for starter-generator with IPMSM for EHV
- Development of Integrated sensors of rotor position and speed based on signal injection for IPMSM drives
- Wind power generator control
- Real-time implementation and testing using dSpace for Sensorless control system of AC drives.

RESULTS**PUBLISHED PAPERS**

1. Lascu, C., Andreescu, G.-D., *Sliding-Mode Observer and Improved Integrator with DC-Offset Compensation for Flux Estimation in Sensorless Controlled Induction Motors*, IEEE Transactions on Industrial Electronics, ISSN 0278-0046, vol. 53, no. 3, 2006, pp. 785-794
2. Boldea, I., Pitic, C.I., Lascu, C., Andreescu, G.-D., Tutelea, L., Blaabjerg, F., Sandholdt, P., *DTFC-SVM Motion-Sensorless Control of PM-Assisted Reluctance Synchronous Machine as Starter-Alternator for Hybrid Electric Vehicles*, IEEE Transactions on Power Electronics, ISSN 0885-8993, vol. 21, no. 3, 2006, pp. 711-719
3. Șerban, I., Andreescu, G.-D., Tutelea, L., Lascu, C., Blaabjerg, F., Boldea, I., *New State Observers and Sensorless Control of Wound Rotor Induction Generator (WRIG) at Power Grid with Experimental Characterization*, 32nd Annual Conference of the IEEE Industrial Electronics Society IECON 2006, Paris, France, Publisher: IEEE, Piscataway, NJ, USA, Proceedings, paper index PF-002356, 2006, 8 pages
4. Șerban, I., Andreescu, G.-D., Lascu, C., Blaabjerg, F., Boldea, I., *Sensorless Wound-Rotor Induction Machine (WRIM): Dual-Converter Motoring Control with Short-Circuited Stator*, 10th International Conference on Optimization of Electrical and Electronic Equipment OPTIM 2006, Brașov, Editors: M. Cernat, A. Nicolaide, I. Mărgineanu, Transilvania University Press, Brașov, Proceedings, ISBN 973-635-704-X; 978-973-635-704-6, vol. 2, pp. 221-228

5. Fătu, M., I., Boldea, Lascu, C., Tutelea, L., Andreescu, G.D., *Motion Sensorless Variable Speed PMSG Control at Power Grid*, 10th International Conference on Optimization of Electrical and Electronic Equipment OPTIM 2006, Brașov, Editors: M. Cernat, A. Nicolaide, I. Mărgineanu, Transilvania University Press, Brașov, Proceedings, ISBN 973-635-705-8; 978-973-635-705-3, vol. 3, pp. 9-16
6. Coroban, V., Boldea, I., Andreescu, G.-D., Blaabjerg, F., *BEGA - Motor/Generator Vector Control for Wide Constant Power Speed Range*, 10th International Conference on Optimization of Electrical and Electronic Equipment OPTIM 2006, Brașov, Editors: M. Cernat, A. Nicolaide, I. Mărgineanu, Transilvania University Press, Brașov, Proceedings, ISBN 973-635-705-8; 978-973-635-705-3, vol. 3, pp. 79-86

RESEARCH GRANTS AND PROJECTS**National grants and projects**

1. Research Grant of Excellence, Ministry of Education and Research, CEEX: X2C33/2006: *Automotive Electric Actuation Technologies (AEAT)*; Director: Prof.dr.eng. I. Boldea, UPT Scientific coordinator: Prof.dr.eng. G.-D. Andreescu (financial value for 2006 granted to the Dept. AIA: 41,700 RON)

The goal is to develop and propose novel electrical actuators with power electronics and control systems for various functions in automobiles on 42Vdc power bus such as: starter/alternator in hybrid electric or electric vehicles; active steering, steering and braking by wire, climate control, independent valve actuation, active suspension damping, etc., need - for comfort improvement, a reasonable energy consumption and robust response. Now, after the first 42Vdc mild hybrid electric Toyota Crown Royal has become commercial in 2002, there is world-wide interest and effort to introduce more and improve power electronic controlled actuators on automobiles.

The project is aiming at the following *objectives*:

- To develop and validate a complete model of the 42Vdc power bus, with its numerous electrical loads, in order to optimally manage the energy consumption and storage on board of automobiles
- To propose a new power electronics control system for the claw-pole rotor alternator capable to work either at 14Vdc or 42Vdc for more power
- To develop better PMSM actuators and their advanced digital sensorless control with redundancy for active steering, steering-by-wire and electric braking-by-wire

- To develop new linear or rotary electric actuators for independent electric valve and active suspension damping control by power electronics for less peak power and energy consumption
- To investigate a novel starter/ alternator configuration (Biaxial Excitation Generator for Automobiles) and its control, characterized by very large constant power speed range, very low voltage regulation, good efficiency
- To propose and realize innovative small brushless electric actuators (less than 50W at 14/42Vdc) with low-cost electronic supply and control for various automotive accessories, such as: windshield wipers, window lifts, throttle plate control, positioning systems for lights, seats and rear mirrors, fuel injectors, cooling fans, blowers for HVAC, etc., as well as variable-speed pumps for oil, fuel and water.

