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**, recipient of 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 division: **Prof. dr. eng Radu-Emil Precup**

➢ *Research Division in Computer Science and Engineering*
Head of 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. Zsuzsa Preitl, PhD student
➢ Assist. eng. Simona Vaivoda, PhD student
➢ Dipl. eng. Ion-Bogdan Ursache, PhD student
➢ Dipl. math. Petru Alexandru Clep, PhD student

RESEARCH FIELDS

➢ Conventional control system structures
➢ 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; signal processing.

MAIN ACTIVITIES

➢ Development of conventional and advanced control systems
➢ Signal processing in 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., Korondi P., *Fuzzy Controllers with Maximum Sensitivity for Servosystems*, IEEE Transactions on Industrial Electronics, ISSN 0278-0046, vol. 54, no. 3, 2007, pp. 1298–1310

2. Precup R.-E., Preitl St., *PI-Fuzzy Controllers for Integral Plants to Ensure Robust Stability*, Information Sciences, Elsevier Science, ISSN 0020-0255, vol. 177, no. 20, 2007, pp. 4410–4429

3. Tomescu M.-L., Preitl St., Precup R.-E., Tar J. K., *Stability Analysis Method for Fuzzy Control Systems Dedicated Controlling Nonlinear Processes*, Acta Polytechnica Hungarica, Budapest Tech Polytehnical Institution, Budapest (Hungary), ISSN 1785-8860, vol. 4, no. 3, 2007, pp. 127–141

4. Precup R.-E., Tomescu M. L., Preitl St., *Lorenz System Stabilization Using Fuzzy Controllers*, International Journal of Computers, Communications & Control, Agora University, CCC Publishing, EBSCO Publishing, ISSN 1841-9836, vol. II, no. 3, 2007, pp. 279–287

5. Precup R.-E., Tomescu M. L., Preitl St., Tar J. K., Paul A. S., *Stability Analysis Approach for Fuzzy Logic Control Systems with Mamdani Type Fuzzy Logic Controllers*, Control Engineering and Applied Informatics, Romanian Society of Control Engineering and Technical Informatics, Bucureşti, ISSN 1454-8658, vol. 9, no. 1, 2007, pp. 3–10

6. Precup R.-E., Preitl St., *On Iterative Approaches for Optimal Tuning of Two-*

Degree-of-Freedom Controllers, Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara, Seria Automatică şi Calculatoare, ISSN 1224-600X, vol. 52 (66), fasc. 1, 2007, pp. 37–44

7. Gaudia A., Korondi P., Precup R.-E., Preitl St., *Approach to Recognize Unusual Behaviors in Distributed Environments*, Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara, Seria Automatică şi Calculatoare, ISSN 1224-600X, vol. 52 (66), fasc. 2, 2007, pp. 73–80

8. Precup R.-E., Preitl St., Ursache I.-B., Clep P. A., Spânu F., *Experiments in Linear and Sliding Mode Control of First- and Second-order Lag Plus Dead Time Processes*, Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara, Seria Automatică şi Calculatoare, ISSN 1224-600X, vol. 52 (66), fasc. 3, 2007, pp. 115–126

9. Precup R.-E., Preitl St., Tar J. K., Takács M., *Optimization Aspects in a Class of Fuzzy Controlled Servosystems*, Proceedings 11th International Conference on Intelligent Engineering Systems INES 2007, Budapest, Hungary, ISBN 1-4244-1148-3, 2007, pp. 235–240

10. Tar J. K., Rudas I. J., Preitl St., Precup R.-E., *Adaptive Control of the TORA System based on a Simple Causal Filter*, Proceedings 16th International Workshop on Robotics in Alpe-Adria-Danube Region RAAD 2007, Ljubljana, Slovenia, ISBN 978-961-243-067-2, 2007, pp. 363–370

11. Precup R.-E., Preitl Zs., Preitl St., *Iterative Feedback Tuning Approach to Development of PI-Fuzzy Controllers*, Proceedings 2007 IEEE International Conference on Fuzzy Systems FUZZ-IEEE 2007, London, UK, ISBN 1-4244-1210-2, 2007, pp. 199–204

12. Precup R.-E., Preitl Zs., Petriu E. M., *Delta Domain Design of Low-Cost Fuzzy Controlled Servosystems*, Proceedings 2007 IEEE International Symposium on Intelligent Signal Processing WISP 2007, Alcala de Henares, Madrid, Spain, CD-ROM, 2007, paper index 33, 6 pp.

13. Precup R.-E., Preitl Zs., Preitl St., Vaivoda S., Tar J. K., Takács M., *Two-Degree-of-Freedom Fuzzy Control in Decentralized Trajectory Tracking*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timişoara, ISBN 1-4244-1234-X, pp. 93–98

14. Preitl St., Precup R.-E., Preitl Zs., Vaivoda S., *Case Studies in Teaching Advanced Control Strategies*, Proceedings 16th International Conference on Control Systems and Computer Science CSCS-17, Bucharest, Editors: I. Dumitrache, S. S. Iliescu, ISBN 978-973-718-741-3, vol. 1, 2007, pp. 634–639

15. Pozna Cl., Precup R.-E., *Plausible Reasoning and Fuzzy Logic*, Proceedings 5th IEEE International Conference on Computational Cybernetics ICCC 2007, Gammarth, Tunis, ISBN 1-4244-1146-7, 2007, pp. 51–56

RESEARCH GRANTS AND PROJECTS

National grants and projects

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 modelling 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 the offer of systematic approaches.

The developed controller structures and software were 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 baked 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 then 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. Stefan 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.no. 35 ID no.17)

Nowadays computational intelligence theory and techniques and Intelligent Systems are in the trend and focus of research interest. 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. Several shortcomings appear 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 mathematical processing of input and output signals oriented to complex control systems is investigated.

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 depends 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 exchange of research results in the field.

PERSPECTIVE DOMAINS

- ➢ Methods for 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
- ➢ Control solutions in power systems, electrical drives, general industrial automation, mobile robots.

STRATEGIC PRIORITIES

- ➢ Control systems ensuring desired 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 Proştean, head of team
- ➢ Prof.dr. eng. Nicolae Budişan, 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 Vaşar, PhD student
- ➢ Assist. eng. Andreea Robu, PhD student

RESEARCH FIELDS
- ➢ System modelling, identification and simulation
- ➢ Unconventional energetic
- ➢ Neural networks and fuzzy systems
- ➢ Adaptive control systems

KEYWORDS
Modelling; identification and simulation of systems; neural networks and fuzzy systems; wind energy conversion systems; unconventional energetic; adaptive control; self-tuning.

MAIN ACTIVITIES

- ➢ Modelling, 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
- ➢ Modelling and simulation of systems with neural networks
- ➢ Development of WECS software
- ➢ Development of adaptive control structures
- ➢ Development of data acquisition systems.

