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

**Prof. dr. eng. Radu-Emil PRECUP**, recipient of the *Grigore Moisil* Prize of the Romanian Academy  
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Research in PROCESS CONTROL

RESEARCH TEAM

- Prof. dr. eng. Stefan Preitl, head of the team  
- Prof. dr. eng. Radu-Emil Precup  
- Dipl. eng. Claudia-Adina Dragos, PhD student  
- Dipl. eng. Mircea-Bogdan Rădac, 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; iterative methods; 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


ISSN 1083-4435, vol. 13, no. 1, 2008, pp. 22-35


BOOKS


RESEARCH GRANTS AND PROJECTS

National grants and projects

1. Research Grant of the National University Research Council (CNCSIS), Type A, no. 98GR, theme 14, code 370. Title: Analysis and development of intelligent control systems with fuzzy controllers dedicated to servosystems. Director: Prof. dr. eng. Stefan Preitl (granted value for 2008: 61,600 RON)

Research team: Prof. Stefan Preitl – project director, Prof. Radu-Emil Precup, MSc student Corina Ardelean.

Fuzzy control is one particular case of nonlinear control techniques. 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 techniques are not generally connected to the process models. So they are used in embedded and mechatronic systems applications. The project offers systematic approaches with respect.

The controller structures and software created in the project were tested in servo systems control problems focused on different categories of processes. The experimental results highlight the control system performance enhancement. Approx. 14 papers were presented and/or published in journals and conference proceedings.
2. Research Grant of the National Centre for Programme Management (CNMP), Type PN2 Partnerships in Priority R&T Domains Programme (2008-2011), no. 12100 / 01.10.2008. Title: Real-time informatics technologies for embedded-system-control of power-train in automotive design and applications (SICONA). Partners: “Politehnica” University of Timisoara (PUT) – P2, “Gh. Asachi” Technical University of Iasi – coordinator, Politehnica University of Bucureşti – P1, SC Siemens VDO Automotive – P3. Director: Prof. dr. eng. Corneliu Lazăr (TUI), director of PUT partner (P2); Prof. dr. eng. Radu-Emil Precup (granted value for 2008: 0 RON)

Research team: Prof. Radu-Emil Precup – director of PUT partner (P2), Prof. Stefan Preitl, Assoc. Prof. Florin Drăgan, Lect. Dan Ungureanu-Anghel, Assist. Prof. Daniel Iercan, Assist. Prof. Emil Voioşan, PhD student Petru Alexandru Clep, PhD student Ion-Bogdan Ursache, PhD student Mircea-Bogdan Radac, PhD and MSc student Claudia-Adina Dragoş, MSc student Ioan-Marius Mezin.

The main objective of the project consists in developing new informatics technologies for improving the performances of the embedded systems controlling the power-train of cars equipped with automated gearboxes. The project applies modern modeling and control strategies to the power-train and its subsystems. On these bases, real-time software modules are developed for the embedded systems, yielding much better operation performances than ensured by the currently used solutions (meaning PID regulation).

Several nonlinear and linearized models and low-cost control solutions for an electromagnetic actuator have been proposed and tested in 2008 by the research team at the P2 partner. They include Tensor Product-based models and S functions. The digital simulation results show the control system performance enhancement. Approx. 4 papers were presented and/or published in journals and conference proceedings.

International grants and projects


Research team: Prof. Stefan Preitl – director of Romanian partner, Prof. Radu-Emil Precup – associate director of Romanian partner, Assoc. Prof. Florin Drăgan, PhD student Ion-Bogdan Ursache, PhD student Petru Alexandru Clep, Assist. Prof. Emil Voioşan, Assist Prof. Daniel Iercan, PhD and MSc student Claudia-Adina Dragoş.

The grant concerns the analysis, development and implementation of new intelligent fuzzy control structures, design techniques and applications on iterative feedback control. The mathematical support is very complex, and the approach needs a strong cooperation between specialist in mathematic/informatics and control engineers. Consequently, ILC techniques treated by the Romanian partner must be completed by Fuzzy logic techniques. Fuzzy logic is one of the primary research areas at the Hungarian partner.