In 2006 the main activity and results were to model and simulate the proposed solutions for all our objectives. There was done a technical study on this subject. The research results have been published in international journals and conference proceedings as ISI, INSPEC, IEEE papers.

PERSPECTIVE DOMAINS

- Automotive control
- Advanced control of electric drives, Robotics
- Real-time control using LabView (LabWindows CVI)
- Applications with FPGA using VHDL, Xilinx.

STRATEGIC PRIORITIES

- Control of EHV and Automotive Electric Actuator Technologies
- dSpace platform, LabView real-time platform
- Advanced control of electric drives, Automotive, Robotics, Mechatronic systems.

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RESEARCH DIVISION IN COMPUTER SCIENCE AND ENGINEERING

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Researches in COMPUTER SYSTEMS ARCHITECTURE

RESEARCH TEAM

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- Prof.dr.eng. Mircea Stratulat
- Prof.dr.eng. Mircea Popa
- Lecturer dr.eng. Marius Marcu
- Assist. Daniela Stanescu

MAIN ACTIVITIES

- Methods of Temperature and Power Reduction in Embedded Systems and their Applications.
- Development of unconventional computer architectures.
- New interfaces based on image and speech recognition.

RESULTS

BOOKS

Marcu M., *Study of the thermal phenomenon in computer systems* (in Romanian), Orizonturi Universitare Publishing House, Timisoara, 2006, ISBN (10) 973-638-277-X, (13) 978-973-638-277-2, 260 pages

PUBLISHED PAPERS

1. Barna C., Stratulat M., *Assistant Software for Alarm Systems*, Proceedings 6th International Conference on Recent Advances in Soft Computing (RASC 2006), Canterbury, UK, 10-12 July 2006, Ed. K. Sirlantzs, ISBN 978-1-902671-43-7, 1-902671-43-0, pp. 465-470
2. Barna C., Stratulat M., *A Localization Method for Based on Infrared Detectors for Surveillance Areas*, IEEE VECIMS 2006, Coruna, Spain, ISBN 1-4244-0243-3, pp. 49-52
3. Novak A., Stratulat M., *MP3 Player with Hard Disk and FM Stereo Radio Transmitter*, Proceedings 7th International Conference on Technical Informatics - CONTI'2006, vol. 2, Computer and Software Engineering, 8-9 June, Timisoara, ISBN (10) 973-625-321-X (vol.2), (13) 978-973-625-321-8, (10) 973-625-319-8, (13) 978 973-625-319-5, pp. 117-122
4. Novak A., Stratulat M., Stanescu Daniela, Chiciudean D., Ciubotaru B., Cioarga R., *Multimedia Streaming of MP3 Audio Content Based on FM Stereo Radio Transmitter*, Proceedings 3rd Romanian- Hungarian Joint Symposium on Applied Computational