RESULTS

PUBLISHED PAPERS

1. Budisan N., Prostean O., Robu N., Filip I., *Revival by Automation of Induction Generator for Distributed Power Systems in Romanian Academic Research*, Renewable Energy, Elsevier Ltd., ISSN 0960-1481, vol. 32, no. 9, July 2007, pp. 1484–1496

2. Filip I., Vasar C., *About Initial Setting of a Self-Tuning Controller*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timişoara, ISBN 1-4244-1234-X, May 2007, pp. 251–256

3. Budisan N., Filip I., Prostean O., Szeidert I., Mihet-Popa L., *Considerations Regarding the Induction Generator's Self-Excitation Within Energy Power Stations*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timişoara, ISBN 1-4244-1234-X, May 2007, pp. 257–261

4. Mihet-Popa L., Prostean O., Filip I., Szeidert I., Vasar C., *Fault Detection Methods for Frequency Converters Fed Induction Machines*, Proceedings 12th IEEE International Conference on Emerging Technologies and Factory Automation ETFA 2007, Patras, Greece, ISBN 1-424-0826-1, Sept. 2007, pp. 161–168

5. Filip I., Prostean O., Dragan F., Vasar C., *Neural-Adaptive Control Based on Adaline Neurons with Application to a Power System*, Proceedings 4th IFAC Conference on Management and Control of Production and Logistics MCPL 2007, Sibiu, Romania, ISBN 978-976-739-481-1, Sept. 2007, pp. 457–464

6. Vasar C., Szeidert I., Filip I., Prostean G., *Short Term Electric Load Forecast with Artificial Neural Networks*, Proceedings 4th IFAC Conference on Management and Control of Production and Logistics MCPL 2007, Sibiu, Romania, ISBN 978-976-739-481-1, Sept. 2007, pp. 443–450

7. Dragan F., Curiac D., Iercan D., Filip I., *Sliding Mode Control for a Buck Converter*, Proceedings 9th WSEAS International Conference on Automatic Control, Modelling & Simulation ACMOS '07, Istanbul, Turkey, ISSN 1790-5117, ISBN 978-960-8457-72-0, May 2007, pp. 161–164

8. Filip I., Prostean O., Szeidert I., Vasar C., *Consideration Regarding the Convergence and Stability of an Adaptive Self-Tuning Control System*, Proceedings 5th IEEE International Conference on Computational Cybernetics, Gammarth, Tunis, ISBN 1-4244-1146-7, Oct. 2007, pp. 75–79

9. Budisan N., Filip I., Balas V., Prostean G., Szeidert I., *Considerations Regarding the Induction Generator's Compound Excitation*, Proceedings 2nd IASME/WSEAS International Conference on Energy & Environment, Portorose, Slovenia, ISSN 1790-5095, ISBN 978-960-8457-69-0, May 2007, pp. 140–146

10. Babescu M., Filip I., Balas V., Prostean O., Vasar C., *Considerations Regarding the Control of a Mixed Genset Based on the Usage of Synchronous and Asynchronous Generator*, Proceedings 2nd IASME/WSEAS International Conference on Energy & Environment, Portorose, Slovenia, ISSN 1790-5095, ISBN 978-960-8457-69-0, May 2007, pp. 123–128

11. Filip I., Vasar C., Prostean O., *Neural Predictors for Electric Energy Consume within Power Systems*, Proceedings 8th International Conference on Applied Electromagnetics, Nis, Serbia, ISBN 978-86-85195-47-0, Sept. 2007, CD-ROM, pp. 1-6

RESEARCH GRANTS AND PROJECTS

National grants and projects

1. National University Research Council (CNCSIS), research grant "*Researches regarding the control of new wind aggregates structures, with non-regulated blades and permanent magnet synchronous generator*", Grant Type A, CNCSIS Code 372/2007, Contract no. 46GR/11.05.2007, Director: Prof. Octavian Prostean, PhD, Financial value: 90,000 RON

The proposed project has the research theme, goal and objectives associated to the priority research domains at international level, researches regarding the control of new wind aggregates structures with vertical axis for conversion of renewable energies, with turbine self limiting blades, with non-regulated

position. The thematic area concerns the increase of the usage degree of wind energy conversion systems as a non-pollutant energy source, conducting to the reducing of carbon emissions and pollution due to the usage of non-ecological resources (coal/gases/oil energy plants), highly pollutant, in concordance to the global trend of ecologic energy production. The scientific importance and the fundamental research character of the proposed grant resides from the fact that the researches regard a scientific domain of a real actual interest, the usage of vertical axis wind turbines with non regulated pitch blades and without limiting (h-dariues, etc), with permanent magnet synchronous machines, having controlled rotation through the load, operating optimally, with variable rotation, usable in urban space (roof-top wind generators). The researches are extremely opportune and focused towards the cost reduction, the performances and efficiency increase, the repayment time period reduction. All those will become possible due to new innovative solutions, among them subscribing the one forecasted within grant researches regarding new elements and structures of the conversion line of wind energy into electrical energy (the elimination of the gear-box, new generator constructions and frequency converters) and respectively new structures and control methods for wind aggregates. The scientific importance is sustained by the new, original proposed solutions, opening the means of effective applicability in the power energy domain, but not only.

2. National University Research Council (CNCSIS), research grant "*Researches concerning the design and implementation of neural control strategies using digital signal processors, with application to the excitation control of the synchronous generators*", Grant Type A, theme no. 5, code 359/2007, Director: Assoc. Prof. dr. eng. Ioan Filip, Financial value: 15,000 RON

The design and synthesis of new control strategies based on neural networks, assuring higher control quality indicators, superior to the ones existing on the market, and their implementation on an informational support, in the actual trend of increased control process complexity, consists into an important component of the technological progress imposed by the informational society with a direct impact on the automatic control domain. The synthesis of new neural control solutions, particularized at the synchronous generators excitation control system, together with the completion of researches regarding the solving of certain issues related to the embedded software implementation on dedicated hardware such as the signal processor, consists into the main goal of the proposed project. In the context of the considered application regarding the synchronous generator excitation command system, the starting point of the research is represented by the identification of mathematical models of synchronous generator based on neural networks (considering several functioning regimes), suitable at simulation studies for the assisting of neural networks controllers design. There are taken into consideration two control strategies: one based on recurrent neural network having added at the final neuron an on-line bias adapting mechanism, respectively a strategy based on ADALINE neural model. The both control structures will be designed, synthesized and tested through simulation scenarios specific to synchronous generators functioning regimes. The last stage is represented by the solving of issues regarding software implementation on the hardware support delivered by a digital signal processor, taking into consideration the development of a Matlab toolbox, thus implementing modularly and flexibly the functionalities of the control structures based on neural networks, assuring rapid code portability into a high level programming language.

3. National University Research Council (CNCSIS), research grant "*Control Systems used in Unconventional Energetic*", Grant Type PN II RU – TD, CNCSIS Code 7/2007, Contract no.5/01.10.2007, Director: Assist.eng. Iosif Szeidert, PhD student, Financial value: 5,000 RON

The main objective of this research project is the automatic control of wind energy conversion systems. This project proposes researches of advanced control systems for wind energy conversion systems, the research being focused mainly on modern/ advanced 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 competitiveness, through the promotion of optimized automatic control structures such as: original conceptions regarding the structure and organization of electrogen systems with induction generators; the study of advanced control methods and strategies for the rotation and voltage of 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 were simulated on computers and on small power laboratory models having the generators drive elements, analogical modelled with electrical machines.

PERSPECTIVE DOMAINS

➢ Real time control of induction machines using LabView (LabWindowsCVI) using the

National Instruments Data Acquisition Systems and by using 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

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Researches in *MEDICAL INFORMATICS*

RESEARCH TEAM

- Prof.dr.eng. Lăcrămioara Stoicu-Tivadar, head of the team
- Prof.dr.eng. Vasile Stoicu-Tivadar,
- Dr. eng. Dorin Berian
- Assist. eng. Romina Pintea, PhD student,
- Asists. eng. Raul Robu, PhD Student
- Assist. eng. Andreea Robu, PhD Student

RESEARCH FIELDS

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

KEYWORDS

Distributed medical informatics; applied informatics; telemedicine.