Fuzzy controllers are developed usually in heuristic manner, and the obvious necessity for systematic development methods dedicated to these controllers has not been covered yet. Also, the sensitivity and stability analysis of fuzzy systems is in permanent actuality.

The two research teams co-organize biannually the International Symposiums on Applied Computational Intelligence and Informatics (SACI), in Timisoara, dedicated to the exchange of research results in the field. Approx. 10 joint papers were presented and/or published in journals and conference proceedings.

2. Bilateral research contract, 2008-2009, partners: “Politehnica” University of Timisoara (PUT), Romania, and University of Ljubljana (UL), Slovenia, Type PN2 Capacities Module III Programme (2008-2009), Protocol of the Third Meeting of the Joint Committee for Scientific and Technological Co-operation between Romania and the Republic of Slovenia / 11.12.2007-24.12.2007; ID no 3 in Annex 1. Title: New results in development and applications of fuzzy control systems. Directors: Prof. dr. eng. Radu-Emil Precup (PUT, Romanian partner) and Assoc. Prof. dr. Škrjanc (UL, Slovenian partner) (granted value for 2008: 0 RON and 8.000 EUR)

Research team: Radu-Emil Precup – director of Romanian partner, Prof. Stefan Preitl – associate director of Romanian partner, Assoc. Prof. Florin Drăgan, Lect. Dan Ungureanu-Anghel, PhD student Ion-Bogdan Ursache, PhD student Petru Alexandru Clep, Assist. Prof. Emil Voioşan, Assist Prof. Daniel Iercan, PhD and MSc student Claudia-Adina Dragoş, PhD student Mircea-Bogdan Radac.

The grant deals with the development and implementation of new fuzzy control structures and design techniques that employ the stability analysis, the sensitivity analysis with respect to parametric variations of the controlled plants, the predictive control techniques and the fuzzy modelling. Several classes of fuzzy control systems are investigated. It is justified to unify and complement the efforts of the two research teams to contribute to better systematic application-oriented approaches resulting in low-cost fuzzy control systems.
The control solutions created by the two research teams are based on their previous experience. The results are tested in several industrial and non-industrial applications. The laboratory equipment at both partners allows the implementation of fuzzy controllers aiming the illustration of the performance improvements. Approx. 5 joint papers were presented and/or published in journals and conference proceedings.

**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
- Solutions for automatic design of model-free control structures
- 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
- Derivative-free optimization of control systems
- Methods and tools to enable the systematic development of fuzzy control systems.

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- Prof.dr. eng. Nicolae Budișan
- Prof. dr. eng. Ioan Filip
- Assist. eng. Iosif Szeidert, PhD student
- Assist. eng. Cristian Vașar, 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**
2. Mihet-Popa L., Volosencu C., Jurca L., Prostean O., Szeidert I., *Simulation Algorithm Developed to Investigate the Effects of...*


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 372/2008, Contract no. 98GR/11.06.2008, Director: Prof. Octavian Prostean, PhD, Financial value: 68,000 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, 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.

**PERSPECTIVE DOMAINS**
- Real time control of induction and synchronous 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,  
- Lect. dr. eng. Dorin Berian  
- Assist. eng. Romina Pintea, PhD student  
- Asists. eng. Raul Robu, PhD Student  
- Assist. eng. Andreea Robu, PhD Student  
- Eng. Vasile Topac, PhD student

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

**KEYWORDS**
- Distributed medical informatics; applied informatics; telemedicine, e-Health.

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

**RESULTS**

**PUBLISHED PAPERS**


4. Morancea O., Stoicu-Tivadar L., Hariton C.,
An Informatics System for Forensic Medicine -
Can it work?, 4th International Conference
Telemedicine/Experience @ Prospects,
Donetsk, Ukraina, Ukrainian Journal of
Telemedicine and Medical Telematics, ISBN
1811-1688; 1728-936x, tom 1, 2008, pp. 159–
163