- Intelligence, Timisoara, May 25-26, 2006, ISBN 963 7154-46-9, pp. 408-418
5. Novak A., Stratulat M., Stanescu Daniela, Chiciudean D., Ciubotaru B., Cioarga R., *Research and Development Platform for Multimedia Streaming of MP3 Audio Content*, Acta Polytechnica Hungaria, Journal of Applied Sciences at Budapest Tech Hungary, vol. 3, Issue 3, 2006, ISSN 1785-8860, pp. 5-17
 6. Popa M., Popa Anca Sorana, Ciocarlie H., *Software Interface for Pocket PC Based Mobile Telephony*, Proceedings of the 4th WSEAS International Conference on Electromagnetics, Wireless and Optical Communications, Venice, Italy, November 20-22, 2006, ISBN 960-8457-56-4, pp. 163-168
 7. Popa M., Popa Anca Sorana, Cretu V., Micea M., *Monitoring Serial Communications in Microcontroller Based Embedded Systems*, Proceedings of the IEEE International Conference on Computer Engineering & Systems (ICCES'06), Cairo, Egypt, November 5-7, 2006, ISBN 1-4244-0272-7, pp. 56-61
 8. Popa, M., Popa, A.S., Cretu, V., Micea, M., *Centralized Management System for Mobile Communications with Pocket PCs*, CISSE 06, 2nd IEEE International Joint Conferences on Computer, Information and System Sciences, and Engineering, Bridgeport, USA, December 4-14, 2006 [in print, Springer Verlag]
 9. Popa M., Ciocarlie H., Botas Alina, Vasile M., *Testing and Monitoring Tools for Serial Transfers in Embedded Systems*, Proceedings of the Fifth International Symposium on Communication Systems, Networks and Digital Signal Processing (CSNDSP 2006), Patras, Greece, July 19-21, 2006, ISBN 960-89282-0-6, pp 744-747
 10. Popa M., Groza V., Botas Alina, *LIN Bus Testing Software*, Proceedings of the 2006 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE 2006), Ottawa, Canada, May 7-10, ISBN 1-4244-0038-4, ISSN 0840-7789, pp. 1390-1393
 11. Popa M., Ionel R., Groza V., Marcu M., *Educational Virtual Instrumentation Application for System Identification*, Proceedings 23rd IEEE Instrumentation and Measurement Technology Conference, Sorrento, Italy, April 24-27, ISBN 0-7803-9360-0, pp. 842-846
 12. Ionel R., Popa M., *Internet and LAN Connected Embedded Virtual Instrumentation*, Proceedings of CONTI'2006, 7th International Conference on Technical Informatics, Timisoara, June 8-9, 2006, vol. 2, ISBN (10) 973-625-321-X, (13) 978-973-625-321-8, pp. 113-116
 13. Popa M., Vasile M., Fuicu S., *Serial Bus Monitoring Software for Microcontrollers Embedded in Mechatronic Systems*, Proceedings of SACI 2006, 3rd Romanian – Hungarian Joint Symposium on Applied Computational Intelligence, Timisoara, May 25-26, 2006, ISBN 963 7154 46 9, pp. 396-407
 14. Popa M., Macrea M., Mihu L., *Reverse Engineering Analyze for Microcontroller's Assembly Language Projects*, in Advances in Systems, Computing Sciences and Software Engineering, Proceedings CISSE'05, 2006, IEEE International Joint Conferences on Computer, Information, and System Sciences, and Engineering, December 10-20, Bridgeport, USA, 2005, Springer-Verlag, ISBN 1-4020-5262-6, pp. 333-338
 15. Marcu M., Fuicu S., *Wireless Local Positioning Systems: Issues and Challenges*, Proceedings 2nd IEEE International Conference on Intelligent Computer Communication and Processing, ICCP 2006, vol. 2, Cluj, Romania, Sept. 2006, ISBN (10) 973-662-235-5, pp. 181-186
 16. Marcu M., Fuicu S., Tomescu V., Zilahi M., Szasz A., Szilard C., Ilea C., *Smart Mobile Distributed Solution for Traffic Flow Optimization*, Proceedings 7th International Conference on Technical Informatics, CONTI'2006, Timisoara, June 2006, ISBN (10) 973-625-321-X, (13) 978-973-625-321-8, pp. 107-112
 17. Fuicu S., Anton A., Marcu M., *Experimental Measurements into TCP Congestion Mechanism over a Wireless 802.11 Network*, Proceedings 7th International Conference on Technical Informatics, CONTI'2006, Timisoara, June 2006, ISBN (10) 973-625-321-X, (13) 978-973-625-321-8, pp. 317-322

RESEARCH CONTRACTS

1. *Design and implementation of a scalable dedicated system for wireless message communication with many mobile receivers located in a limited area* – contract with S.C Luxten-AEM Timisoara, value 6,613 RON, Director: prof.dr.eng. Mircea Popa
2. *Methods for temperature and power reducing in mobile embedded systems*, CNCSIS grant 2738/19.05.2006, Director: Marius Marcu, Collaborator: Sebastian Fuicu
3. *Software application for IP communication monitoring in the GSM B10 system*, contract No. 505/05.01.2006 with Alcatel Timisoara,

Director: Marius Marcu, Collaborator:
Sebastian Fuicu

4. *Ethereal plugins set for IP protocols monitoring in the GSM B10 system*, contract No. 504/03.04.2006 with Alcatel Timisoara, Director: Sebastian Fuicu, Collaborator: Marius Marcu

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Researches in DISTRIBUTED AND REAL-TIME SYSTEMS

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- Prof.dr.eng. Horia Ciocârlie
- Assist.eng. Carmen Holotescu
- Assist.eng. Sorin Șerău
- Assist.eng. Dan Cosma
- Assist.eng. Stejărel Vereș
- Assist.eng. Adrian Petru Mierluțiu
- Assist.eng. Ciprian-Bogdan Chirilă

MAIN ACTIVITIES

- Programming and distributed processing media
- Network protocols.
- Designing, implementing and testing real-time executives for systems based on various microprocessors
- Implementing and testing real-time executives for dedicated applications
- Extending real-time concepts in distributed applications
- Integrating Enterprise Applications into GRID-Type Networks Using Service-Oriented Software Architectures
- Methods, Techniques and Structures for Adaptive Computing Applications in Data Communications Field

RESULTS

BOOKS

1. Ciocârlie H., *Universul limbajelor de programare (The Universe of Programming Languages)*, Orizonturi Universitare Publishing House, Timișoara, 2006, ISBN (10) 973-638-246-X, ISBN (13) 978-973-638-246-8, 203 pages

2. Ciocârlie H., *Programarea sistemelor distribuite în limbajele orientate pe obiecte. Prelucrarea grafică paralelă și distribuită pe structura grid a datelor geografice și de mediu (Distributed Systems Programming in Object-Oriented Languages. Distributed and Parallel Graphic Processing on Grid Structure of Environmental Geographical Data)*, First volume of the MEDIOGRID workgroup, Technical University of Cluj-Napoca, 8-9 Dec. 2005, Ed. MEDIAMIRA, Cluj-Napoca, 2006, vol. 1, ISBN (10) 973-713-091-X, ISBN (13) 978-973-713-091-4, pp. 117-122
3. Ciocârlie H., *Limbaje orientate pe obiecte destinate programării sistemelor distribuite, Prelucrarea grafică paralelă și distribuită pe structura grid a datelor geografice și de mediu (Object-Oriented Languages for Distributed Systems Programming. Distributed and Parallel Graphic Processing on Grid Structure of Environmental Geographical Data)*, First volume of the MEDIOGRID workgroup, Technical University of Cluj-Napoca, 8-9 Dec. 2005, Ed. MEDIAMIRA, Cluj-Napoca, 2006, vol. 2, ISBN (10) 973-713-092-8, ISBN (13) 978-973-7132-1, pp. 188-195