MAIN ACTIVITIES

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

RESULTS

PUBLISHED PAPERS

1. Stoicu-Tivadar L., Morancea O., Purdel A., Srbin L., Djan M., *Communication Support in Healthcare – A Didactical Approach*, Proceedings 3rd International Conference: Euro-Mediterranean Medical Informatics and Telemedicine EMMIT 2007, Mangalia, Romania, ISBN 978-973-739-423-1, May 2007, pp. 37–43

2. Stoicu-Tivadar V., Berian D., Nica D., *An Extensible Telemedicine System Using DOM and XML*, Proceedings 3rd International Conference: Euro-Mediterranean Medical Informatics and Telemedicine EMMIT 2007, Mangalia, Romania, ISBN 978-973-739-423-1, May 2007, pp. 137–143

3. Stoicu-Tivadar V., Berian D., Nica D., *A Flexible Chronic Care Model Implementation in a GP Software*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timişoara, ISBN 1-4244-1234-X, May 2007, pp. 59–64

4. Berian D., Dragomir T. L., *Interpolative Models Regarding the Health Status of a Population*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timişoara, ISBN 1-4244-1234-X, May 2007, pp. 65–70

5. Stoicu-Tivadar L., Stoicu-Tivadar V., *Extension for a Chronic Care Model Implementation in a GP Network Using XML and DOM*, Medical Informatics in Enlarged Europe, European Federation for Medical Informatics, Proceedings of the Special Topic Conference 2007, Brijuni, Croatia, AKA & IOS Press, ISBN 978-3-89838-083-6 (Aka), ISBN 978-1-58603-763-5 (IOS Press), May 2007, pp. 87–94

PUBLISHED BOOKS

1. Berian D., *Structuri şi Strategii Asociate Sistemelor Informatice pentru Asistenţa Medicală Primară (Structures and Strategies associated to Information Systems for Primary Healthcare)*, Ed. Politehnica, Timişoara, ISBN 978-973-625-503-8, 2007, 222 p.

RESEARCH GRANTS AND PROJECTS

1. IBM Central/Eastern Europe, Middle East, and Africa (CEMA) Faculty Awards Program, *Analysing solutions for consistent healthcare services that support the continuity of care document representation using an IBM solution for SOA management.*

Participants: Lăcrămioara Stoicu-Tivadar, Vasile Stoicu-Tivadar, Dorin Berian, Romina Pintea ("Politehnica" University of Timişoara).

The objectives include: the analysis of the actual state of the art regarding evidence based medicine and the possibility to use SOA approach to the development of the domain, definition of the technical specifications for the proposed system, the development of the core of the application,

integrating the specifications of the HL7 standard, the design and development of the HL7 interfaces that will allow the HIS to communicate with adjacent medical systems, inserting the results to the content of a lecture in a master program.

The suggested R&D activities are:
development of a Computer Cluster (2 Servers, 2 Workstations) for testing & validation of the solution
Analysis of the WebSphere Business Services Fabric facilities for support in healthcare regarding message communication using HL7 standards;
implementation
testing
dissemination of the results
development of new Courses and Labs
running the new developed Courses and Labs
issuing the conclusions (final common meeting with medical and technical domain people).

The project will gather experiences from the medical and IT domains regarding the implementation of standards for communication of medical messages. The final goal is to ensure interoperability of systems in healthcare that will have as result lower costs on long term and a better clinical practice based on evidence from a large data set.

Based on IBM experiences the estimated results will help clients to achieve quicker (less time, less money) and more efficient implementation processes using service-oriented applications. The solution will try to find answers using the IBM key-segments from its offer of services and products: preparing IT infrastructure for SOA and creating SOA specialised on activity domains.

We will use a new technological platform – based on SOA that support semantic standards. In the project we will do this research referring to HL7 standard. We intend to work using the IBM products HL7 CDA (Clinical Document Architecture) Builder. We intend to study and implement the facilities offered by WebSphere Transformation Extender Pack for HL7, IBM WebSphere Transform Ext Pk HL7 V8.0.1. The hardware support will consist of IBM powerful equipment.

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

2. 2nd Romanian National Research Program *TELEASIS – NGN support-based, Complex System for home tele-attendance of elderly people.*
Participants: academic, research and medical organisations and SME's from Bucureşti, Timişoara, Iaşi, Piteşti. Local staff: Lăcrămioara Stoicu-Tivadar, Vasile Stoicu-Tivadar, Dorin Berian, Romina Pintea, Raul Robu, Andreea Robu ("Politehnica" University of Timişoara).

The main objective of the project is the development of a tele-support system for elderly people, from medical and social perspective, as well. This system has as a goal the implementation and development of the social and medical support services of elderly people, at their homes, in accordance with the fulfilment of the requirement of this category, to live in their own homes not in asylum. In this way, the project contributes to increase the active live duration of the people, and to optimise the customised management of the way of life of the assisted person.

The planned R&D activities will develop:
➤ an experimental model for a specific local intelligent unit for the homes of the elderly people
➤ an experimental model for the Teleassistace Centre
➤ the telecare network
➤ the specific database and the required software solutions
➤ a model of tele-attendance services
➤ a complete guide of the developed know-how and technology.

The project will contribute to the development of knowledge related to NGN networks, and middleware technologies, to the development of the complex tele-attendance software systems.

3. 2nd Romanian National Research Program SIMIMED –*Integrated medical information management system based on HL7 Standard.*
Participants: academic and medical organisations and SME's from Cluj, Timişoara, and Braşov. Local staff: Lăcrămioara Stoicu-Tivadar, Vasile Stoicu-Tivadar, Dorin Berian, Romina Pintea, Raul Robu, Andreea Robu ("Politehnica" University of Timişoara).

The main objective of the project is the research, design and implementation of a pilot integrated system development for the management of the patients, human and material resources in a hospital (Hospital Information System – HIS), based on the more advances Standards form the medical informatics domain - HL7, DICOM, EN 13606, adapted to the needs of the Romanian Healthcare system.

The planned R&D activities are:
The analysis of the actual context and the general design
The technical specifications definition for the HIS
The development of the kernel of the HIS, including the compliance with HL7 Standard
The design and the implementation of the software modules for each medical speciality
The design and development of HL7-compliant communication interfaces with other Healthcare information systems

The enlargement of the partnership with other medical organisations in order to implement the results of the project.

In this way, the project will develop a modular and flexible solution that one can adapt to any Healthcare organisation, and can integrate with other existing Healthcare Information systems.

PERSPECTIVE DOMAINS

a. Distributed architectures and appropriate technological solutions
b. Mobile applications and related technologies
c. Interoperability standards in distributed medical informatics
d. 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 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

➤ Prof. dr. eng. Nicolae Robu, head of the team
➤ Prof. dr. eng. Gheorghe-Daniel Andreescu
➤ Prof. dr. eng. Toma-Leonida Dragomir
➤ Assoc. Prof. dr. eng. Ioan SILEA
➤ Lecturer dr. eng. Sorin Nanu
➤ Assist. eng. Tiberiu Ionică
➤ Assist. eng. Ana-Maria Dan
➤ PhD. student eng. Cristian Schlezinger

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

Advanced control of electrical drives; Automotive electric actuation; Sensorless direct torque and flux control; State and disturbance observers; Variable structure flux-observer with signal injection; Active flux observer; Fault-tolerance; Fuzzy-interpolating implementation; Wind energy; Real-time implementations.

MAIN ACTIVITIES

➤ Control systems in Automotive electric actuation technologies
➤ Development of Sensorless control system with hybrid observer from zero speed for starter-generator with IPMSM for EHV
➤ Sensorless control of high-speed SPMSM
➤ Wind turbine PMSG sensorless control
➤ Real-time implementation and testing using DSpace for Sensorless control system of AC drives
➤ Informatics systems
➤ Solar energy.

