

INSTITUTE OF CONTROL  
AND COMPUTATION ENGINEERING

2009 ANNUAL REPORT



WARSAW UNIVERSITY OF TECHNOLOGY  
FACULTY OF ELECTRONICS AND INFORMATION TECHNOLOGY  
INSTITUTE OF CONTROL AND COMPUTATION ENGINEERING  
NOWOWIEJSKA 15/19, 00-665 WARSAW, POLAND  
<http://www.ia.pw.edu.pl>, [sekretariat@ia.pw.edu.pl](mailto:sekretariat@ia.pw.edu.pl)





## *From the Director*

The Institute of Control and Computation Engineering (ICCE; in Polish: Instytut Automatyki i Informatyki Stosowanej) was created in 1955 as the Chair of Automatic Control and Telemechanics by Professor Władysław Findeisen. It was reorganized in 1970 to become the Institute of Automatic Control. Rapid development of microprocessor technology and its impact on the field of control in recent years directed the interest of the research staff and students towards computational and algorithmic aspects of control, decision support, man-machine interfaces, network communications, etc. This resulted in 1994 in the creation of new educational profiles offered by the Institute and a change of its name to the present one.

The Institute offers courses in a broad area of information technology, concentrating on control and decision support systems, at three levels of education. At the first two levels (equivalent to B.Eng. and M.Eng.) the degree programs combine courses from the areas of computer science and control. We are also proud to offer interesting opportunities to our postgraduates, so that they can continue their study and research towards a Ph.D., either in Computer Science or in Control and Robotics. This standard educational offer was supplemented in the academic year 2007/2008 by postgraduate studies in Management of Information Technology Resources organized by Dr. Andrzej Zalewski and Engineering of Management Information Systems and Decision Support Systems organized by Dr. Tomasz Traczyk. There is a growing interest in this form of studies. In the period 2007/2008 23 persons took part in this course, however the 2008/2009 edition attracted 63 listeners. Besides that our Institute, as the representative of the Faculty of Electronics and Information Technology, jointly with the Faculty of Power and Aeronautical Engineering started an Erasmus Mundus Masters Program in Robotics. The partners of Warsaw University of Technology in this Program are Ecole Centrale de Nantes (Nantes, France) – the coordinator and Università Degli Studi di Genova (Genova, Italy). The students from within and outside of the EU study for two years, each year in one of the partner institutions and obtain a double diploma from those universities upon successful completion of the studies.

Warsaw University of Technology was successful to secure funds from the EU European Social Fund for the Program of Development of WUT. Our Institute participates in the realization of the task: Development of the 2nd level studies in Control and Robotics in WUT. Prof. Piotr Tatjewski is responsible for this task. Four faculties of WUT participate in it. It is scheduled for the years 2008–2012.

In 2009 the group headed by Prof. Ewa Niewiadomska-Szyrkiewicz was involved in organizing the 12-th National Conference on Evolutionary Algorithms and Global Optimization, May 31 - June 3, 2009, Zawoje, Poland, which gathered Polish scientists working in the area of artificial intelligence, modeling and optimization. As usual in September the Institute took part in the annual event called the Science Festival. Prof. Włodzimierz Kasprzak delivered a lecture entitled Computer Vision in Autonomous Machines. Moreover, laboratory presentations were organized by Mr. T. Winiarski, and Mr. A. Wilkowski. The Group of Robot Programming and Pattern Recognition, has been involved in a grant obtained from the 7th Framework Program of the Commission of the European Union (NHP-2007-3.2-1).

The project named Self Reconfigurable Intelligent Swarm Fixtures (SwarmItFIX) is directed at the development of a universal fixturing device that can be used by aeroengineering and car manufacturing industries. The partners of WUT in this project are DIMEC University of Genova (Italy, the coordinator), Exechon (Sweden), PIAGGO Aero Industries Spa. (Italy),

ZTS-VVU Vyskumno-vyvojovy Ustav Kosice a.s. (Slovakia), Centro Ricerche FIAT S.C.P.A. (Italy). In the year 2009 Prof. Andrzej Pacut lead the project entitled 'The Platform for secure implementation of biometric systems for verification and identification'. The project was the result of the 7th competition for development projects in the field of security and country's defence, of the Ministry of Science and Higher Education. The project coordinated by ICCE involves also NASK, Polish Security Printing Works and University of Warsaw enabling the creation of a network of collaborating biometrics laboratories. Prof. Eugeniusz Toczyłowski prolonged for the year 2009 an industry-sponsored research grant from the Polish Transmission System Operator, PSE-Operator S.A., for the development of new theoretical market models and algorithms to support efficient and incentive-compatible solutions in the Polish energy balancing market.

Research is a vital part of our activities, directly affecting both the institute's recognition in Poland and abroad, and the quality of teaching. Description of research programs conducted by the faculty of the Institute can be found in this report. I express my sincere appreciation to the staff of the institute for their efforts and contributions to our achievements in teaching and research.

*Cezary Zieliński*

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Institute of Control and Computation Engineering  
Faculty of Electronics and Information Technology  
Warsaw University of Technology  
Nowowiejska 15/19, 00-665 Warsaw, Poland  
<http://www.ia.pw.edu.pl>, [sekretariat@ia.pw.edu.pl](mailto:sekretariat@ia.pw.edu.pl)

MAIN OFFICE, room 521  
tel.: +48 22 825 09 95, +48 22 234 73 97, fax: +48 22 825 37 19

STUDENTS OFFICE, room 22/23  
tel.: +48 22 234 7750



## 1 General Information

The following information about organization of the Institute reflects the situation on December 31, 2009.

### 1.1 Directors

Professor Cezary Zieliński, Director  
Professor Włodzimierz Ogryczak, Deputy Director for Research  
Dr. Tomasz Traczyk, Deputy Director for Academic Affairs

### 1.2 Organization of the Institute

#### SYSTEMS CONTROL DIVISION

<i>Division Head:</i>	Professor Krzysztof Malinowski
<i>Professors:</i>	Włodzimierz Kasprzak, Krzysztof Malinowski, Ewa Niewiadomska-Szynkiewicz, Andrzej Pacut, Cezary Zieliński
<i>Professors, retired:</i>	Władysław Findeisen, Radosław Ładziński, Jacek Szymanowski
<i>Reader:</i>	Adam Woźniak
<i>Assistant Professors:</i>	Piotr Arabas, Adam Czajka, Mariusz Kamola, Andrzej Karbowski, Adam Kozakiewicz, Tomasz J. Kruk, Bartłomiej Kubica, Wojciech Szynkiewicz, Paweł Wawrzyński
<i>Assistants:</i>	Tomasz Kornuta, Przemysław Strzelczyk (until Sept. 2009), Tomasz Winiarski
<i>Senior Lecturer:</i>	Michał Warchoł
<i>Ph.D. Students:</i>	Marcin Chochowski, Małgorzata Kudelska, Andrzej Igielski, Michał Karpowicz, Tomasz Kornuta, Michał Kudelski, Piotr Kwaśniewski, Marek Majchrowski, Michał Marks, Jacek Michałek, Łukasz Mirtecki, Bartosz Papis, Joanna Putz-Leszczynska, Łukasz Stasiak, Przemysław Strzelczyk, Anna Sibilska-Mroziewicz, Piotr Trojanek, Artur Wilkowski

Research of the division is conducted in 3 research groups:

**Complex Systems Group (E. Niewiadomska-Szynkiewicz, K. Malinowski, P. Arabas, M. Kamola, A. Karbowski, A. Kozakiewicz, T. J. Kruk, B. Kubica, A. Woźniak, M. Warchoł, M. Karpowicz, P. Kwaśniewski, M. Marks)**

The main area of interest is the theory and methodology of model-based predictive repetitive control and hierarchical control structures for non-linear systems under uncertainty, methods for solving continuous and discrete time optimization problems, and software for computer aided analysis and design of complex systems. Particular attention is given to distributed and parallel, synchronous and asynchronous, computations as well as to analysis and design of control algorithms and pricing techniques for computer networks. Also, important work is concerned with development of techniques for information systems security.

**Biometrics and Machine Learning Group (Andrzej Pacut, A. Czajka, P. Wawrzyński, P. Strzelczyk, M. Chochowski, M. Kudelska, M. Kudelski, J. Michałek, Ł. Mirtecki, B. Papis, J. Putz-Leszczynska, Ł. Stasiak)**

Research of the group is centered on biologically inspired control and information processing, including biometrics, machine learning, uncertainty modeling, and biological modeling. Biometrics consists in using personal characteristics for identity authentication. Our research in biometrics includes pattern recognition for iris, hand-written signature, face image, etc. Also, safety of biometric data storage and exchange, biometrics intelligent cards, and data encryption using biometrics are investigated. Machine learning research is focused on reinforcement learning, applied to adaptive control and multi-agent systems. Also, learning in neural networks and modeling granularity is investigated.