PUBLISHED PAPERS

1. Tudor D., Crețu V., Ciocârlie H., *Parallel Branch and Bound Experiment Using Java Based Message Passing and Shared Object Space Solutions*, CONTI'2006, Proceedings of the 7th International Conference on Technical Informatics, Timisoara, vol. 2, ISBN (10) 973-625-321-X, (13) 978-973-625-8, pp. 161-166
2. Șebu Laura, Ciocârlie H., *The Design of Stateful Web Services based on Web Service Resource Framework implemented in Globus Toolkit 4*, SYNASC 2006, 8th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, Timisoara, Sept. 22-29, 2006, IeAT Technical Report 06-07, pp. 63-70

RESEARCH CONTRACTS

1. *Mediogrid: Distributed and Parallel Graphic Processing on Grid Structure of Environmental Geographical Data*, Subcontract 19-CEEX-103-128/07.10.2005, value for 2006: 140,135 RON, Director: Vladimir Cretu, Collaborator: Horia Ciocârlie
2. *Programming milieu for developing real-time distributed applications for embedded systems*, CNCSIS grant No. 58GR/19.05.2006, value for 2006: 24,000 RON, Director: Horia Ciocârlie

3. *Fatigue behaviour study and modeling of steel and aluminium load-bearing structures used in transportations, in case of random testing*, CNCIS grant No. GR226/14.09.2006, value for 2006: 25,000 RON, Collaborator: Horia Ciocârlie

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Researches in COMPUTER SYSTEMS RELIABILITY

RESEARCH TEAM

- Prof.dr.eng. Mircea Vladutiu
- Lecturer dr.eng. Marius Marcu
- Assist.eng. Lucian Prodan
- Assist.eng. Mihai Udrescu

MAIN ACTIVITIES

- Watchdog processor for reliability increasing of computers
- Selftesting development concepts
- Selfchecking 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

RESULTS

PUBLISHED PAPERS

1. Marcu M., Vladutiu M., Moldovan H., *Microprocessor Thermal Characterization using Thermal Benchmark Software*, WSEAS Transactions on Computers, Issue 11, Vol. 5, Nov. 2006, ISSN 1109-2750, pp. 2628-2633
2. Marcu M., Vladutiu M., Moldovan H., *Microprocessor Thermal Benchmark*, Proceedings of the 10th WSEAS International Conference on Computers, WSEAS 2006, Athens, Greece, Jul. 2006, ISBN 960-8457-47-5, pp. 1220-1223
3. Marcu M., Vladutiu M., *Realistic Resistive Bridging Faults Simulation Using SPICE Models*, 15th IEEE North Atlantic Test Workshop, NATW 2006, Inn at Essex, USA, May 2006, pp. 204-209

4. Marcu M., Vladutiu M., *Two-Values Fault Coverage Definition for Realistic Resistive Bridging Faults Simulation*, Proceedings of the 7th International Conference on Technical Informatics, CONTI'2006, Timisoara, June 2006, ISBN (10) 973-625-321-X, (13) 978-973-625-321-8, pp. 131-136
5. Marcu M., Vladutiu M., Fuicu S., *Fault Selection Pseudo-Genetic Algorithm for Fault Coverage Interval Estimation*, Proceedings of the 7th International Conference on Technical Informatics, CONTI'2006, Timisoara, June 2006, ISBN (10) 973-625-321-X, (13) 978-973-625-321-8, pp. 127-130
6. Marcu M., Vladutiu M., Moldovan H., Popa M., *Thermal Benchmark and Power Benchmark Software*, International Workshops on THERMAL INvestigations of ICs and Systems (THERMINIC 2006), Nice, France, Sept. 27-29, 2006, ISBN 2-916187-0409, pp. 203-208
7. Prodan L., Udrescu M., Vladutiu M., *A Dependability Perspective on Emerging Technologies*, Proceedings 3rd ACM International Conference on Computing Frontiers (CF'06), Ischia, Italy, May 2-5, 2006, pp. 187-198
8. Udrescu M., Prodan L., Vladutiu M., *Implementing Quantum Genetic Algorithms: A Solution Based on Grover's Algorithm*, Proceedings 3rd ACM International Conference on Computing Frontiers (CF'06), Ischia, Italy, May 2-5, 2006, pp. 71-82

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Researches in DISTRIBUTED DATA BASES AND ARTIFICIAL INTELLIGENCE

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- Lect.dr.eng. Dan Pescaru
- Lect.dr.eng. Sorin Babii
- Lect.dr.eng. Doru Todinca
- Assist.eng. Liliana Jian
- Assist.eng. Cosmin Cernazanu
- Assist.eng. Dan Ciresan