RESULTS

PUBLISHED PAPERS

1. Fătu M., Lascu C., Andreescu G.-D., Teodorescu R., Blaabjerg F., Boldea I., *Voltage Sags Ride-Through of Motion Sensorless Controlled PMSG for Wind Turbines*, Proceedings 42nd IAS Annual Meeting, Industry Applications Conference IEEE-IAS 2007, New Orleans, Louisiana, USA, IEEE Press, ISSN 0197-2618, ISBN 978-1-4244-1260-9, Sept. 2007, pp. 171–178

2. Ancuți R., Andreescu G.-D., Boldea I., Iles-Klumpner D., *Four Rotor Position and Speed Simplified Estimators for Vector Control of High-Speed SPMSM, With Test Comparisons*, Journal of Electrical Engineering JEE, http://www.jee.ro, ISSN 1582-4594, vol. 7, no. 4, Dec. 2007, paper 7.4.8, pp. 1–8

3. Boldea I., Andreescu G.-D., Rădulescu M. M., Cernat M., *Tehnologii noi de actuatoare electrice pentru automobile*, Symposium Scientific Contributions in Transports – CEEX Programme, Bucharest, ISBN 978-973-0-05258-9, Nov. 2007, pp. 127–130

4. Boldea I., Andreescu, G.-D. Rădulescu M. M., Cernat M., *Tehnologii noi de actuatoare electrice pentru automobile – CEEX programme X2C33/2006*, Bucharest, Nov. 2007, ISBN 978-973-0-05258-9, pp. 381–384

5. Fatu M., Lascu C., Andreescu G.-D., Teodorescu R., Blaabjerg F., Boldea I., *Voltage Sags Ride-Through of Motion Sensorless Controlled Dual Converter Wind PMSG,* Timis Academic Days, X-th edition, Symposium on Electrotechnics and Electroenergetics, Timişoara, ISBN 978-973-625-436-9, May 2007, CD-ROM: 5.pdf, pp. 1–8

6. Silea I., *Computational Support and Equipment for the Study of Temperature Adjustment in a Laboratory*, Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara, Seria Automatică şi Calculatoare, Timişoara, ISSN 1224-600X, vol. 52 (66), no. 3, 2007, pp. 127–132

7. Robu N., Andone D., Vasiu R.,*Using On-Line Tools for E-Learning in Romania*, Proceedings 13th International Conference on Technology Supported Learning & Training ICWE 07, Berlin, Germany, ISBN 3-9810562-7-2, Dec. 2007, pp. 201–204

8. Vasiu R., Andone D., Robu N., *E-Learning in Romania – A Critical Analysis*, Proceedings 13th International Conference on Technology Supported Learning & Training ICWE 07, Berlin, Germany, ISBN 3-9810562-7-2, Dec. 2007, pp. 410–412

RESEARCH GRANTS AND PROJECTS

1. Research Grant of Excellence, CEEX: X2C33/ 2006 *Automotive Electric Actuation Technologies (AEAT)*; UPT Scientific coordinator: Prof.dr.eng. G. D. Andreescu (financial value for 2007: 64,000 lei)

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 42Vdc battery model and an efficient battery state estimator 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 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-BEGA) 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 2007 the main activity and results were to realize experimental models and to do preliminary experimental tests for all our objectives. International cooperation in the field with the Aalborg University, Institute of Energy Technology, Denmark, included the mobility of Prof.dr.eng. Gheorghe-Daniel Andreescu as a visiting professor for 2 weeks.

PERSPECTIVE DOMAINS

➢ Automotive control
➢ Advanced control of electric drives, Robotics
➢ Real-time control using LabView
➢ Applications with FPGA using VHDL, Xilinx.

STRATEGIC PRIORITIES

➢ Control of EHV and Automotive Electric Actuator Technologies
➢ DSpace platform, LabView real-time platform
➢ SCADA systems

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RESEARCH DIVISION IN COMPUTER SCIENCE AND ENGINEERING

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Researches in *EMBEDDED AND REAL-TIME SYSTEMS, DIGITAL SIGNAL PROCESSING*

RESEARCH TEAM

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- Prof. dr. eng. Mircea Popa
- Assoc. Prof. dr. eng. Mihai Micea
- Assoc. Prof. dr. eng. Ioana Şora
- Assoc. Prof. dr. eng. Doru Todincă
- Assoc. Prof. dr. eng. Marius Marcu
- Lect. dr. eng. Sorin Babii
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- Assist. eng. Bogdan Ciubotaru
- Assist. eng. Carmen Holotescu
- Assist. eng. Daniela Stanescu

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
- New interfaces based on image and speech recognition.

RESULTS

PUBLISHED PAPERS

1. Babii S., Cretu V., Petriu E. M., *Performance Evaluation of Two Distributed Back-Propagation Implementations*, Proceedings IEEE International Joint Conference on Neural Networks, Orlando, Florida, USA, Aug. 2007, CD-ROM

2. Tudor D., Cretu V., *A Data Model View on MedioGrid*, Proceedings 16th International Conference on Control Systems and Computer Science CSCS-16, Bucharest, May 2007, pp. 150-154

3. Tudor D., Macariu G., Cretu V., *Dynamic Policy Based Replication on the Grid*, Proceedings 9th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, Workshop on Grid Computing Applications Development SYNASC'07, Timisoara, IEEE Computer Society Press, 2007, pp. 145-150

4. Marcu M., Fuicu S., Girban A., Popa M., *Experimental Test Cases for Wireless Positioning Systems*, Proceedings IEEE Conference Computer as a Tool EUROCON 2007, Warsaw, Poland, ISBN 978-1-4244-0813-9, 2007, pp. 530-537

5. Marcu M., Fuicu S., Girban A., *Local Wireless Positioning System*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, 2007, pp. 171-176

6. Cioarga R., Ciubotaru B., Chiciudean D., Micea M. V., Cretu V., Groza V., *Emergent Behavioral Modeling Language in Obstacle Avoidance*, Proceedings 24th IEEE Instrumentation and Measurement Technology Conf. IMTC 2007, Warsaw, Poland, CD

7. Ciubotaru B., Cioarga R., Chiciudean D., Micea M. V., Stratulat M., *Connectivity Improvement in Wireless Sensor Networks Based on Mobile Nodes*, Proceedings 24th IEEE Instrumentation and Measurement Technology Conf. IMTC 2007, Warsaw, Poland, CD

8. Ciubotaru B., Pescaru D., Todinca D., *Performances Analysis on Video Transmission in a Wireless Sensor Network*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, 2007, pp. 183-186

9. Fuicu S., Marcu M., *An Experimental Approach of TCP Behavior in WLAN Networks*, Buletinul Stiintific al Universitatii "Politehnica" din Timisoara, Seria Automatica si Calculatoare, Vol. 52 (66), Fasc. 4, 2007, pp. 159-162

10. Klein I., Stratulat B., Marcu M., *SoftPhone-VoIP Mobile Communication Solution*, Buletinul Stiintific al Universitatii "Politehnica" din Timisoara, Seria Automatica si Calculatoare, Vol. 52 (66), Fasc. 4, 2007, pp. 173-176

11. Muscalagiu I., Vidal J., Cretu V., Popa H. E., Panoiu M., *The Effects of Agent Synchronization in Asynchronous Search Algorithms*, Proceedings 1st KES Symposium on Agent and Multi-Agent Systems – Technologies and Applications KES-

AMSTA2007, Lecture Notes in Artificial Intelligence, Springer–Verlag, Vol. 4496, May 2007, pp. 53–62

12. Popa M., Moica C., Popa A. S., Mnerie D., *Hierarchical Ad Hoc Networks*, Proceedings IEEE International Conference on Computer as a Tool EUROCON Warsaw, Poland, Sept. 2007, pp. 2509-2516

13. Popa M., Popa A. S., Pătiţoiu C., *A Web Connected Smart Sensor*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, 2007, pp. 105-110