**Robot Programming and Pattern Recognition Group (C. Zieliński, W. Kasprzak, W. Szynkiewicz, T. Winiarski, T. Kornuta, A. Sibilska-Mroziewicz, P. Trojanek, A. Wilkowski)**

Research of the group is concerned with robot motion planning and control systems, autonomous mobile robot localization and navigation, robot programming methods, computer vision systems and speech recognition systems. In the robot control systems area research is focused on new motion and force/position control algorithms for multi-robot systems. Special emphasis is given to the sensor-based motion planning and control of the single and multiple articulated or mobile robots. This research aims at the creation of service robots. In the computer vision and signal processing (speech analysis) area the research is concentrated on autonomous navigation, transportation and security relevant environments. All of this research is centered around service robots, i.e. two-handed devices using visual servoing, force control, and speech recognition to fulfill tasks that humans usually execute.



**CONTROL AND SOFTWARE ENGINEERING DIVISION**

<i>Division Head:</i>	Professor Piotr Tatjewski
<i>Professors:</i>	Piotr Tatjewski, Krzysztof Sacha
<i>Assistant Professors:</i>	Paweł Domański, Maciej Ławryńczuk, Piotr Marusak, Marcin Szlenk, Andrzej Zalewski
<i>Assistant:</i>	Andrzej Ratkowski (since Oct. 2009)
<i>Senior Lecturers:</i>	Jerzy Gustowski, Zygmunt Komor, Urszula Kręglewska
<i>Senior Engineer:</i>	Włodzimierz Macewicz
<i>Ph.D. Students:</i>	Ali Mhammed Benniran, Adam Działak, Anna Felkner, Andrzej Grudzień, Maciej Gula, Szymon Kijas, Marcin Ludzia (until Oct. 2009), Andrzej Ratkowski, Łukasz Szejba, Piotr Sztandera, Maciej Szumski

Research of the division is conducted in 2 research groups:

**Control Engineering Group (P. Tatjewski, P. Domański, Z. Komor, M. Ławryńczuk, P. Marusak, J. Gustowski, U. Kręglewska, A. Działak, Ł. Szejba, M. Szumski)**

Research of the group encompasses control engineering techniques, in particular industrial process control. The focus is on predictive and fuzzy control algorithms, multilayer optimizing and supervisory control, and non-linear system control and analysis. Model-based predictive control algorithms for linear and nonlinear process modeling are developed and investigated. Soft computing methods for design and tuning of control systems are used, based first of all on fuzzy systems and neural nets. Theoretical considerations are combined with simulation analysis and investigations. Computer Control Systems Laboratory is equipped with programmable controllers, industrial computers and workstations with software tools, including Matlab with Toolboxes and SCADA systems.

**Software Engineering Group (K. Sacha, A. Zalewski, W. Macewicz, M. Szlenk, A. Ratkowski, A. Felkner, A. Grudzień, S. Kijas, M. Ludzia, P. Sztandera)**

The main area of interest is the development and quality evaluation of software. Topics include software processes, analysis, design and quality evaluation methods, and software audit. A new research area is service-oriented architecture (SOA). Apart of the research activity, we have been working on a number of commercial projects related to the development and evaluation of huge software systems for public organizations and for the industry. The scope of those projects included business process modeling, requirements analysis, strategic planning, conducting the testing process, and software audit.

**OPERATIONS AND SYSTEMS RESEARCH DIVISION**

<i>Division Head:</i>	Professor Eugeniusz Toczyłowski
<i>Professors:</i>	Włodzimierz Ogryczak, Eugeniusz Toczyłowski, Wiesław Traczyk
<i>Readers:</i>	Jerzy Paczyński, Tomasz Traczyk
<i>Assistant Professors:</i>	Krzysztof Fleszar (until Sept. 2009), Janusz Granat, Mariusz Kaleta, Adam Krzemienowski (on leave since Oct. 2009), Krzysztof Pieńkosz, Grzegorz Płoszajski, Kamil Smolira (since May 2009), Andrzej Stachurski, Tomasz Śliwiński, Izabela Żółtowska
<i>Assistants:</i>	Przemysław Kacprzak (since Oct. 2009), Piotr Pałka (since Oct. 2009)
<i>Senior Lecturers:</i>	Tadeusz Rogowski, Jerzy Sobczyk
<i>Ph.D. Students:</i>	Krzysztof Bareja, Przemysław Kacprzak, Kamil Kołtyś, Bartosz Kozłowski (until Feb. 2009), Robert Kuźmiuk, Michał Majdan, Paweł Markowski, Andrzej Midera, Piotr Modliński, Paweł Olender (since Feb. 2009), Piotr Pałka, Adam Połomski (since Feb. 2009), Piotr Rzepakowski

Research of the division is conducted in 2 research groups:

**Operations Research and Management Systems Group (E. Toczyłowski, T. Traczyk, K. Fleszar, M. Kaleta, K. Pieńkosz, G. Płoszajski, K. Smolira, I. Żółtowska, P. Kacprzak, P. Pałka, K. Kołtyś, R. Kuźmiuk, A. Midera, P. Modliński)**


Research of the group is concerned with operation research and structural discrete optimization methods for control and management of discrete processes, including applications in the network structure development, deregulated electric power industry, IP networks, computer integrated manufacturing, etc. The research is focused on market and auctions design, scheduling techniques, efficient structural-based optimization algorithms, time-table generation, strategic and tactical planning, detailed scheduling, and real-time operational control. Also, the object oriented and relational database management systems and CASE methods are investigated to design of the distributed multi-functional heterogeneous information systems.

**Optimization and Decision Support Group (W. Ogryczak, W. Traczyk, J. Paczyński, J. Granat, A. Krzemienowski, A. Stachurski, T. Śliwiński, T. Rogowski, J. Sobczyk, K. Bareja, B. Kozłowski, M. Majdan, P. Markowski, P. Olender, A. Połomski, P. Rzepakowski)**

Research of the group is focused on the theory of distributed and parallel computational methods, and software for optimization. The theory covers a whole area of linear and non-linear, dynamic, stochastic and multiple criteria problems, and deals with such topics as the sensitivity aspects and the parametric aspects. Another area covers the decision theory, including the multi-person decisions and the game theory, and deals with software building for decision support and organization and management of computer networks. Also, research is carried on the methods of reasoning in knowledge based systems.

1.3 Research Areas

## Complex Systems Group

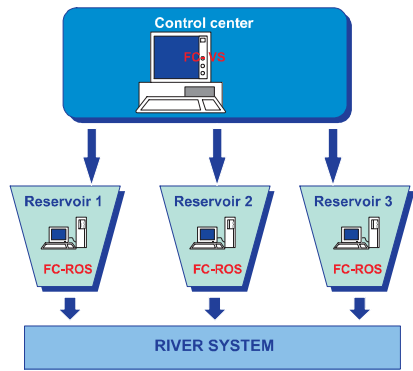


### Software for complex systems simulation

Flood Control

FC-ROS & FC-VS (*Flood Control*)

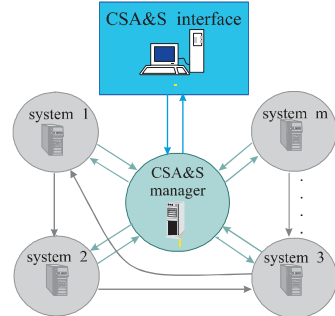
decision support systems for flood control in multireservoir systems.



Distributed Simulation

CSA&S (*Complex Systems Analysis & Simulation*)


heterogeneous software environment providing a framework for simulation experiments carried out on parallel computers.



ASim/Java (*Asynchronous Simulation/Java*)

library that may be used to build parallel or distributed discrete event simulators

## Complex Systems Group



### Traffic control in TCP/IP networks

Family of price-based control algorithms for IP networks

Congestion control:

- New algorithm proposed
- Verified through simulations

Joint traffic engineering / bandwidth allocation methodology - designed to improve effectiveness (under investigation).

Simulation Tools


TcpSim – a fast TCP/IP simulator:

- calculation of transmission times for bulk data transfers
- flow-based - much faster than packet-level simulators
- original method of traffic modeling
- implemented in Java.