MAIN ACTIVITIES

- Designing and implementing relational databases with complex network structures
- Pattern recognition in medicine and chemistry
- Development of a hybrid expert system (rules + neural network) for research in infectious diseases
- Implementing 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. Zafiu A., Stefanescu I., Holban St., Franti E., *An algorithm to determine the multivalued implicant vectors with a guaranteed minimum number of specified entries*, WSEAS Transaction on Computers Research Issue 2, vol 1, Dec 2006, ISSN 1991-8755, pp. 272-278
2. Tundrea E., Lahire P., Pescaru D., Chirila C.B., *SmartFactory - A Prototype for Model Oriented Software Engineering Based on Eclipse Platform*, Proceedings of the International Conference on Technical Informatics - CONTI'2006, ISBN 978-973-625-319-5, vol. 2, Timisoara, June 8-9, 2006, pp. 71-76
3. Tundrea E., Lahire P., Pescaru D., Chirila C.B., *SmartModels - A Framework For Generating On-Line Learning Software Solutions*, Proceedings of the 12th International Conference NETTIES 2006, ISBN (10): 973-638-262-1 ISBN (13): 978-973-638-262-8, Orizonturi Universitare, Timisoara, September 6-9, 2006, pp. 69-75
4. Tundrea E., Pescaru D., Chirila C.B., *SmartModels. A Model Oriented Approach Validated by a Prototype Based on Eclipse Platform*, 2006 IEEE-TTTC International Conference on Automation, Quality&Testing, Robotics AQTR 2006, Cluj, Romania, May 25-28, 2006
5. Cosma M., Pescaru D., Ciubotaru B., Todinca D., *Routing and Topology Extraction Protocol for a Wireless Sensor Network using Video Information*, 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence (SACI'06), Timisoara, May 25-26, 2006
6. Chirila C.B., Ruzsilla Monica, Crescenzo P., Lahire P., Pescaru D., Tundrea E., *Towards a Reengineering Tool for Java based on Reverse Inheritance*, 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence (SACI'06), Timisoara, May 25-26, 2006
7. Ciresan D., Pescaru D., *Using Character Moment Based Invariant Features to Improve Off-Line Handwriting Recognition*, 8th International Conference on Development and Application Systems DAS'06, Suceava, Romania, 25-27 May, 2006
8. Pescaru D., Fuiorea D., Gui V., Toma C., Gabriel-Miro Muntean, A. Doboli, *Image-based Node Localization Algorithm for Wireless Video Sensor Networks*, IT&T Conference 2006, Carlow, Ireland, ISSN 1649-1246, 25-26 October, 2006, pp. 139-148
9. Fuiorea D., Pescaru D., Gui V., Toma C., *Feature Based 2D Image Registration Using Mean Shift Parameter Estimation*, Scientific Bulletin of the "Politehnica" University of Timisoara, Trans. on Electronics and Communications, Vol. 51(65), no2/2006, ISSN 1583-3380, pp. 77-80
10. Crisan M., *Meaning as Cognition*, Proceedings 1st International Conference on Multidisciplinary Information Sciences and Technologies-InSciT'2006, Merida, Spain, ISBN-10 Vol. II: 84-611-3105-3, pp.369-373
11. Crisan M., *Information Machine and the Gödelian Case*, Scientific Bulletin of the "Politehnica" University of Timisoara, Trans. on Automation and Computer Science, Vol. 51 (65), No.4, 2006, pp. 45-50
12. Crisan M., *Meaning as Differentiated-Cognition*, Proceedings 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence - SACI'2006, Timisoara, pp. 602-613
13. Crisan, M., *Upon the Gödelian Argument*, Proceedings 7th International Conference on Technical Informatics - CONTI'2006, Timisoara, Vol. 2, pp. 179-182

RESEARCH GRANTS AND CONTRACTS

1. *Bio-View – Program set for simulation of biological processes with dedicated interface*, VIASAN Program, Interdisciplinary Subprogram #4, PED project, value for 2006: 20,000 RON, Director: Stefan Holban
2. *Integrated informatic system for complex evaluation of risk and quality prediction factors in obstetrics*, CEEX-INFOSOC 99/31.07.2006, value for 2006: 17,000 RON, Director: Stefan Holban
3. *Platform for video surveillance applications based on wireless sensor networks*

technology, CNCSIS MEdC No. 2739/2006, value for 2006: 22,500 RON, Director: Dan Pescaru

4. *Intelligent anticipatory agent oriented on decision and e-learning applications*, CNCSIS grant No. 346/3/2006, value for 2006: 15,400 RON, Director: Marius Crişan

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Researches in *ELECTRICAL MACHINES TESTING AND DIGITAL SIGNAL PROCESSING*

RESEARCH TEAM

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- Lect.dr.eng. Mihai Micea
- Lect.dr.eng. Ioana Șora
- Dr.eng. Gheorghe Madescu
- Dr.eng. Marțian Moț
- Eng. Simion Drăgan

MAIN ACTIVITIES

- Testing, modeling and monitoring in the domain of electric machines and equipments using data acquisition and processing systems.
- Design and implementation of digital signal conditioning, acquisition and data processing systems.
- Data recording and processing programs for transient regime analysis of electrical machines.
- Optimal design of electrical machines.
- Virtual instrumentation systems.
- Modeling, Design and Development of Real-Time Systems for Critical Applications of Data Acquisition, Signal Processing and Embedded Control.