14. Popa M., Popa A. S., Slavici T., Silaghe L., *On the Implementation of the OSEK/VDX Operating System on Advanced Microcontrollers*, Proceedings IEEE International Conference on Computer as a Tool EUROCON, Warsaw, Poland, Sept. 2007, pp. 419-426

15. Şora I., Verbaeten P., Berbers Y., *CCDL: The Composable Components Description Language*, International Journal on Software Tools for Technology Transfer STTT, Springer, Germany, Vol. 9, No. 2, 2007, pp. 155-168

16. Stanescu D., Borca D., Stratulat M., *Digital Watermarking Using Principal Component Analysis*, Buletinul Stiintific al Universitatii Politehnica din Timisoara, Seria Automatica si Calculatoare, vol. 52(66), Fasc. 4, 2007, pp. 169-172

17. Stanescu D., Stratulat M., Groza V., Ghergulescu I., Borca D., *Steganography in YUV color Space*, Proceedings International Workshop on Robotic and Sensors Environments ROSE-2007, Ontario, Ottawa, Canada, ISBN 1-4244-1527-6, Oct. 2007, pp. 131-137

18. Stanescu D., Stratulat M., Ciubotaru B., Chiciudean D., Cioarga R., Borca D., *Digital Watermarking Using Karhunen-Loeve transform*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, pp. 187-190

19. Stanescu D., Stratulat M., Ciubotaru B., Chiciudean D., Cioarga R., Micea M.V., *Embedding Data in Video Stream Using Steganography*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, pp. 241-244

20. Tomoioaga R., Stratulat M., Micea M. V., *Smart Home based on an EIB/KNX Network*,

Buletinul Stiintific al Universitatii Politehnica Bucuresti, vol. 49(63), Fasc. 4, pp. 135-138

RESEARCH GRANTS AND PROJECTS

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Researches in *DISTRIBUTED AND REAL-TIME SYSTEMS*

RESEARCH TEAM

➢   Prof. dr. eng. Ioan Jurca, head of the team
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➢   Assist. eng. Sorin Şerău
➢   Assist. eng. Dan Cosma
➢   Assist. eng. Stejărel Vereş
➢   Assist. eng. Adrian Petru Mierluţiu
➢   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

PUBLISHED PAPERS

1. Ciocârlie H., *Programming Language for the Development of Distributed Real-Time Applications Dedicated*, Proceedings International MultiConference of Engineers and Computer Scientist IMECS 2007, Hong Kong, March 2007, pp. 540-545

2. Ciocârlie H., Atănăsoae M., Ciocârlie M., *Object Pascal Compiler for Development of Palm OS Applications*, Proceedings International Conference on Computer as a Tool EUROCON 2007, Warsaw, Poland, Sept. 2007, pp. 681-685

3. Ciocârlie H., Simon L., *Definition of a High Level Language for Real-Time Distributed Systems Programming*, Proceedings International Conference on Computer as a Tool EUROCON 2007, Warsaw, Poland, Sept. 2007, pp. 828-834

4. Cosma D., Marinescu R., *Distributable Features View: Visualizing the Structural Characteristics of Distributed Software Systems*, Proceedings 4th IEEE International Workshop on Visualizing Software for Understanding and Analysis VISSOFT 2007, Banff, Canada, IEEE Computer Society Press, June 2007, pp. 55-62

5. Pop F., Tudor D., Cristea V., Cretu V., *Fault-Tolerant Scheduling Framework for MedioGrid System*, Proceedings International Conference on Computer as a Tool EUROCON 2007, Warsaw, Poland, Sept. 2007, pp. 505-510

6. Popa M., Popa A. S., Ciocârlie H., *Mobile Telephony with Pocket PCs Phone Edition*, WSEAS Transactions on Communications, Issue 1, Vol. 6, 2007, pp. 146-153

7. Tudor D., Cretu V., Ciocârlie H., *A Performance Analysis on Message Passing Tools for Grid,* Proceedings International Conference on Knowledge Engineering: Principles and Techniques KEPT 2007, Cluj-Napoca, Romania, ISBN 978-973-610-556-2, pp. 244-251

8. Tudor D., Macariu G., Cretu V., *Dynamic Policy Based Replication on the Grid*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, pp. 77-82

RESEARCH GRANTS AND PROJECTS

1. *Programming Milieu for Developing Real-Time Distributed Applications for Embedded Systems*, CNCSIS grant No. 76GR/23.05.2007, Director: Horia Ciocârlie

2. *Mediogrid: Distributed and Parallel Graphic Processing on Grid Structure of Environmental Geographical Data*, Subcontract 19-CEEX-I03-128/07.10.2005-2008, Director: Vladimir Cretu, Collaborator: Horia Ciocârlie

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Researches in *ADVANCED COMPUTING ARCHITECTURES AND SYSTEMS*

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➢ Lecturer dr. eng. Lucian Prodan
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➢ Assist. eng. Versavia Ancusa (PhD Student)
➢ eng. Alexandru Amaricai (PhD Student)
➢ eng. Răzvan Bogdan (PhD Student)
➢ eng. Oana Boncalo (PhD Student)
➢ eng. Cristian Ruican (PhD Student)

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. Amaricai A., Vladutiu M., Prodan L., Udrescu M., Boncalo O., *Design of Addition and Multiplication Units for High Performance Interval Arithmetic Processor*, Proceedings IEEE Workshop on Design and Diagnostics of Electronic Circuits and Systems, Krakow, Poland, April 2007, pp. 223-226

2. Amaricai A., Vladutiu M., Prodan L., Udrescu M., Boncalo O., *Exploiting Parallelism in Double Path Adders' Structure for Increased Throughput of Floating Point Addition*, Proceedings 10th EUROMICRO Conference on Digital System Design, Architectures, Methods and Tools, pp. 132-137

3. Amaricai A., Vladutiu M., Prodan L., Udrescu M., Boncalo O., *Hardware Support for Combined Interval and Floating Point Multiplication*, Proceedings 14th Mixed Design of Integrated Circuits and Systems, ISBN 83-922632-4-3, 2007, pp. 278-282

4. Amaricai A., Vladutiu M., Prodan L., Udrescu M., Boncalo O., *Design of Addition and Multiplication Units for High Performance Interval Arithmetic Processor*, Proceedings IEEE Workshop on Design and Diagnostics of Electronic Circuits and Systems, pp. 223-226

5. Ruican C., Udrescu M., Prodan L., Vladutiu M., *Automatic Synthesis for Quantum Circuits using Genetic Algorithms*, Proceedings International Conf. on Adaptive and Natural Computing Algorithms ICANNGA'07, Warsaw, Poland, LNCS 4431, Springer-Verlag Berlin Heidelberg, pp. 174-183

6. Ruican C., Udrescu M., Prodan L., Vladutiu M., *Automatic Synthesis for Quantum Circuits using Genetic Algorithms*, Adaptive and Natural Computing Algorithms, Proceedings, LNCS 4431, Springer-Verlag, Berlin Heidelberg, 2007, pp. 174-183

7. Boncalo O., Udrescu M., Prodan L., Vladutiu M., Amaricai A., *Using Simulated Fault Injection for Fault Tolerance Assessment of Quantum Circuits*, Proceedings IEEE 40th Annual Simulation Symposium, Norfolk VA, USA, March 2007, pp. 213-220

8. Boncalo O., Udrescu M., Prodan L., Vladutiu M., Amaricai A., *Assessing Quantum Circuits Reliability with Mutant-Based Simulated Fault Injection*, Proceedings 18th European Conference on Circuit Theory and Design, pp. 942-945

9. Boncalo O., Udrescu M., Prodan L., Vladutiu M., Amaricai A., *Saboteur Based Fault Injection for Quantum Circuits Fault Tolerance Assessment*, Proceedings 10th EUROMICRO Conference on Digital System Design, Architectures, Methods and Tools, 2007, pp. 634-640