BrokerSim – a C++ pricing simulation package for OPNET:

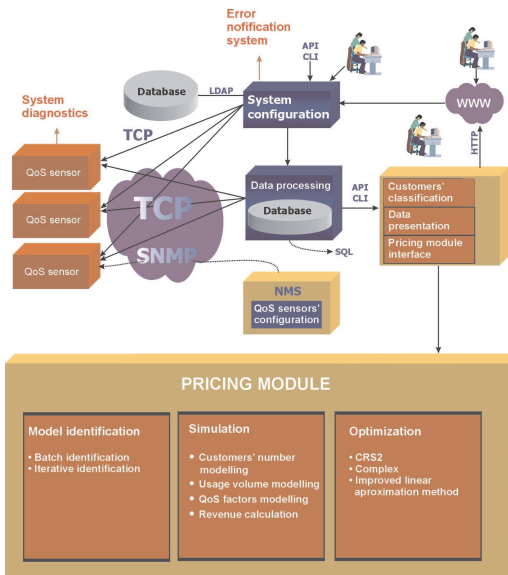
- traffic generator for user profiles
- short-term traffic demand approximator
- broker module: pricing decisions and traffic shaping
- router pricing module augmenting OPNET's router model

## Complex Systems Group




### Quality of Service in IP Networks

- Differentiation of IP services
- Quality of service
- Pricing support
- Integration with NSP operation systems

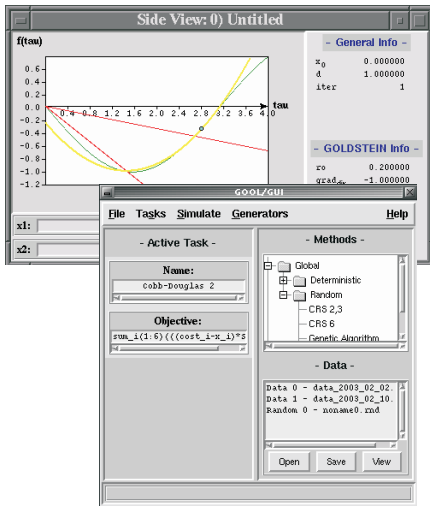


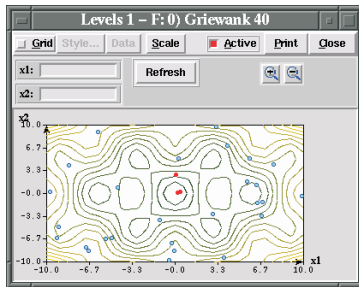
## Complex Systems Group



### Global optimization

#### GOOL - Global Optimization Object-Oriented Library






**GOOL**

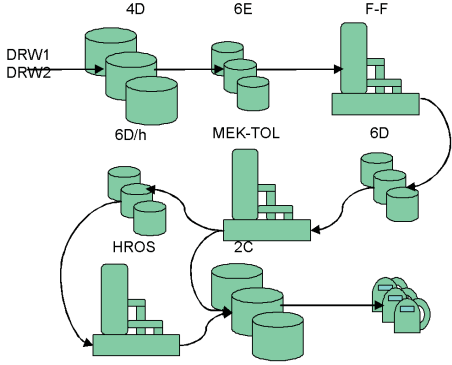
library of random search generators and optimization algorithms for convex and nonconvex, unconstrained and constrained problems

## Complex Systems Group

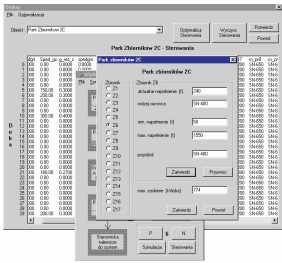


### Operations scheduling using Constraint Programming

Solution of a scheduling problem in an Oil Refinery Division



Oil Refinery Division




Simulation and optimization system

**Goals:**

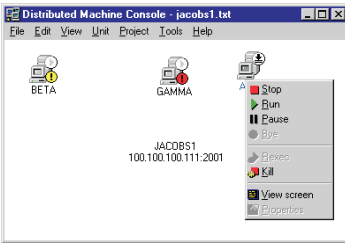
- Simulation of an Oil Refinery Division
- Finding all feasible solutions
- Meeting all technical requirements
- Constraint scheduling methods
- Very fast computations


## Complex Systems Group



### Parallel and distributed computations

- research on price and direct method of decomposed optimization
- research on parallel implementation of global optimization algorithms
- development of new software tools for parallel and distributed computations
- a monograph published in 2001






New software tools:

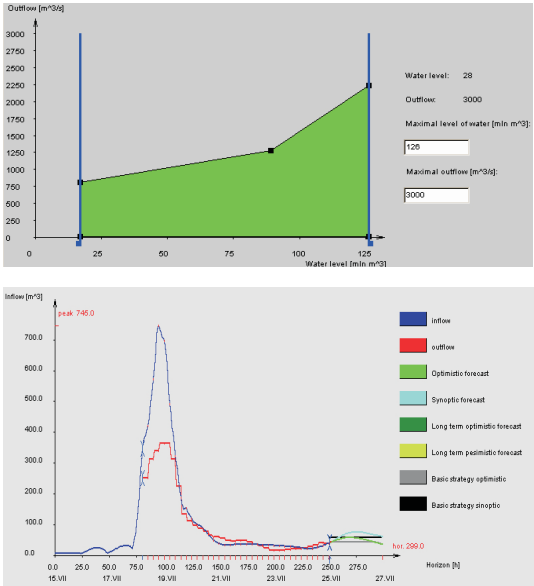
- WDM** (windows distributed machine) – a software environment for performing distributed computations in a cluster of machines working under windows
- GEPAS** (generic parallel suite) – an implementation of distributed shared memory in network
- NONOS** (nonlinear optimization solver) – an ASP type optimization server (submission by e-mail or browsers)

## Complex Systems Group




### Optimal control and closed-loop design

- development of OO libraries for calculation of optimal control in general nonlinear deterministic problems with constraints
- development of OO libraries for calculation of optimal closed-loop policies in general stochastic problems
- development of Decision Support Systems for flood control in single and multireservoir systems
- theoretical studies on optimal control in various conditions eg. with stochastic scenarios, fuzzy systems, worst-case, different risk measures, etc.
- theoretical and simulation studies on real-time control in computer networks at different levels

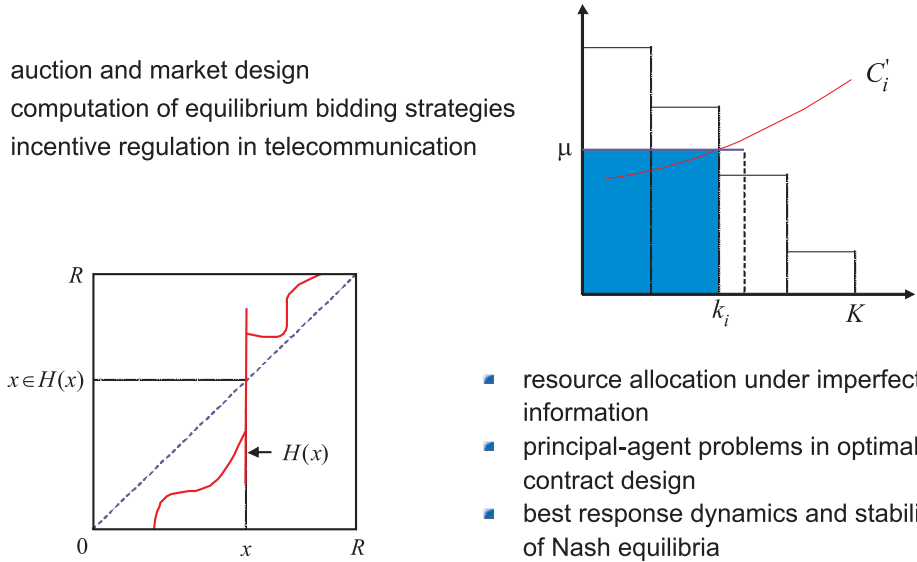


## Complex Systems Group




### Game theory and mechanism design

- auction and market design
- computation of equilibrium bidding strategies
- incentive regulation in telecommunication



- resource allocation under imperfect information
- principal-agent problems in optimal contract design
- best response dynamics and stability of Nash equilibria

## Complex Systems Group



### Interval computations for nonlinear problems

Instead of single numbers (points), we can perform calculations on intervals (possibly multidimensional).

Rules of interval arithmetic (and other interval functions) are designed so that:

$$a \in a = [\underline{a}, \bar{a}], \quad b \in b = [\underline{b}, \bar{b}],$$

$$\varepsilon \in \{+, -, \cdot, /, \} \Rightarrow a \varepsilon b \in a \varepsilon b$$

Such an approach allows to describe the uncertainty of parameters and also to deal with numerical inaccuracy.

For example we have the following rules for addition and multiplication:

$$[\underline{a}, \bar{a}] + [\underline{b}, \bar{b}] = [\underline{a} + \underline{b}, \bar{a} + \bar{b}]$$

$$[\underline{a}, \bar{a}] \cdot [\underline{b}, \bar{b}] = [\min\{\underline{a}\underline{b}, \underline{a}\bar{b}, \bar{a}\underline{b}, \bar{a}\bar{b}\}, \max\{\underline{a}\underline{b}, \underline{a}\bar{b}, \bar{a}\underline{b}, \bar{a}\bar{b}\}]$$

Interval (inclusion) function:

$$f(x) = x^2 + 2x + 1$$

$$f(x) = x^2 + 2 \cdot x + 1$$

$$x \in x = [\underline{x}, \bar{x}] \Rightarrow f(x) \in f(x)$$

$$f[-5, 1] = [-5, 1]^2 + 2 \cdot [-5, 1] + 1 = [-9, 28] \supseteq [0, 16]$$


Interval tools:

- the branch-and-bound method
- monotonicity test
- interval Newton operators
- constraint propagation
- ...