PUBLISHED BOOKS

1. Korodi Adrian, Robu Raul, Pintea Romina,
Programarea Calculatoarelor, Editura
Politehnica, Timisoara, ISBN 978-973-625-

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 included: 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 R&D activities were:
• 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 gathered experiences from the medical
and IT domains regarding the implementation of
standards for communication of medical messages.
The final goal was 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. The
obtained 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 used 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
studied and implemented the facilities offered
by WebSphere Transformation Extender Pack for
HL7, IBM WebSphere Transform Ext Pk HL7
V8.0.1. The hardware support was insured by IBM
powerful equipment.
The project was financed by IBM Company, as a
result of a worldwide 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, Vasile Topac, ("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
Teleassistisce 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, Timișoara, and Brașov. Local staff: Lăcămioara Stoicu-Tivadar, Vasile Stoicu-Tivadar, Dorin Berian, Romina Pintea, Raul Robu, Andreea Robu, Vasile Topac (“Politehnica” University of Timișoara).
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
- Prof. dr. eng. Ioan SILEA
- Lecturer dr. eng. Sorin Nanu
- Assist. eng. Tiberiu Ioncă
- 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


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 2008 granted for the Dept. AIA: 58,000 lei)

The goal is to develop and propose novel electrical actuators with power electronics and control systems for various functions in automobiles 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. A V/F control with two novel stabilisation loops is proposed for high-speed IPMSM drives.

In 2008 – the final grant year, the main activities and results were to contribute for 4 experimental models realization and to do final experimental tests for all our objectives. There were elaborated the scientific and technical annual research report, and the final report on this subject. The research results have been published in international ISI journals and conference proceedings indexed in international data bases ISI-Proc., IEEE Xplore, INSPEC.

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

- Prof. dr. eng. Vladimir Crețu, head of the team
- Prof. dr. eng. Mircea Stratulat
- Prof. dr. eng. Mircea Popa
- Assoc. Prof. dr. eng. Mihai Micea
- Assoc. Prof. dr. eng. Ioana Șoara
- Assoc. Prof. dr. eng. Doru Todincă
- Assoc. Prof. dr. eng. Marius Marcu
- Lect. dr. eng. Sorin Babi
- Assist. eng. Dan Chictudean
- Assist. eng. Răzvan Ciocârghău
- Assist. eng. Bogdan Ciobotaru
- 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


RESEARCH GRANTS AND PROJECTS

1. **FILOLET** Innovative system for electrical energy monitoring based on wavelet transformation for industrial consumers - contract with Alcatel, UPT, value 2147000 RON, director Micea Mihai

2. **FILOLET** Innovative system for electrical energy monitoring based on wavelet transformation for industrial consumers - contract with UEFISCSCU, MedCI, value 20000 RON, director Micea Mihai

3. **SICRAMAS**: Intelligent system for non-linear management of runner flow with asynchronous engines - contract with UEFISCSCU, MedCI, value 60000 RON, director Micea Mihai

4. **CORE-TX**: Real-time systems embedded in complex applications of distributed artificial perception, collaborative robotized milieus and intelligent sensor networks - contract with UEFISCSCU, MedCI, value 15000 RON, director Mihai V. Micea

5. **MELISSEVS**: Development and analysis of an integrated model for collaborative robotized milieus and intelligent sensor networks representation - contract with UEFISCSCU, MedCI, value 162000 RON, director Mihai V. Micea

6. Developing and maintenance of plugging for IP monitoring application in GSM B11 system - contract with Alcatel-Lucent, value 12000 RON, director Marcu Marius

7. **AI based technologies for the software infrastructure of next generation radio networks** - contract with CNCSIS, value 24000 RON, director director Todinca Doru