10. Boncalo O., Udrescu M., Prodan L., Vladutiu M., Amaricai A., *Using Simulated Fault Injection for Fault Tolerance Assessment of Quantum Circuits*, Proceedings IEEE 40th Annual Simulation Symposium, ISSN 1080-241X, 2007, pp. 213-220

11. Boncalo O., Udrescu M., Prodan L., Vladutiu M., Amaricai A., *Quantum Circuits Fault Tolerance Assessment with Mutant Based Fault Injection*, Proceedings 17th European Conference on Circuit Theory and Design ECCTD 2007, 2007, pp. 942-945

12. Boncalo O., Udrescu M., Prodan L., Vladutiu M., Amaricai A., *Simulated fault injection for quantum circuits based on simulator commands*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, pp. 245-250

13. Ancusa V., *Extending the Consensus Problem*, International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering CISSE 2007, Bridgeport, USA

RESEARCH GRANTS AND PROJECTS

QUERIST Model for Fault and Errors Simulation in Quantum Circuits, Oana Boncalo, Mihai Udrescu, Lucian Prodan, Mircea Vladutiu, Alexandru Amaricai, CNCSIS Grant no. 380/2007

A Methodology for Splitting Reversible/ Quantum Circuits in Order to Asses Their Fault Tolerance, Oana Boncalo, Mihai Udrescu, Lucian Prodan, Mircea Vladutiu, CNCSIS Grant no. 380-17/2007

Floating Point Addition on 2 Ways for Interval Arithmetic, Alexandru Amaricai, Mircea Vladutiu, Lucian Prodan, Mihai Udrescu, Oana Boncalo, CNCSIS Grant no. 643/2005

Investigating Existent Models for Creating New Dependability Estimation Models, Lucian Prodan, CNCSIS Grant no. 371/2007

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Researches in *DISTRIBUTED DATA BASES AND ARTIFICIAL INTELLIGENCE*

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➢ Assoc. Prof. dr. eng. Dan Pescaru
➢ Lect. dr. eng. Sorin Babii
➢ 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. Zaharie D., Holban S., Lungeanu D., *A Computational Intelligence Approach for Ranking Risk Factors in Preterm Birth,* Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, 2007, pp. 135-140

2. Babii S., *Performance Evaluation for Training a Distributed Back-Propagation Implementation*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, pp. 273–276

3. Crişan M., *Towards an Attractor-Based Natural Language Modelling*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, pp. 171-176

4. Crişan M., Erzse G., *Chaotically Deterministic Anticipatory Systems*, Proceedings International Conference on Computer Engineering & Systems ICCES '07, Cairo, Egypt, IEEE Computer Society, Nov. 2007, pp. 268-273

5. Crişan M., *Attractor-Based Incursive Observers*, Proceedings International Conference on Convergence Information Technology ICCIT 2007, Gyeongju, Korea, IEEE Computer Society, Nov. 2007, pp. 768-771

6. Babii S., Cretu V., Petriu E., *Performance Evaluation of Two Distributed BackPropagation Implementations,* Proceedings International Joint Conference on Neural Networks IJCNN 2007, Orlando, Florida, USA, ISSN 1098-7576, ISBN 1-4244-1380-X

7. Ciubotaru B., Pescaru D., Todinca D., *Performances Analysis on Video Transmission in a Wireless Sensor Network*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, pp. 183-186

8. Crişan M., *Consciousness as Information Generation*, Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Electronics and Communications, Vol. 52(66), No. 2, 2007, pp. 95-100

9. Fuiorea D., Gui V., Pescaru D., Toma C., *Using Registration Algorithms for Wireless Sensor Network Node Localization*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timisoara, ISBN 1-4244-1234-X, pp. 209-214

10. Istin C., Pescaru D., *Deployments Metrics for Video-based Wireless Sensor Networks*, Buletinul Stiintific al Universitatii "Politehnica", Timisoara, Seria Automatica si Calculatoare, Vol. 52(66), Fasc. 4, 2007, pp. 163-168

11. Kallakuri S., Doboli A., Doboli S., Pescaru D., Curiac D., *SoC Design Point Selection for Dynamic Adaptation under Continuously Varying Throughput Constraints*, Proceedings NASA/ESA Conference on Adaptive Hardware and Systems AHS-2007, 2007, pp. 365-372

12. Melita N. T., Holban Ş., *Visualing a Genetic Algorithm - Support Vector Machine Approach to Gene Microarrays Supervised Learning*, Buletinul Stiintific al Universitatii "Politehnica" din Timisoara, Seria Automatica si Calculatoare, Vol. 52 (66), Fasc. 4, 2007, pp. 181-186

13. Ostafe D., Pentiuc G.S., Holban Ş., Vlad S., *Regression Methods for Determination of a Multilayer Network Architecture*, Buletinul Stiintific al Universitatii "Politehnica" din Timisoara, Seria Automatica si Calculatoare, Vol. 52 (66), Fasc. 4, 2007, pp. 177-180

14. Pârvu O., Jian I., *An approach Towards the Use of an Embedded Databases Engine*, Buletinul Stiintific al Universitatii "Politehnica" din Timisoara, Seria Automatica si Calculatoare, Vol. 52 (66), Fasc. 4, 2007, pp. 155-158

15. Pescaru D., Gui V., Toma C., Fuiorea D., *Analyses of Post-Deployment Sensing Coverage for Video Wireless Sensor Networks*, Proceedings 6th International Conference RoEduNet 2007, Craiova, ISBN 978-973-746-581-8, pp. 109-113

RESEARCH GRANTS AND PROJECTS

1. *A Study of the Cognitive and Predictive Characteristic Modeling for an Intelligent Agent in E-Learning Applications*, Marius Crisan, CNCSIS Grant 346 theme 10

2. *An Integrated Informational Service for the Complex Evaluation of Risk Factors and Quality Assessment in Obstetrics*, Ştefan Holban, CEEX INFOSOC 99/31.07.2006

3. *Interactive Greenhouse Structures Design Using an Embedded Database, Investment Decision Tool,* Ionel Jian, Ovidiu Pârvu, Contract FP6, "GreenergyCorint", 89/2006

4. *The Investment Decision Tool, an Application Dedicated to the Design and Evaluation of Optimal Greenhouse Structures*, Ovidiu Pârvu, Ionel Jian, Ioana Ionel, FP6 Contract, "GreenergyCorint", 89/2007

5. *Extraction of Topology Information Using Image Registration*, Dan Pescaru, Vasile Gui, Daniela Fuiorea, CNCSIS Grant 377 theme 25/2007, GR76/23.05.2007

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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
➢ Assist. eng. Adrian Mierlutiu
➢ Assist. eng. Dan Cosma
➢ Assist. eng. Ciprian Chirila

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.