Problems that can be solved:

- systems of nonlinear equations
- constraint satisfaction problems
- global optimization problems
- multicriterial optimization problems (convex and nonconvex)

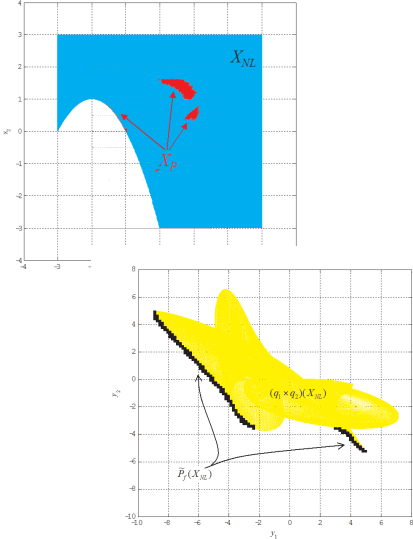
## Complex Systems Group




### Interval computations seek the Pareto-front of nonlinear multicriterial problems

```

compute (q(), x0, ey, ex)
// L is the list of quadruples
// (y, L_in, L_bound, L_unchecked),
// where L's are lists of qes x
y0 = q(x0);
enqueue(L, (y0, {}, {}, {x0}));
while (a quadruple in L, for which
      wid(y) > ey)
  pop this quadruple
  (y, L1, L2, L3) from L;
  if (L1?{}) then
    delete sets dominated by y;
  end if
  if (wid(y) > ey) then
    bisect y;
    invert resulting sets;
    enqueue results;
  end if
end while
end compute
        
```



## Biometrics and Machine Learning Group




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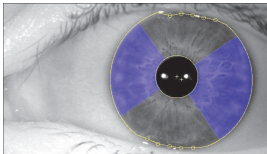
### Biometrics

#### Iris verification

- Prototype iris recognition system
  - real-time automatic iris capture
  - automatic localization of iris and occlusions
  - fast Zak-Gabor transform for calculation of the unique iris features
  - stimulated infrared reflections analysis for detection of subterfuges (printed irises)
- Eye aliveness detection
  - pupil dynamics modeling (patent pending)
  - detection of stimulated reflections from the cornea
  - frequency spectrum analysis
- Iris image permutation for replay attack prevention

**Prototype iris recognition system (IRS) with aliveness detection**

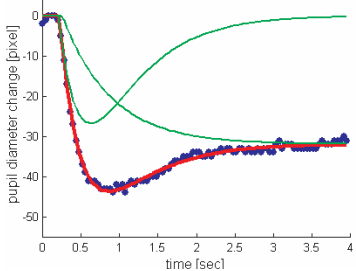





**Iris coding**  
Human eye imaged in infrared light by the IRS. Automatic localization of iris sectors free from occlusions (marked in blue)

**Aliveness detection**

Comparison of measured (blue dots) and modeled (red line) pupil reaction to light changes enables to construct a subterfuge detection mechanism



## Biometrics and Machine Learning Group



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### Biometrics

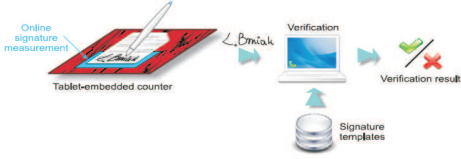
#### Handwritten signature-based identity verification


Verification of on-line signatures

- recognition based on handwriting dynamics [x-velocity, y-velocity, pressure]
- use of neural networks and dynamic programming, Hidden Markov Models for verification

Verification of scanned signatures(off-line)

- integration of several independent methods of verification in a two stage classifier with a global classifier at the second stage
- use of morphological features, texture features, grid features, ...

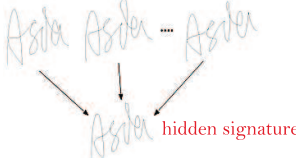




**'Hidden Signature'**- solution for template creation


We introduced the idea of hidden signature an artificial signature which has a feature of minimizing the mean dissimilarity between itself and the signatures from the training set.

This idea has been successfully applied to both on and off-line verification systems and significantly improved its results. Both systems were tested on public databases MCYT and SVC.





## Biometrics and Machine Learning Group

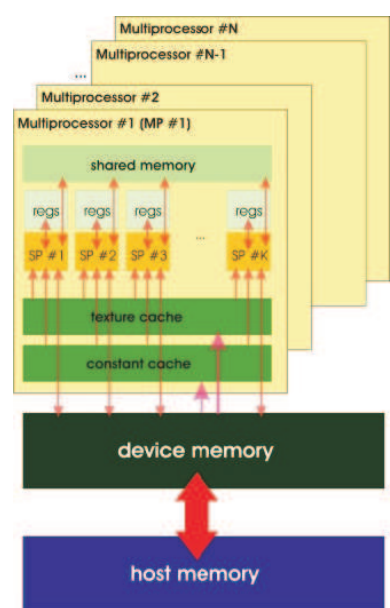


### Biometrics


**Robust algorithms on GPUs (Graphics Processing Units)**

Iris-based verification and identification system

- application of NVIDIA CUDA™ technology
- optimized algorithms for highly parallel biometric template database search
- using OSIRIS, Daugman and Czajka iris feature coding methods
- up to 10 mln identities checked per second (100 ns per match) on GeForce GTX285,
- identification is from 10 to 50 times faster than state-of-art systems
- identification method based on the best match or on the list of best candidates
- verification engine capable of performing thousands of verification tasks per second
- support for encrypted biometric template databases

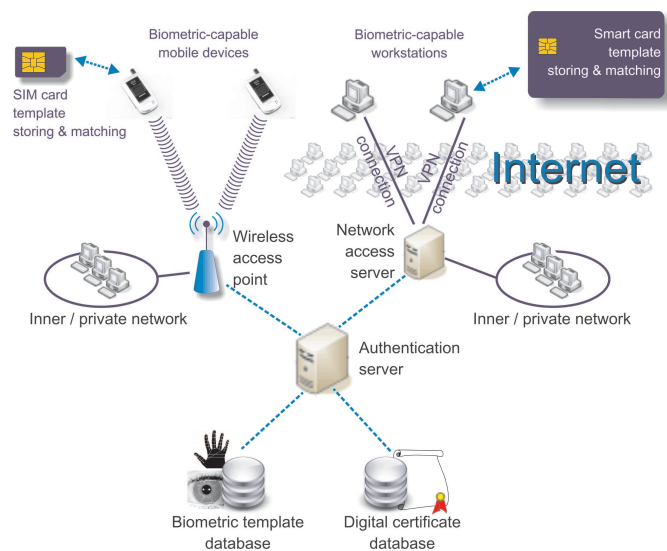


## Biometrics and Machine Learning Group



### Biometrics

**Biometric authentication for secure remote access**



Novel authentication protocols and techniques employing biometrics

VPN & wireless networks applications


Development of biometric capable mobile devices and workstations

Smartcards and SIM cards application for distributed template storage and processing (match-on-token)

Central template database design and management

Multiple biometrics (iris, fingerprint and others)

## Biometrics and Machine Learning Group



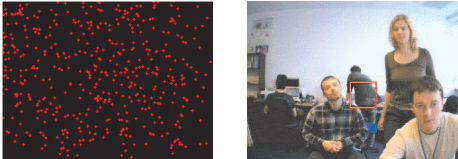
  

### Biometrics

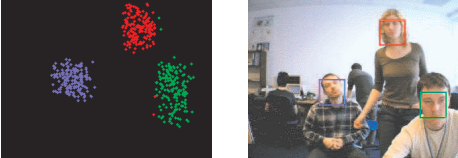
**Particle filter-based face tracking and identification**

- reference object stored as hue - saturation histogram in the HSV color space
- particle filtering for focus of attention
- „dust”-filtering, based on single pixel classification with fast cluster labelling algorithm for exact tracking
- Bhattacharyya coefficient -based distance measure used to weight particles and „dust”
- automatic detection of the number of objects by Modified X-Means algorithm
- work in progress on gradual information collection for the purpose of identification with increasing confidence level


**Sample tracking sequence (24 fps)**



Frame #0: Particles spread all over the image (left: particle space, right: the image space)




Frame #4: Particles converged to objects, number of objects detected automatically



Frame #4: Dust filtering for exact tracking

## Biometrics and Machine Learning Group




### Biometrics

**EEG-based identity verification**

- Comparison of EEG signals distant in time
  - Short-term variability of EEG
  - Long-term variability of EEG
- Variability of EEG models in different recording conditions
- Linear modeling of EEG signal
- Nonlinear modeling of EEG
  - GARCH - Generalized Autoregressive Conditional Heteroskedasticity model