BOOKS


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RESEARCH TEAM

- Prof. dr. eng. Ioan Jurca, head of the team
- Prof. dr. eng. Vladimir Creţu
- Prof. dr. eng. Horia Ciocărlie
- Assist. eng. Carmen Holotescu
- Assist. eng. Sorin Şerău
- Assist. eng. Dan Cosma
- Assist. eng. Stejărel Vereş
- Assist. eng. Adrian Petru Mierluţiu
- Assist. eng. Ciprian-Bogdan Chirilă
- Assist. eng. Georgiana Macariu

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


15. Carstea A., Frincu M., Konovalov A., On Service-Oriented Symbolic Computing, Parallel Processing and Applied Mathematics, LNCS (Springer), ISSN 0302-


RESEARCH GRANTS AND PROJECTS

1. eMuCo Embedded Multi-Core Processing for Mobile Communications (STREP), - contract with EU, FP7-EU, value 73000 Euro, director Cretu V., Ciocarlie H.

2. Programming environment for real-time embedded distributed applications - contract with CNCSIS, value 22000, director Ciocarlie Horia

3. Fatigue studying and modeling in steel and aluminum bearer structures for random trials - contract with CNCSIS, value 30000, director Ciocarlie Horia

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Researches in ADVANCED COMPUTING ARCHITECTURES AND SYSTEMS

RESEARCH TEAM

- Prof. dr. eng. Mircea Vladutiu
- Lecturer dr. eng. Marius Marcu
- Lecturer dr. eng. Lucian Prodan
- Lecturer dr. eng. Mihai Udrescu
- Assist. eng. Versavia Ancusa (PhD Student)
- eng. Alexandru Amaricai (PhD Student)
- eng. Razvan 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


2. Amaricai A., Vladutiu M., Prodan L., Udrescu M., Boncalo O., Floating Point Divide-Add Fused for Newton’s Interval Method, Euromicro Work In Progress Session held in Conjunction with Euromicro SEAA 2008 and


**BOOKS**

**RESEARCH GRANTS AND PROJECTS**
1. Design of Floating Point Units for Interval Arithmetic - contract with CNCSIS - PN II, value 25480 RON, director Amaricai Alexandru
2. Simulation Based Reliability Assessment of Quantum Circuits - contract with CNCSIS - PN II, value 24800 RON, director Boncalo Oana
3. Dependability estimation for emerging bioinspired systems using hierarchical reconfiguring strategies - contract with CNCSIS, value 56640 RON, director Prodan Lucian
4. Reversible and quantum circuits design for fault-tolerance - contract with CNCSIS, value 70000 RON, director Udrescu Mihai
5. Bioinspired architectures for reversible and quantum circuits - contract with UPT, value 296000 RON, director Vladutiu Mircea

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**RESEARCH TEAM**
- Prof. dr. eng. Ionel Jian
- Prof. dr. eng. Ștefan Holban
- Prof. dr. eng. Marius Crișan
- 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**


BOOKS

RESEARCH GRANTS AND PROJECTS
1. MaternQual – Integrated informatics systems for complex evaluation of obstetrics related risk factors - contract with Universitatea de Medicina si Farmacie “Victor Babes” din Timisoara – UMFVBT; Universitatea de Vest din Timisoara – UVT; Spitalul universitar de obstetrica-ginecologie “Dr. Dumitru Popescu” din Timisoara - TM05 Bridgeman srl, value 70431, director Holban Stefan

2. Intelligent anticipatory agent oriented on decision and e-learning applications - contract with CNCSIS, value 15.400 RON, director Crisan Marius

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

PUBLISHED PAPERS


RESEARCH GRANTS AND PROJECTS
1. Methods and tools for continuum quality insurance in complex software systems - contract with UEFISCSU, value 205.515 RON, director Minea Marius

2. Distributed Enviroment for Control and Optimisation Characteristics of Distributed Software Systems - contract with CNCSIS/UEFISCSU, value 40.000 RON, director Marinescu Radu