BOOKS

Crețu, V., *Data structures and algorithms: Course for online education*, 186 pages, UPT Publ. Center, 2006

PUBLISHED PAPERS

1. Micea, M., Crețu, V., Groza V., *Maximum Predictability in Signal Interactions with the HARETICK Kernel*, IEEE Transactions on Instrumentation & Measurement, August 2006,

Vol. 55, Nr. 4, IEIMAO, ISSN 0018-9456, pp. 1317-1330

2. Muscalagiu I., Crețu V., *Improving the Performances of Asynchronous algorithms by combining the nogood processors with no good learning techniques*, Informatica, Vol. 17, No. 1, 2006, ISSN 0868-4952, pp. 39-54
3. Bocan V., Crețu V., *Mitigating Denial of Service Threats in GSM Networks*, Proceedings of ARES 2006, First International Conference on Availability, Reliability and Security, Vienna, pp.523-528
4. Muscalagiu I., Crețu V., Popa E., *Message Management in the Case of AWACS Family Techniques*, Proceedings 7th International Conference on Technical Informatics – Conti'2006, ISBN 978-973-625-319-5, Vol. 2, Computer and Software Engineering, Timisoara, 2006, pp. 215- 220
5. Fagadar-Cosma M., Faniciu L. D., Micea M., *Data Routing and Remote Protocol Analysis using the TETHRA System*, Proceedings 32nd Annual Conference of the IEEE Industrial Electronics Society, IECON'06, Paris, France, Nov. 2006, ISBN 1-4244-0136-4, pp. 603-608
6. Cioarga R. D., Micea M., Ciubotaru B., Chiuciudean D., Stanescu Daniela, *CORE-TX: Collective Robotic Environment - the Timisoara Experiment*, Proceedings 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, SACI'2006, Timisoara, May 2006, ISBN 963-7154-46-9, pp. 495-506

RESEARCH GRANTS AND PROJECTS

1. *Requirement Control System*, Disertation Research Project for Fraunhofer Institute of Manufacturing Engineering and Automation (IPA) Stuttgart, Germany, Director: Vladimir Crețu
2. *Modeling, design and development of real-time systems for critical embedded applications of signal acquisition, processing and digital control*, CNCSIS grant 717/2005-7, Theme 7/2005, value for 2006: 20,995 RON, Director: Vladimir Crețu
3. *Real-time systems embedded in complex applications of distributed artificial perception, collaborative robotized milieus and intelligent sensor networks*, Research Grant of Excellence, CEEX-ET-07/2006-2008, MEdC - UEFISCSU, Contract No.1437/28/2006, value for 2006: 126,000 RON, Director: Mihai V. Micea, Team: Ioana Sora, Dan Chiciudean, Razvan Cioarga, Bogdan Ciubotaru

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**Researches in OBJECT-ORIENTED
SOFTWARE ENGINEERING****RESEARCH TEAM**

- Assoc.prof.dr.eng. Radu Marinescu
- Assoc.prof.dr.eng. Marius Minea
- Assist.eng. Călin Jebeleanu
- Assist.eng. Cristina Marinescu
- Assist.eng. Petru Florin Mihancea

RESEARCH FIELDS

- Evolution and re-engineering of object-oriented software systems
- Software quality assurance
- Analysis and formal verification of software

KEYWORDS

Object-oriented software evolution, re-engineering, design faults, detection strategies, quality metrics, quality assurance, analysis tools, formal verification

BOOKS

1. Clarke, E., Minea, M., Tiplea, F.L., *Verification of Infinite-State Systems with Applications to Security*, (Volume 1 in NATO Security through Science Series: Information and Communication Security), IOS Press, Jan. 2006, ISBN 1-58603-570-3, 244 pages
2. Marinescu C., Mihancea P. F., *Programare Orientata pe Obiecte in Limbajul Java (Object-oriented programming in Java)*, "Politehnica" Publishing House, Timisoara, 2006, ISBN (10)973-625-306-6, (13)978-973-625-306-5, 200 pages

PUBLISHED PAPERS

1. Jebelean C., Cretu V., *A Proposal to Support the Extreme Programming Development Methodology from Quality Assurance Point of View*, Proceedings 8th Int. Conference on Technical Informatics–Conti'2006, ISBN 978-

973-625-319-5, Vol.2, Computer and Software Engineering, Timisoara 2006, pp. 37-42