## Biometrics and Machine Learning Group



### Biometrics

#### Biometric cryptography

- Assessing information capacity of biometric data
  - no model approach based on statistical properties of comparisons
  - model approach based on models for each modality
- Complexity analysis of biometric data
  - inner-structure of codes (dependencies e.g. iris codes)
- Comparison of properties and effectiveness of different algorithms for biometric modalities
  - iris modality – Osiris, Czajka, Masek, Neurotechnology
  - fingerprint – NIST, Neurotechnology
- Analysis of application of different biometric cryptography approaches to different modalities/algorithms
- Analysis of aspects of secure implementation of biometric systems

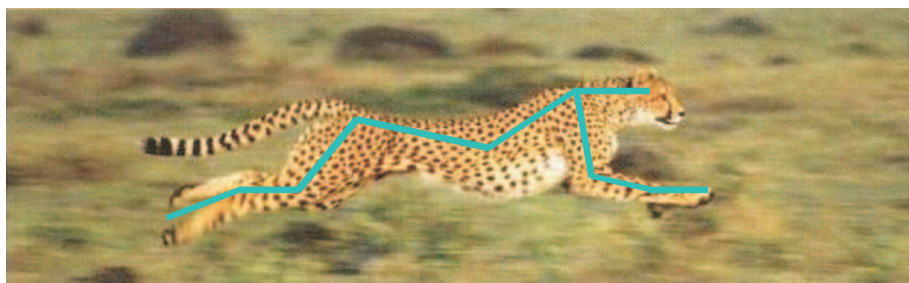
## Biometrics and Machine Learning Group




### Machine Learning

#### Model-free on-line adaptive control based on reinforcement learning

Typical Reinforcement Learning methods are far too slow to be used in adaptive control. Our solution is based on a combination of **Actor-Critic methods** and **experience replay**. Simulations show more than **hundredfold increase** of control adaptation learning speed. We tested this approach using a simulated planar model of cheetah.




## Biometrics and Machine Learning Group




### Machine Learning

Project on humanoid robots learning of physical activities

In cooperation with PLUM z o.o. company we started a project on learning in humanoid robots. The objective of the project is to design algorithms that enable the robots to learn to walk and adroitly run. The immediate result of the project would be a learning brain for a remote-controlled Bioloid.




## Biometrics and Machine Learning Group




### Machine Learning

Project on learning-driven policy optimization in industrial robots

We started a project on learning in industrial robots. The objective of the project is to design a technology that enables the robot controller to optimize their movements through learning. The project is founded by grant N514237137 of Ministry of Science and Higher Education in Poland.



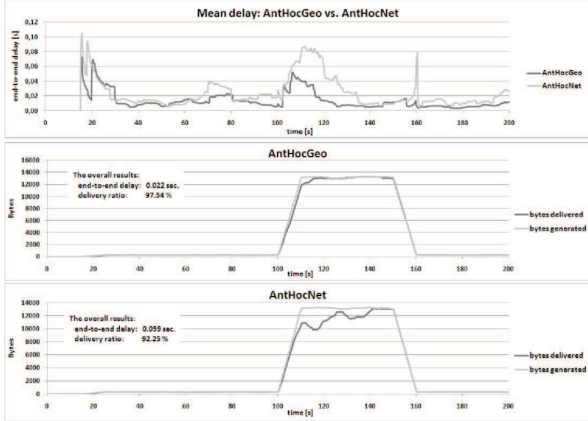
## Biometrics and Machine Learning Group



### Machine Learning


Ant routing with distributed geographical localization of knowledge in ad-hoc networks

- Highly dynamic environment
- We propose to connect the knowledge gathered by ant agents with locations within the network rather than with individual nodes
- Mobile nodes exchange their knowledge as they move across the network
- Routing connections defined on the locations level are much more robust to dynamic topology changes than the connections on the nodes level
- Adaptation capabilities of ants are improved, together with the overall performance of the network (Fig. right)




**Distributed localization of knowledge in AntHocGeo improves the adaptation capabilities of ants (during a sudden jump and a sudden drop of the network's load level)**

## Robot Programming and Pattern Recognition Group

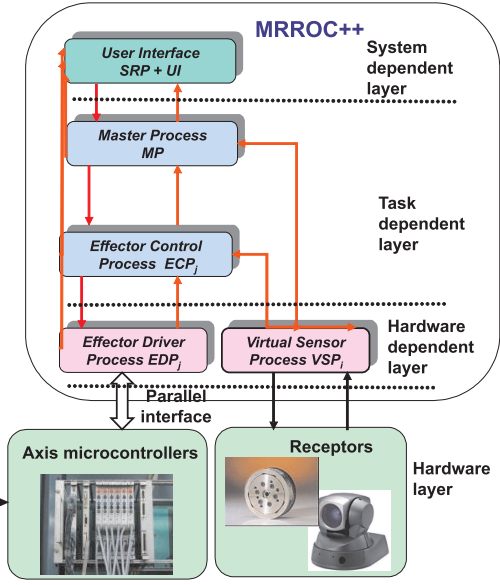


### MRROC++ robot programming framework


- a collection of: C++ classes, QNX processes, and a design pattern
- designed for building open modular robot control systems
- network distributed
- requires custom built axis controllers and parallel interface to a host PC within an Ethernet network



Two co-operating IRp-6 robots




## Robot Programming and Pattern Recognition Group



### RNT and POLYCRANK prototype robots


- **RNT robot:** high stiffness, large workspace, serial-parallel kinematic structure
  - well suited to milling and polishing tasks
- **POLYCRANK robot:** capable of very fast motions, has no joint limits, direct drive
  - well suited to palletization tasks

RNT robot:




Control systems based on MRROC++ programming framework

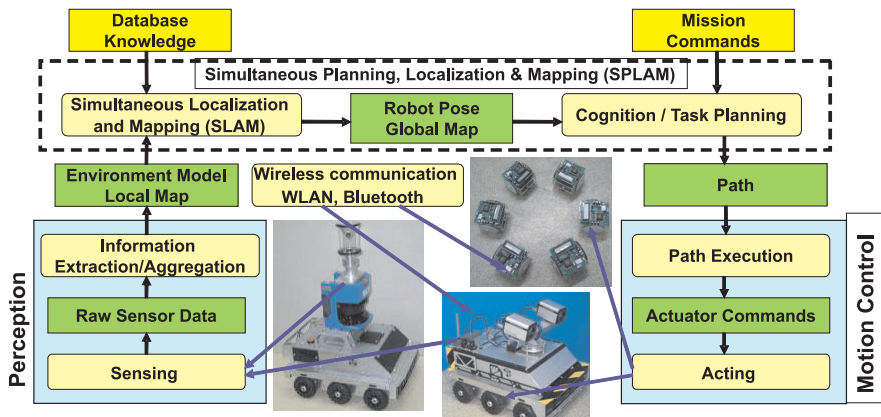
POLYCRANK robot



## Robot Programming and Pattern Recognition Group




### Control architecture for autonomous mobile robot teams



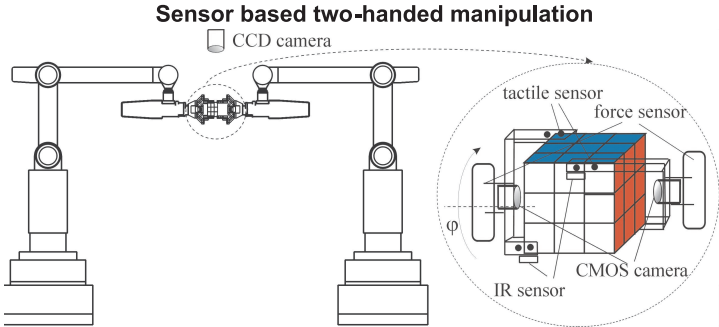
**Research objectives:**

- To develop the perceptual, representation, reasoning, learning and communication capabilities of autonomous mobile robot systems in human-oriented real-life environments
- To develop and implement a complete, effective, and reusable software for autonomous robot systems that incorporates both programming (manual coding) and learning-derived (automated coding) software composition to increase the ability of autonomous robots to function in unpredictable, dynamic environments
- To study the human-robot interaction (multi-modal interfaces)

## Robot Programming and Pattern Recognition Group



### Sensor based two-handed manipulation




Rubik's cube puzzle as a benchmark task for service robots

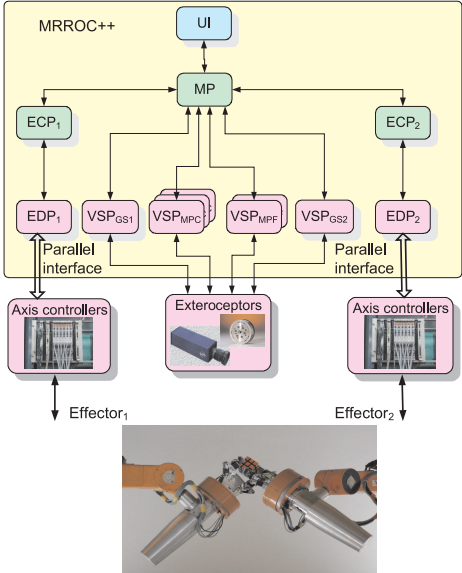
**Solution of the benchmark task requires:**