PUBLISHED PAPERS

1. Marinescu C., *Discovering the Objectual Meaning of Foreign Key Constraints in Enterprise Applications*, Proceedings 14th Working Conference on Reverse Engineering WCRE 2007, Vancouver, Canada, IEEE Computer Society Press, pp. 100-109

2. Marinescu C., *Design Analysis Tool for Enterprise Systems*, Proceedings 7th IEEE International Working Conference on Source Code Analysis and Manipulation SCAM 2007, Tool Demonstrations Section, Paris, France, IEEE Computer Society Press, pp. 158-158

3. Marinescu C., *Identification of Relational Discrepancies between Database Schemas and Source-Code in Enterprise Applications*, Proceedings 9th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing SYNASC 2007, Timisoara, pp. 93-100

4. Mihancea P. F., Ganea G., Verebi I., Marinescu C., Marinescu R., *McC and Mc#: Unified C++ and C# Design Facts Extractors Tools*, Proceedings 9th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing SYNASC 2007, pp. 101-104

5. Balint M., Mihancea P. F., Gârba T., Marinescu R., *Norex: A Distributed Reengineering Environment*, Proceedings 23rd IEEE International Conference of Software Maintenance ICSM 2007, pp. 523-524

6. Marinescu C, *DATES: Design Analysis Tool for Enterprise Systems*, Proceedings 7th IEEE International Working Conference on Source Code Analysis and Manipulation SCAM 2007, Paris, France, pp. 157-158

7. Girba T., Ducasses S., Kuhn A., Marinescu R., Ratiu D., *Using Concept Analysis to Detect Co-Change Patterns*, Proceedings 9th International Workshop on Principles of Software Evolution IWPSE 2007,

8. Ţundrea E., Lahire P., Pescaru D., Chirilă C.B., *SmartFactory – Validation Framework for Meta-Modeling in Software Engineering*,

Buletinul Stiintific al Universitatii "Politehnica" din Timisoara, Seria Automatica si Calculatoare, Vol. 52 (66), Fasc. 2, 2007, pp. 101-106

RESEARCH GRANTS AND PROJECTS

NOREX: A Distributed Environment for Controlling and Optimizing Software System Evolution, Radu Marinescu, CEEX, Module 2, ET, no. 5880/18.09.2006

IPLASMA: Integrated Evolving Software Analysis Environment, Radu Marinescu, CNCSIS Tip A, No. 27688/14.03.2005

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Researches in *ELECTRICAL MACHINES TESTING AND DATA ACQUISITION AND PROCESSING*

RESEARCH TEAM

➢ Prof. dr. eng. Vladimir Creţu
➢ Prof. dr. eng. Marius Biriescu
➢ Assoc. Prof. dr. eng. Ioana Şora
➢ Assoc. Prof. dr. eng. Mihai Micea
➢ Dr. eng. Gheorghe Madescu
➢ Dr. eng. Marţian Moţ
➢ 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

PUBLISHED PAPERS

1. Biriescu M., Groza V., Cretu V., Proştean O., Madescu G., Mot M., *Computer Aided Testing of Electrical Machines*, Proceedings IEEE International Conference on Computer as a Tool EUROCON 2007, Warsaw, Poland, pp. 1910-1915

2. Marcu M., Tudor D., Moldovan H., Micea M. V., *Power Profile Evaluation of Battery-Powerd Mobile Applications*, Proceedings 14th IEEE International Conference on Electronics, Circuits and Systems ICECS 2007, Marrakech, Morocco, ISBN 1-4244-1378-8, Dec. 2007, pp. 1015-1018

3. Cioarga R., Micea M. V., Ciubotaru B., Chiciudean D., Cretu V., Groza V., *eBML: A Formal Language for Behavior Modeling and Application Development in Robotic Collectives*, Proceedings International Workshop on Robotic and Sensors Environments ROSE 2007, Ottawa, Canada, IEEE Cat.No. 07EX1991, pp. 80-85

RESEARCH GRANTS AND PROJECTS

Design and Simulation of an Automated Production Equipment for Semiconductor Industry, Advanced Clean Production - IT (ACP-IT), Ltd., Timisoara, Contract No.612/28.02.2007, Director: V. Cretu, Team: M. V. Micea, A. Kuczapski, M. Novac

Planning Techniques for Industrial Processes in the Semiconductor Industry, Advanced Clean Production - IT (ACP-IT), Ltd., Timisoara, Contract No. 612/28.02.2007, Director: V. Cretu, Team: M. V. Micea, A. Kuczapski, M. Novac

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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
➢ Cryptology and information security
➢ Biomedical engineering

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
- Assist. dr. 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
- Sensor networks
- System identification

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; sensor networks; system identification.

RESULTS

RESEARCH GRANTS AND PROJECTS

1. CNCSIS Grant, Code 360, theme no. 205, contract no. 58GR/19.05.06 (continued in 2007 and 2008), *Applied researches to develop virtual instruments for process monitoring, with application to the electrical drives.* Director: Assoc. Prof. dr. eng. Constantin Voloşencu

2. National Instruments Grant *Developing of virtual instruments on the test stand*, "Politehnica" University of Timişoara and National Instruments Europe. Director: Assoc. Prof. dr. eng. Constantin Voloşencu.

3. Postdoctoral research program *Computational Intelligence in Control*, World Scientific and Engineering Academy and Society (WSEAS), Athens, Greece, "Politehnica" University of Timişoara, 2004-2007. Director: Assoc. Prof. dr. eng. Constantin Voloşencu.

BOOKS

1. Voloşencu C., *Sisteme fuzzy şi neuronale,* Politehnica Publishing House, Timişoara, 2007

2. Voloşencu C., *Sisteme de conducere a acţionărilor electrice*, Politehnica Publishing House, Timişoara, 2007

3. Korodi A.*, Contributions to the Dependability Analysis of the Automatic Systems,* Politehnica Publishing House, Timişoara, 2007, ISBN 978-973-625-543-4, ISSN 1842-5208, 208 p.

PUBLISHED PAPERS

1. Voloşencu C., Curiac D. I., Doboli A., Dranga O., *Malicion Node Detection in Sensor network Using Autoregression Based on Neural Network*, Proceedings 4th IFAC Conference on Management and Control of Production and Logistics MCPL 2007, Sibiu, ISBN 978-973-739-481-1, pp. 571-577

2. Voloşencu C., Curiac D. I., Banias O., Doboli A., Dranga O., *Knowledge Based System for Reliable Perimeter Protection Using Sensor Networks,* Proceedings International Conference on Wireless Information Networks and Systems, Winsys 2007, Barcelona, Spain, ISBN 978-989-8111-16-9, July 2007, pp. 51-58

3. Curiac D. I., Banias O., Dragan F., Voloşencu C., Dranga O., *Malicious Node Detection in Wireless Sensor Networks Using an Autoregression Technique*, Proceedings 3rd International Conference on Networking and Services ICNS 2007, Athens, Greece, ISBN 0-7695-2448-9, pp. 87/1-87/6

4. Curiac D. I., Voloşencu C., Doboli A., Dranga O., Bednarz T., *Neural Network Based Approach for Malicious Node Detection in Wireless Sensor Networks*, Proceedings WSEAS International Conference on Circuits, Systems, Signal and Telecommunications CISST' 07, Gold Coast, Queensland, Australia, ISBN 978-960-8457-58-4, CD-ROM, pp. 8-13

5. Curiac D. I., Voloşencu C., Doboli A., Dranga O., Bednarz T., *Discovery of Malicious Nodes in Wireless Sensor Networks Using Neural Predictors*, WSEAS Transactions on Computer Research, Issue 1, Vol. 2, ISSN 1991-8755, Jan. 2007, pp. 38-43

6. Korodi A., Dragomir T. L., *Mobile Fault Detection and Diagnosis Module for Automatic Systems,* Proceedings 15th IEEE Mediterranean Conference on Control and Automation MED' 07, Athens, Greece, Proceedings, ISBN 978-1-4244-1282-2, June 2007, pp. 1-6

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Research group in *PROCESS CONTROL*

RESEARCH TEAM

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➢ Assist. eng. Onuţ Lungu
➢ Assist. eng. Emil Voişan
➢ 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. Ghosal A., Iercan D., Kirsch C. M., Henzinger T. A., Sangiovanni-Vincentelli A., *Separate Compilation of Hierarchical Real-Time Programs into Linear-Bounded Embedded Machine Code,* Proceedings Workshop on Automatic Program Generation for Embedded Systems APGES 2007, Salzburg, Austria, Oct. 2007