2. Marinescu C., Jurca I., *A Meta-Model for Enterprise Applications*, 8th International Symposium on Symbolic and Numeric Algorithms for Scientific Computation, SYNASC 2006, Timisoara, Romania, IEEE Computer Society Press
3. Marinescu C., *Quality Assessment of Enterprise Software Systems*, 13th Working Conference on Reverse Engineering, WCRE 2006, Benevento, Italy, Doctoral Symposium Section, IEEE Computer Society Press, ISBN 0-7695-2719-1, pp. 309-310
4. Marinescu C., *Identification of Design Roles for the Assessment of Design Quality in Enterprise Applications*, 14th International Conference on Program Comprehension, ICPC 2006, Athens, Greece, IEEE Computer Society Press, ISBN 0-7695-2601-2, pp.169-178
5. Mihancea P. F., *Towards a Client Driven Characterization of Class Hierarchies*, Proceedings 14th International Conference on Program Comprehension, ICPC 2006, Athens, Greece, IEEE Computer Society Press, ISBN 0-7695-2601-2, pp. 285-294

RESEARCH CONTRACTS

1. *Research and training in software testing, verification and validation*, contract with OCE Software SRL, No. 479/27.06.2006, value 19.500 RON, Director: Marius Minea
2. *Quality evaluation in distributed software systems*, CNCSIS TD grant No. 58GR/2006, Director: Cristina Marinescu
3. *Methods for analysis the relations between the architectural components in OCE applications*, Contract with OCE Software SRL, No. 197/22.02.2006, Director: Cristina Marinescu

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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
- Fuzzy and neural systems
- Virtual instrumentation in control
- Control of electrical drives

Research group in APPLIED SYSTEMS THEORY

RESEARCH TEAM

- Prof.dr.eng. Toma-Leonida Dragomir, head of the team
- Assoc.prof.dr.eng. Constantin Voloşencu
- Lecturer dr. eng. Dorina Popescu
- Lecturer dr. eng. Sorin Nanu
- Assist. eng. Ana Maria Dan
- PhD Student eng. Adrian Korodi

MAIN RESEARCH FIELDS

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

KEYWORDS

Fault detection, identification and diagnosis, modelling, system safety and availability, controller design, process control, interpolating strategies, fuzzy logic, neural networks, control of electrical drives, virtual instruments.

RESULTS

RESEARCH GRANTS AND PROJECTS

1. CNCSIS Grant no. 309/33062, Research theme in cooperation with the University of Craiova, *The development of automated structures for increase the dependability of the control systems with applications in industrial systems (energetics, chemistry, aviation, robotics)*, 2004 (continued in 2005 and 2006)
2. CNCSIS Grant, Code 205, theme no. 25, contract no. 32940/22.06.2004 (continued in

2005 and 2006), *Researches to implement strategies based on fuzzy logic and neural networks for fault detection and diagnosis, with application at the electrical drives*, Director: Assoc.prof.dr.eng. Constantin Voloşencu

BOOKS

1. Popescu D., *Introduction in the Sensitivity Theory of Dynamical Systems* (in Romanian), Universitaria Publishing House, Craiova, 2006, ISBN 973-742-292-9, 174 pages
2. Dragomir T. L., *System Theory - Applications*, second edition, "Politehnica" Publishing House, 2006, ISBN 973-625-233-7, 204 pages

PAPERS

1. Gabor G., Korodi A., Dragomir T. L., *Increasing Availability for Vaporizers Temperature Stabilization of a Geothermal Power Plant*, Proceedings 7th Int. Conference on Technical Informatics–CONTI'2006, Vol. 1, Automation and Applied Informatics, Timisoara, June 2006, ISBN (10)973-625-320-1, ISBN (13)978-973-625-320-1, pp. 25-30
2. Groza B., Dragomir T.L., Petrica D., *Using the Discrete Squaring Function in the Delayed Message Authentication Protocol*, International Conference on Internet Surveillance and Protection, ICISP'06, France, 26-28 Aug. 2006, IEEE Computer Society Press, IEEE Computer Society Order Number E2649, Library of Congress Number 2006929554, ISBN 0-7695-2649-7, on CD
3. Korodi A., Dragomir T. L., Gabor G., *Temperature Control Solution Using Interpolation for a Geothermal Power Plant*, IFAC WS ESC'06, Energy Saving Control in Plants and Buildings, October 2-5, 2006 Bansko, Bulgaria, ISBN (10)954-9641-47-3, ISBN (13)978-954-9641-47-9, pp. 235-240
4. Korodi A., *Interpolative Fault Tolerant Controller for a Mobile Robot*, 12th IEEE International Conference on Methods and Models in Automation and Robotics MMAR, 28-31 August 2006, Miedzyzdroje, Poland, ISBN 83-60140-93-6, pp. 651-656
5. Korodi A., *Structuri de Reglare Folosite pentru Roboți*, Raport Științific Intern, June 2006, 68 pages

6. Popescu D., Honae D., *An Approach about State - Space Observers Design Using Sensitivities*, Proceedings 7th International Conference on Technical Informatics–CONTI'2006, Vol.1, Automation and Applied Informatics, Timisoara, June 2006, ISBN (10)973-625-320-1, ISBN (13)978-973-625-320-1, pp. 107-110

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For the field "Management of the innovation and creativeness"

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Research group in *PROCESS CONTROL*

RESEARCH TEAM

- Lect.eng. Florin Drăgan
- Assist.eng. Onuț Lungu
- Assist.eng. Emil Voișan
- PHD student Dan Alexandru
- Assist. eng. Daniel Iercan

RESEARCH FIELDS

- Chaotic systems
- Programmable Logic Controllers
- Remote control
- Operating Systems
- Real-time Programming

KEYWORDS

Chaotic systems, programmable logic controllers, remote control.