- Two-handed manipulation skill to efficiently turn the faces of the cube
- Visual sensing capability to locate the cube and identification of its initial state
- Visual servomechanism to approach the cube and to get hold of it
- Using tactile and force sensors to avoid jamming of the cube while rotating the faces
- Capacity for using tactile and force stimulus in manipulation
- Fusion of deliberative and behavioural control to work out the plan of motions solving the puzzle and to adapt quickly to sudden changes in the environment (e.g., jamming)
- Ability to recognize spoken commands and to synthesize replies and queries

## Robot Programming and Pattern Recognition Group



### Two-handed Service Robot Controller Capable of Solving a Rubik's Cube Puzzle



**Components:**

**MP** – Master Process (produces the solution of the puzzle and generates the nominal motion trajectories for the two arms)


**ECP** – Effector Control Process (transmits the macro-steps generated by the MP to the EDP)

**VSP** – Virtual Sensor Process (aggregates data from sensors, i.e. cameras, enabling the localisation of the cube and identification of its state)

**EDP** – Effector Driver Process (divides the macro-step into steps and executes each step using the Task Frame Formalism for position-force control)

**UI** – User Interface (operator console and status and error reporting)

# Robot Programming and Pattern Recognition Group



## FraDIA: Framework for Digital Image Analysis

**FraDIA**

- Loading and switching image sources
- Loading and switching user tasks
- Methods for events/data passing between graphical interface, sources and tasks

**Process shell (constant)**

- Saving images and AVI movies
- Loading and writing configuration XML files
- Communication with the MRROC++ framework

**Task Kernel (exchangeable)**

- Image processing and recognition algorithm
- Graphical interface related to given task, enabling modification of its parameters, etc.

**Image Source Kernel (exchangeable)**

- Acquisition from given image source
- Graphical interface enabling management of source parameters

Analog camera

Movie (AVI)

Image sequence

Image (JPG, PNG)


**Main concepts:**

- Creation of the possibility to implement, train and test image recognition algorithms offline (recording/loading movies and images)
- Utilization of created algorithms in robotic tasks: drivers for cameras, ready-to-use communication mechanisms in both FraDIA and MRROC++ frameworks

**Implementation details (version 1.0):**

- Framework written in C/C++, based on the OpenCV and FLTK libraries
- Four threads: image acquisition, image processing, GUI, communication with the MRROC++
- Object-oriented design: set of base abstract classes and interfaces, collection of ready to use components, utilization of multiple design patterns

# Robot Programming and Pattern Recognition Group




## FraDIA: Utilization in selected robotic tasks

**Robot playing checkers :**

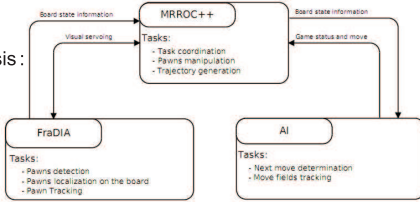
Two working modes of visual information analysis :

- recognition of checkers board state
- estimation of selected checker position (during visual servoing)




**Robot Solving Rubik's Cube:**

- Real-time estimation of cube position
- Identification of the cube state



**Haar Classifier based object grasping:**

- Training of the Haar Classifier based on computer -aided object pointing in pre-recorded movies
- Utilization of Haar Classifier for real -time object grasping



**Procedures for automatic camera calibration:**

- Computations of location of stand -alone camera (SAC) in the global reference frame
- Computations of mounted on the gripper camera (EIH) position in relation to the robots gripper



## Robot Programming and Pattern Recognition Group



### FraDIA: Future development plans

#### Core modifications:

- Creation of complex, parallel signal -to-symbols processing stream
- Development of new component type, where results of processing and analysis will be transferred to: sink
- Extraction of existing „hard -coded” sinks (MRROC++ transceiver, recording of movies/single images to files) and their transformation to mode „flexible” form
- Utilization of the Qt framework for the implementation of new GUI and communication between components
- Distribution of whole recognition process into multiple threads/processes

#### New sources:

- New image sources: fast digital camera ( 94 fps), virtual camera, lidar
- Possibility for utilization of non -vision sources, e.g. microphone (speech processing)

#### Utilization of GPU (Graphical Processing Unit):

- Utilization of GPU for fastening of multiple image processing algorithms
- Parallelization of image segmentation and its implementation on GPU

#### Visual servoing:

- Redesign of the communication methods with the MRROC++ structure
- Implementation of common methods related to the location of objects in the global reference frame

## Robot Programming and Pattern Recognition Group



### Problems of Active Sensing

#### Concept:

Active perception means for a perceptual system to actively seek for the information and not just rely passively on information falling accidentally on the sensor. This also means that the system must be mobile and can interact with the environment.

#### Active vision:

In the case of a static observer, identification of distant or partially occluded object can be very difficult and sometimes even impossible. Those problems can be overcome by the introduction of an active observer, which can perform actions which will facilitate the interpretation of perceptual information. This approach is known as Active Vision.

#### Examples of active vision behaviours:

- In the case of sensory data received from the cameras located on the active observers (mobile robots, manipulators, etc.) most obvious behavior is to change the location of camera, thus its field of view.
- Change internal camera parameters (focus length, etc.).
- Actively control the scene lightning (position of light sources or the power of their illumination).

#### Utilization of active vision by the Robot Cashier:

- The goal of robot cashier is to detect and identify objects located on the conveyor belt.
- Object are identified through the recognition of their barcodes.
- Thus it can be impossible to properly interpret barcodes by the analysis of images retrieved from static camera located above the conveyor, the idea is to use camera integrated with the robot gripper.
- If something similar to barcore is detected on the scene, robot moves its effector in order to reach position which will enable proper barcode identification.

# Robot Programming and Pattern Recognition Group



## Elementary behaviours of robot manipulators

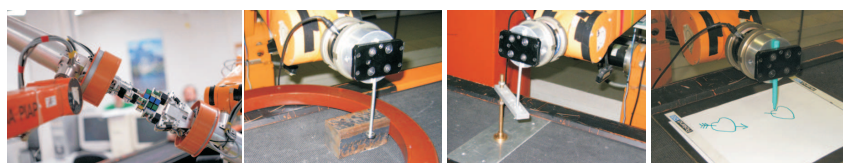
### Main concepts:

Three elementary behaviors can be distinguished. They suffice to implement all possible cases of interaction between a manipulator and the environment. Those behaviors are:

- unconstrained motion with the assumption that no contact with obstacles will be encountered – where pure position control suffices
- contact with the environment – where pure force control is used,
- intermediate or transitional behavior – where initially unconstrained motion is expected to result in eventual contact, or vice versa – for this purpose some form of parallel position–force control has to be utilized (e.g., stiffness, damping or impedance control).

The existing manipulator control can be classified taking into account the proposed behaviors.

In terms of those behaviors complex tasks can be specified formally and implemented.



Rubik's cube solver

Following an unknown contour

Rotating a crank

Copying drawings

# Robot Programming and Pattern Recognition Group



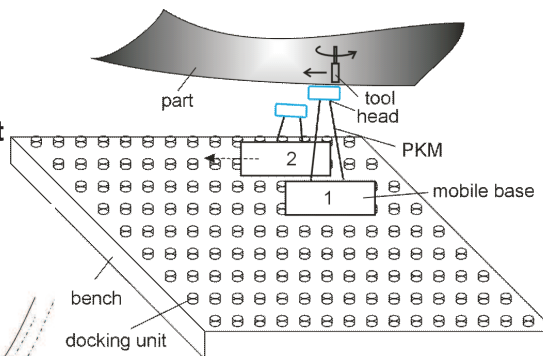
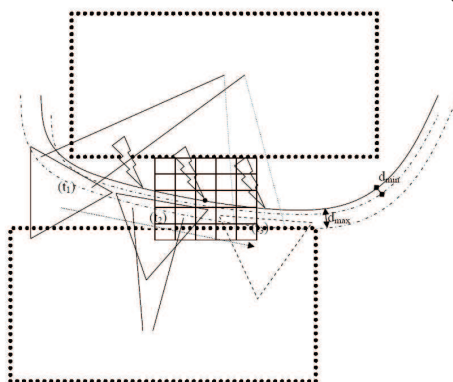
## Planning and controlling a swarm of mobile fixtures

Seventh Framework Program

Theme [NMP-2007-3.2-1]

Project: **SwarmItFIX** -


**Self Reconfigurable Intelligent Swarm Fixtures**



Active mobile fixture system for drilling and milling processes:

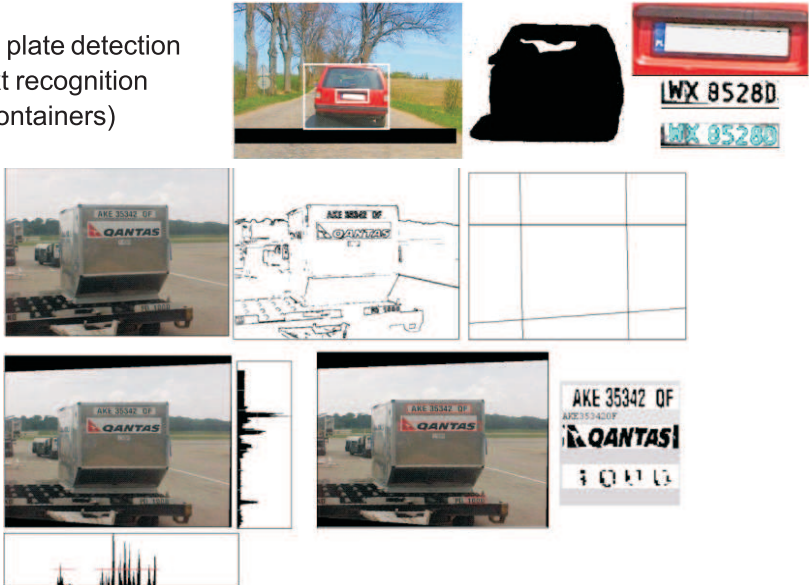
a bench with docking units, 2 mobile bases with PKM manipulators and heads.