3. NanoSim: Micro/nanometric scale transport process in biomedicine and material science - contract with Acad. Romana fil. Timisoara, UMF Bucuresti, UBB Cluj, UMF Timisoara, director Minea Marius


5. Quality assurance in distributed software systems - contract with MCTI, value 5617 RON, director Marinescu Cristina

RESEARCH GRANTS AND PROJECTS
1. Methods and tools for continuum quality insurance in complex software systems - contract with UEFISCSU, value 205.515 RON, director Minea Marius

2. Distributed Enviroment for Control and Optimisation Characteristics of Distributed Software Systems - contract with CNCSIS/UEFISCSU, value 40.000 RON, director Marinescu Radu

3. NanoSim: Micro/nanometric scale transport process in biomedicine and material science - contract with Acad. Romana fil. Timisoara, UMF Bucuresti, UBB Cluj, UMF Timisoara, director Minea Marius


5. Quality assurance in distributed software systems - contract with MCTI, value 5617 RON, director Marinescu Cristina
6. Timisoara Engineering Center accord - contract with TRW Automotive, value 28949 EUR, director Minea Marius

7. ARTIST2 – Embedded System Design - contract with EU, FP6 NoE, director Minea Marius

8. AVANTSSAR – Automated Validation of Trust and Security of Service-oriented Architectures - contract with EU, FP7 STREP, value 24.000 EUR, director Minea Marius

9. Cercetari in domeniul automatizarii procesului de testare software - contract with Oce Software SRL, value 12700 RON, director Minea Marius

10. Practical formal verification using automated reasoning and model checking - contract with NTAS, INTAS, value 2700 EUR, director Minea Marius

11. Reversed engineering techniques for class hierarchies - contract with CNCSIS, value 30000 RON, director Mihancea Petru

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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
➢ Prof. dr. eng. Constantin Voloșencu
➢ 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 monitorization, with application to the electrical drives. Director: Assoc. Prof. dr. eng. Constantin Voloșencu

PAPERS
c. Bichiş C.D., Dragomir T.L., On Modelling and Simulating Natural Gas Transmission...

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Research group in PROCESS CONTROL

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- Assist. dr. eng. Daniel Iercan
- Assist. eng. Onuţ Lungu
- Assist. eng. Emil Voişan
- Assist. eng. Lucian Fedorovici

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

KEYWORDS
Chaotic systems; programmable logic controllers; remote control

ACTIVITIES
- hard real-time technologies
- robot motion and control
- analysis and synthesis of the electronic converters with chaotic behaviour

PUBLISHED PAPERS

BOOKS

STRATEGIC PRIORITIES
- Control of chaotic systems;
- Hard real-time control;
- Remote control.

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Research group in CRYPTOLOGY AND INFORMATION SECURITY

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- Phd. Eng. Bogdan Groza
- Assist. eng. Lavinia Dragomir
- Assist. eng. Raul Robu
- Assist. eng. Căiman Dadiana
RESEARCH FIELDS
- Authentication protocols
- Provable secure public-key cryptosystems
- Foundations of cryptology, number theory
- Applied cryptography, security for industrial control systems

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

PUBLISHED PAPERS

BOOKS

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Research group in BIOMEDICAL ENGINEERING

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

RESEARCH FIELDS
- Friability 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
3. Albu A., Stanciu L., Medical Diagnosis System Based on CT Images, 10th International Symposium “Young People and Multidisciplinary Research”, Timișoara, Proceedings, ISSN 1843-6609, Nov. 2008, pp. 190–195

RESEARCH GRANTS
1. PN II Grant D1-1-019/18.09.2008, Integrated system for management of medical information using HL7 standard - SIMIMED, Director: Prof.dr.eng. Lăcrămioara STOICU-TIVADOR
2. PN II Grant 11-066/18.09.2007, Complex system, on NGN support, for tele-assistance, at home, for old persons – TELEASIS, Director: Prof.dr.eng. Lăcrămioara STOICU-TIVADOR

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

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