ACTIVITIES

- camera virtual with COIN 3D
- haptic device control
- analysis and synthesis of the electronic converters with chaotic behaviour

PUBLISHED PAPERS

1. Drăgan F., *Controlling Chaos in DC/DC Converters using Ott-Grebogi-Yorke and Pyragas Methods*, WSEAS Transactions on Circuits and Systems, Vol. 5, No. 6, June 2006, ISSN 1109-2734, pp. 849-854
2. Drăgan F., *Controlling a chaotic behavior of a Current Mode Controlled Boost Converter Using OGY Method*, IEEE-TTTC Int.

Conference on Automation, Quality&Testing, Robotics, AQTR 2006, Cluj-Napoca, Romania, ISBN 1-4244-0361-8, pp. 118-121

3. Ghosal A., Henzinger T. A., Iercan D., Kirsch C., Sangiovanni-Vincentelli A., *A Hierarchical Coordination Language for Interacting Real-Time Tasks*, EMSOFT, Seoul, Korea, ISBN 1-59593-542-8, pp. 132-141
4. Iercan D., Ghosal A., *Timed Input/Output Determinacy for Tasks with Precedence Constraints*, Proc. 7th International Conference on Technical Informatics - CONTI'2006, ISBN 978-973625-321-8, pp. 149-154
5. Voisan E., Iercan D., Dragan F., Lungu O., *Hardware-software Solutions to Surveillance an Objective*, Proc. 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, ISBN 963-7154 46-9, pp. 248-255
6. Ghosal A., Henzinger T.A., Iercan D., Kirsch C., Sangiovanni-Vincentelli A., *Hierarchical Timing Language*, Technical Report EECS-2006-79, University of California, Berkeley

STRATEGIC PRIORITIES

- Control of chaotic systems
- Remote control

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Research group in *CRYPTOLOGY AND INFORMATION SECURITY*

RESEARCH TEAM

- Lecturer dr. eng. Dorina Petrică, head of team
- Phd student Bogdan Groza
- Assist.eng. Lavinia Dragomir
- Assist.eng. Raul Robu
- Assist.eng. Căiman Dadiana

RESEARCH FIELDS

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

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.

ACTIVITIES

- Development of efficient authentication protocols without prior shared secrets.
- Implementation of one-way chained based authentication protocols with or without time synchronization.
- Research in public-key cryptography and foundations of cryptology.

PUBLISHED PAPERS

1. Groza B., *Using one-way chains to provide message authentication without shared secrets*, 2nd International Workshop on Security, Privacy and Trust in Pervasive and Ubiquitous Computing, SecPeru'06, Lyon, France, 2006, IEEE Computer Society, ISBN 0-7695-2549-0, pp. 82-87
2. Groza B., *Construction techniques for one-way chains and their use in authentication*, Control Engineering and Applied Informatics Journal, vol. 8, no. 1, 2006, ISSN 1454-8658, pp. 42-51
3. Groza B., *The Delayed Message Authentication Protocol with Chains Constructed on the Discrete Power Function*, 7th International Conference on Technical Informatics CONTI'2006, ISBN 973-625-319-X, pp. 33-36
4. Groza B., Petrica D., *On chained cryptographic puzzles*, 3rd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, SACI'2006, ISBN 963-7154-46-9, pp. 182-191
5. Silea I., Petrica D., *Simulink Model for Switched Reluctance Motor Drives*, 7th International Conference on Technical Informatics CONTI'2006, ISBN 973-625-319-X, pp. 201-208
6. Silea I., Petrica D., *Aspects of TGS 813 Gas Sensor's Use*, 3rd Romanian-Hungarian Joint Symposium on Applied Computational

Intelligence, SACI'2006, ISBN 963-7154-46-9, pp. 192-203

7. Silea I., Petrica D., *Distributed Informatic System for the Measurement and Control of Various Dangerous Gases Concentration*, Scientific Bulletin of the "Poliytchnica" University of Timisoara, Transactions on Automatic Control and Computer Science, Vol. 51(65), No. 1, 2006, ISSN 1224-600X, pp. 65-70

RESEARCH GRANTS

1. MEdC-CNCSIS Grant TD-90/2006, *Security protocols and cryptographic techniques based on one-way functions for assuring information authenticity*, Director: Bogdan Groza
2. Cooperation with the University of Craiova under MEdC-CNCSIS Grant A-309/2006, *The development of automated structures for increase the dependability of the control systems with applications in industrial systems (energetics, chemistry, aviation, robotics)*

PERSPECTIVE DOMAINS

- DoS resistant authentication protocols.
- Public-key encryption schemes secure against IND-CCA2 (NM-CCA2) adversaries.
- The use of cryptographic techniques for assuring security in industrial control systems.

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