## Robot Programming and Pattern Recognition Group




### Text recognition in outdoor images

Licence plate detection and text recognition (cars, containers)

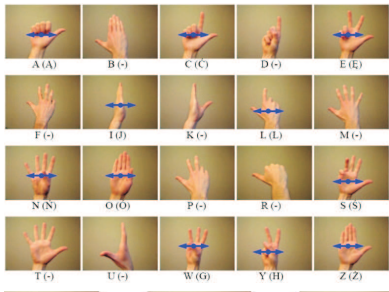


## Robot Programming and Pattern Recognition Group

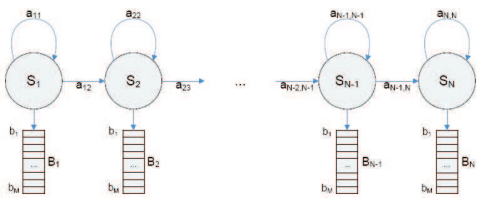


### Gesture recognition in digital images

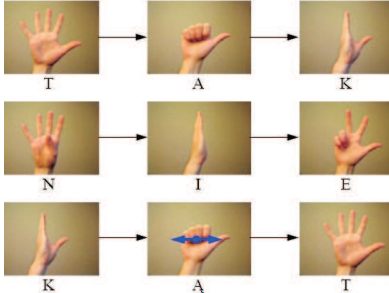
- Static and dynamic poses („letters”)



- HMM modelling of pose sequences




- Examples of gestures („words”):



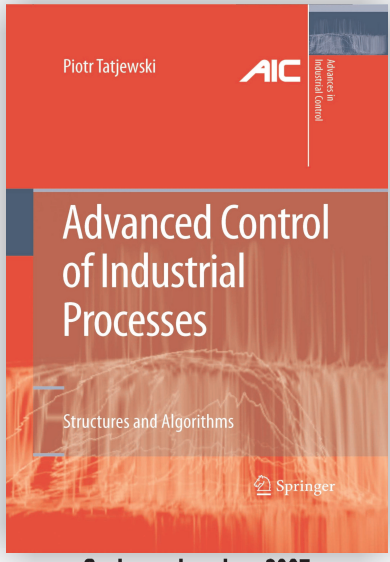


## Control Engineering Group




### Advanced control of industrial processes

- The multilayer control structure for industrial processes
- Non-linear process modeling using fuzzy techniques and neural networks
- Fuzzy control algorithms of Takagi-Sugeno type
- Algorithms and structures of model predictive control with linear and nonlinear process models (control laws, optimization-based algorithms)
- Software for development and testing of advanced process control algorithms




**Springer, London, 2007**

## Control Engineering Group




### Optimization of industrial processes and large-scale systems

- Procedures for steady-state optimization of industrial processes
- Structures and algorithms for on-line measurement-based set-point optimization under uncertainty
- Hierarchical (multilevel) optimization methods for large-scale systems
- Multilevel algorithms for on-line set-point optimization of interconnected processes under uncertainty



**Imperial College Press/ World Scientific, 2005**

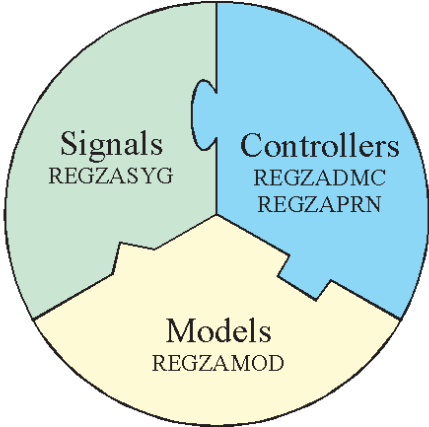
## Control Engineering Group




### REGZA - Algorithms and software environment for modeling and advanced control of industrial processes

**Software Package:**

- **REGZASYG** – programs and interface for signal processing
- **REGZAMOD** – programs and interface for process modeling
- **REGZADMC** – interface and model predictive control algorithms: linear DMC and nonlinear with fuzzy process models
- **REGZAPRN** – interface and model predictive control algorithms: linear GPC and nonlinear with neural network process models



## Control Engineering Group

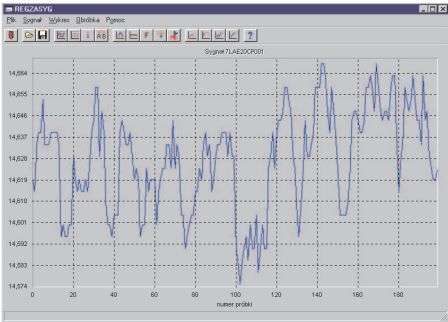


### REGZA - Algorithms and software environment for modeling and advanced control of industrial processes

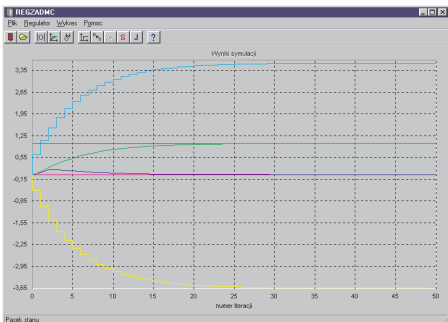
Nonlinear predictive control structures based on fuzzy and neural models

- Algorithms with successive linearization
- Algorithms with nonlinear prediction and linearization
- Algorithms with iteratively updated nonlinear prediction and linearization
- Algorithm with nonlinear optimization

**Main window of REGZASYG program**




**Main window of REGZADMC program**





## Software Engineering Group



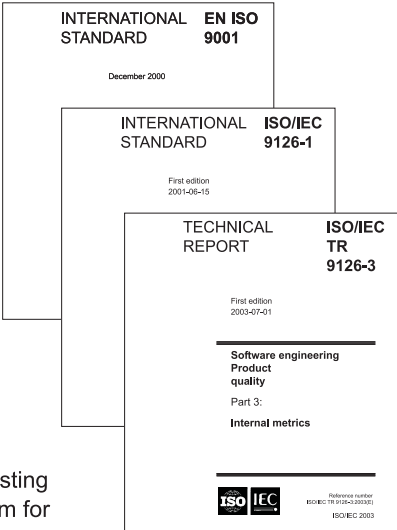
### Evaluation of the software quality

**Research topics:**


- Quality of the software process
- Quality of the software products
- Evaluation method:
  - Defining the set of quality criteria
  - Defining the set of questions
  - Evaluation and ranking
  - Threats and recommendations

**Sample projects:**

- Evaluation of the expected quality of software developed for IACS (support system for EU Common Agriculture Policy in Poland)
- Supervision and evaluation of the acceptance testing of the integrated management and control system for the post delivery service in Poland