2. Curiac D. I., Iercan D., Dranga O., Drăgan F., Banias O., *Chaos-Based Cryptography: End of the Road?* Proceedings International Conference on Emerging Security Information, Systems and Technologies SECURWARE 2007, Valencia, Spain, ISBN 0-7695-2989-5, Oct. 2007, pp. 71–76

3. Drăgan F., Curiac D., Iercan D., Filip I., *Sliding Mode Control for a Buck Converter,* Proceedings 9th WSEAS International Conference on Automatic Control, Modelling & Simulation ACMOS '07, Istanbul, Turkey, ISBN 978-960-8457-72-0, May 2007, pp. 161–164

4. Drăgan F., Curiac D. I., Voisan E., Motantau A., *Experimental Control of Chaotic Behaviour in DC-DC Converters*, Proceedings 4th IFAC Conference on Management and Control of Production and Logistics MCPL 2007, Sibiu, Romania, ISBN 978-976-739-481-1, Sept. 2007

5. Auerbach J., Bacon D. F., Iercan D., Kirsch C. M., Rajan V.T., Röck H., Trummer R., *Java Takes Flight: Time-Portable Real-Time Programming with Exotasks*, Proceedings ACM Conference on Languages, Compilers, and Tools for Embedded Systems LCTES 2007, San Diego, California, USA, ACM SIGPLAN Notices, ISSN 0362-1340, June 2007, pp. 51–62

STRATEGIC PRIORITIES
➢ Control of chaotic systems;
➢ Hard real-time control;
➢ 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., *Broadcast Authentication Protocol with Time Synchronization and Quadratic Residues Chains*, Proceedings 2nd International Conference on Availability, Reliability and Security ARES'07, International Symposium on Frontiers in Availability, Reliability and Security FARES'07, Vienna, Austria, ISBN 978-0-7695-2775-8, 2007, pp. 550–557

2. Groza B., Dragomir T. L., *On the Use of One-Way Chain Based Authentication in Secure Control Systems*, Proceedings 2nd International Conference on Availability, Reliability and Security ARES'07, International Workshop on Advances in Information Security WAIS'07, Vienna, Austria, ISBN 978-0-7695-2775-8, pp. 1214–1221

3. Groza B., Petrica D., Barbu S., Bilanin M., *Implementation of an Authentication Protocol for Sending Audio-Video Information in Java*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timişoara, ISBN 1-4244-1234-X, ISBN 978-1-4244-1234-1, pp. 237–240

4. Groza B., *On the Use of the Discrete Power Function for Building Public-Key Cryptosystems*, Proceedings Applied Informatics & Communications, Athens, Greece, WSEAS Press, 2007, pp. 7–11

5. Groza B., *An Extension of the RSA Trapdoor in a KEM/DEM Framework*, Proceedings Symposium on Symbolic and Numeric Algorithms for Scientific Computing SYNASC'07, Timisoara, pp. 182–187

BOOKS

1. Petrică Dorina, *Sisteme Expert - Aplicaţii în Domeniul Medical*, Orizonturi Universitare Publishing House, Timişoara, ISBN 978-973-638-328-1, 2007, 253 p.

2. Groza B., *Introducere în Criptografia cu Cheie Publică*, Politehnica Publishing House, Timişoara, ISBN 978-973-625-654-9, 2007, 136 p.

RESEARCH GRANTS

MEdC-CNCSIS Grant TD-122/2007, *Protocoale criptografice de autentificare prin coduri MAC cu chei inlantuite si cu sincronizare temporala sau challenge response si prin semnaturi digitale multiple-time sau one-time in arbori Merkle*, Director: Bogdan Groza

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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Research group in *BIOMEDICAL ENGINEERING*

RESEARCH TEAM

➢ Lect. dr. eng. Antonius N. Stanciu
➢ Assist. dr. eng. Adiana Albu
➢ Assist. eng. Loredana M. Ungureanu

RESEARCH FIELDS

➢ Reliability of Medical Equipments
➢ Bionics
➢ Medical Diagnosis and Medical Informatics
➢ Artificial Intelligence (Expert Systems and 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 a diagnosis system based on: expert systems (logical and statistical inference), artificial neural networks and medical images.

➢ Development of a artificial hand hydraulically actuated

PUBLISHED PAPERS

1. Drăgulescu D., Albu A., *Medical Predictions System*, Acta Polytechnica Hungarica, Journal of Applied Sciences at Budapest Tech, Hungary, vol. 4, no. 3, ISSN 1785-8860, 2007, pp. 89–101

2. Albu A., *Artificial Intelligence in Medical Diagnosis*, Proceedings 9th International Symposium "Young People and

Multidisciplinary Research", Timişoara, ISSN 1843-6609, Nov. 2007, pp. 219–222

3. Drăgulescu D., Albu A., Naaji A., *Medical Predictions System for Hepatitis Infection*, Proceedings 3rd International Conference Euro-Mediterranean Medical Informatics and Telemedicine EMMIT 2007, Mangalia, Romania, ISBN 978-973-739-423-1, May 2007, pp. 302–308

4. Naaji A., Drăgulescu D., Albu A., *The 3D Modeling of the Human Upper Limb*, Proceedings 3rd International Conference Euro-Mediterranean Medical Informatics and Telemedicine EMMIT 2007, Mangalia, Romania, ISBN 978-973-739-423-1, May 2007, pp. 260–266

5. Drăgulescu D., Albu A., *Expert System for Medical Predictions*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timişoara, ISBN 1-4244-1234-X, May 2007, pp. 123–128

6. Ungureanu L., Stanciu A., Menyhardt K., A *Hydraulic Solution for Actuating a Human Hand Prosthesis*, WSEAS Transactions on Systems, Issue 1, vol. 6, ISSN 1109-2777, Jan. 2007, pp. 40–46

7. Drăgulescu D., Perdereau V., Droiun M., Ungureanu L., Menyhardt K., *3D Active Workspace of Human Hand Anatomical Model*, BioMedical Engineering Online, ISSN 1475-925X, May 2007

8. Drăgulescu D., Ungureanu L., Menyhardt K., Stanciu A., *About a Dynamical Model of Human Hand*, Russian Journal of Biomechanics, vol. 11, no. 1, ISSN 1812-5123, 2007, pp. 68–73

9. Ungureanu L., Robu N., Manoilă V., *Driving Software for an Artificial Human Hand Hydraulically Actuated*, Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara, Seria Automatică şi Calculatoare, Editura Politehnica, Timişoara, ISSN 1224-600X, vol. 52 (66), Fasc. 3, 2007, pp. 131–134

10. Drăgulescu D., Ungureanu L., Menyhardt K., Stanciu A., *3D Active Workspace of the Human Hand Shaped End Effector*, Proceedings 13th IASTED International Conference on Robotics and Applications, Wurzburg, Germany, ISSN 978-0-88986-685-0, Aug. 2007, pp. 76–81

11. Drăgulescu D., Ungureanu L., *The Modeling Process of a Human Hand Prosthesis*, Proceedings 4th International Symposium on Applied Computational Intelligence and Informatics SACI 2007, Timişoara, ISBN 1-4244-1234-X, May 2007, pp. 263–268

BOOKS

1. Albu A., *Establishing Databases for Hepatitis Diagnosis Using Image Processing of Liver's CT Scans*, Politehnica Publishing House, Timişoara, ISBN 978-973-625-400-0, 2007, 142 p.

2. Ungureanu L. M., *Models for Reconstructing the Human Hand and Its Functions*, Politehnica Publishing House, Timişoara, ISBN 978-973-625-571-7, 2007, 283 p.

RESEARCH GRANTS

STRATEGIC PRIORITIES

➢   Testing protocols for cochlear implantation
➢   The communication interface between a hand prosthesis and the human body

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