## Software Engineering Group



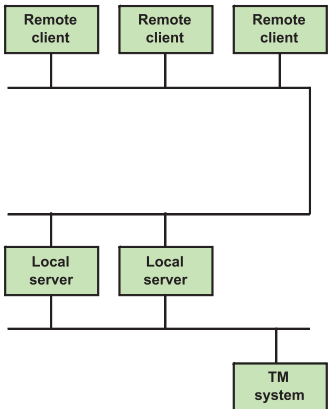
### Distributed Open Systems

**Research topics:**

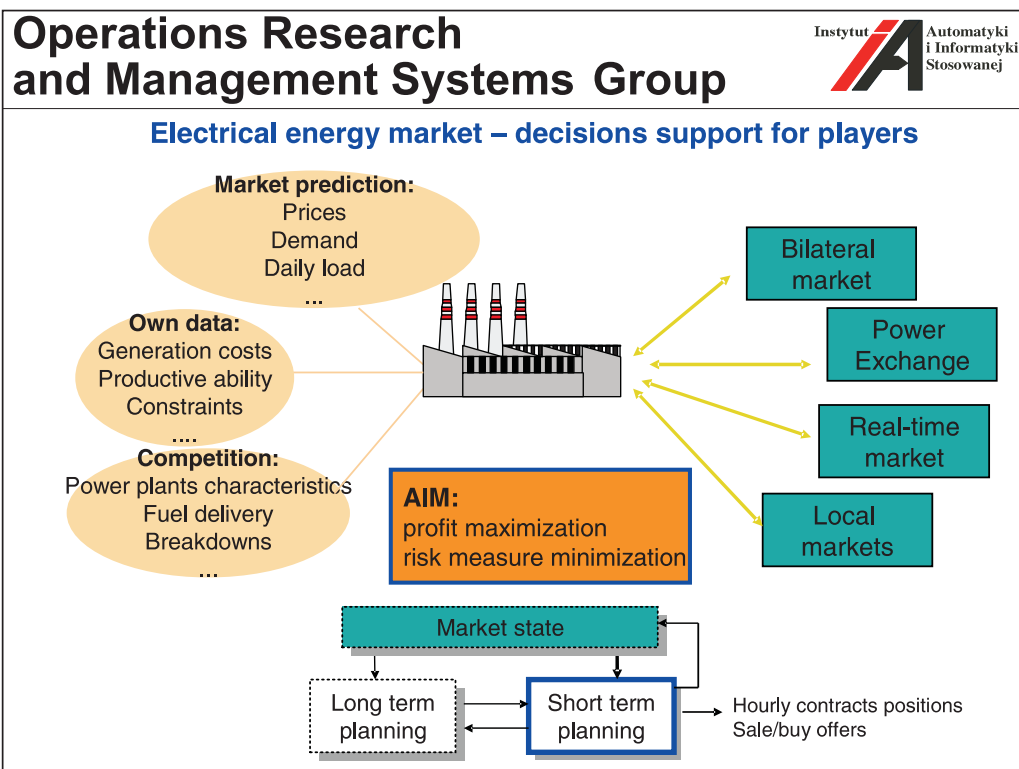
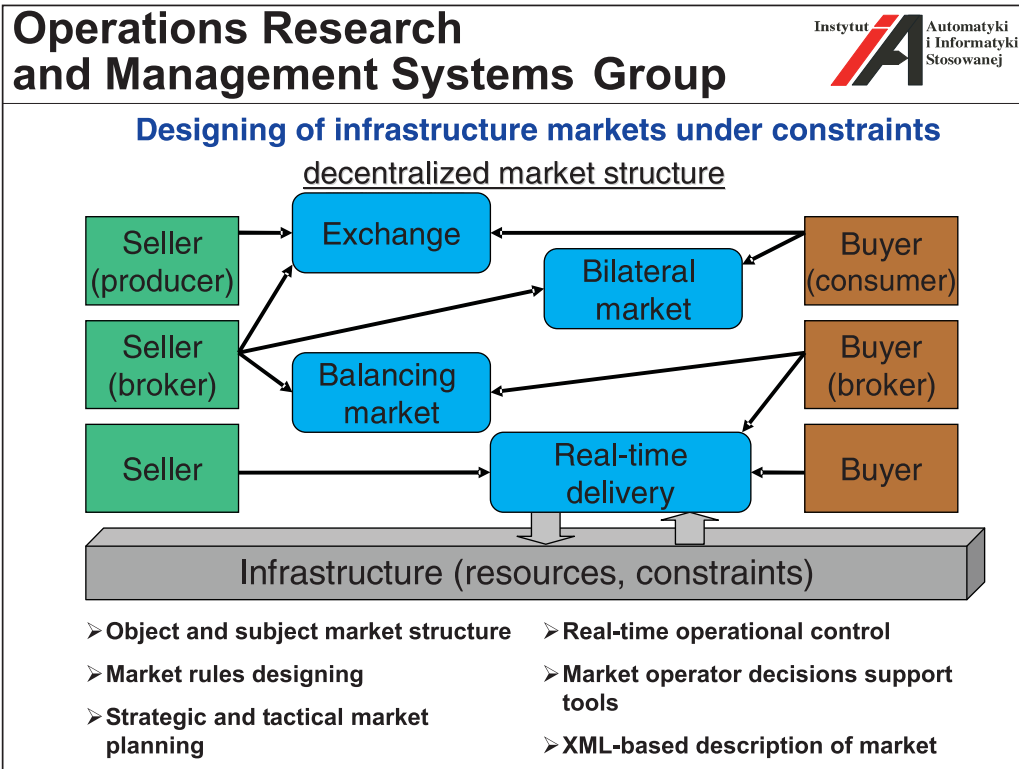
- Service Oriented Architectures (SOA)
  - Architecture and Architecture Decisions
  - System Evolution and Transformation
- Security in Distributed Open Systems
- Role-Based Trust Management languages
  - Syntax and Semantics
  - Credentials
  - Credential Chain Discovery
  - Soundness and Complexity of Inference Rules

**Languages and Conceptual Tools:**


- RT<sub>0</sub>, RT<sub>1</sub>, RT<sub>2</sub>, RT<sup>T</sup>
- BPEL
- Architecture Decision Models



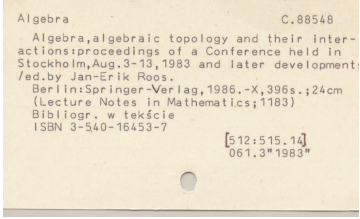




## Operations Research and Management Systems Group



### Library catalogue digitization



Skew correction

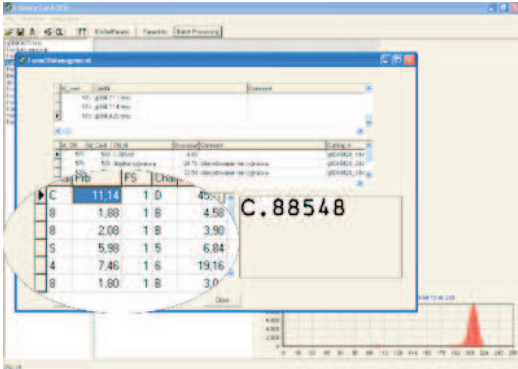
Binarization

Noise elimination

Segmentation

C.88548

Algebra and their inter-  
ference held in




Framing

C.88548

Recognition

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## Operations Research and Management Systems Group



### M<sup>3</sup> Multicommodity Market Model

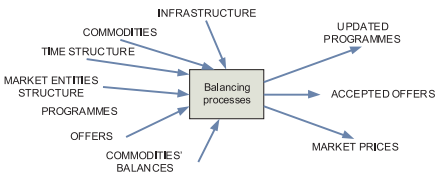
M<sup>3</sup> is a flexible and universal market data and communication model  
<http://www.openm3.org>

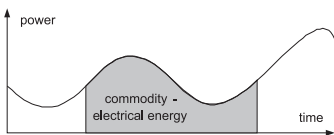
M<sup>3</sup> is mainly (but not only) designed for

- **Centralized** (auctions, exchanges) and **distributed, multicommodity** markets
- **Infrastructure** markets
- **„Real-time”** markets on which commodities
  - are non-storable, localized in time and space,
  - delivered too late become worthless, their storage is limited
  - are integrals of some instantaneous values

M<sup>3</sup> consists of several layers: formal mathematical model, conceptual data model, expressed in form of UML class diagrams, exemplary relational database structure, XML schemas for static data, communication models and XML schemas for messages and Web Services definitions.

**Conceptual model of M<sup>3</sup>** describes the inputs and outputs of elementary balancing process:






M<sup>3</sup> helps markets' development by providing

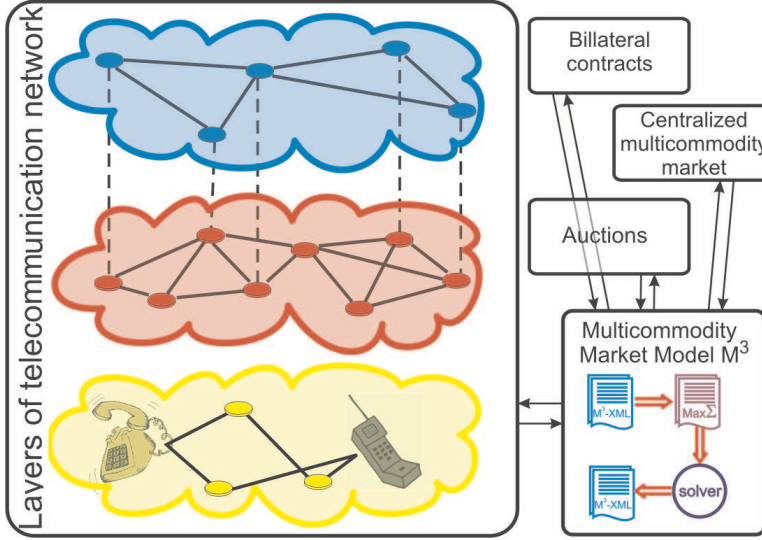
- flexible framework both for real-world market systems and for research projects
- possibilities for integration of software components
- possibilities for organizing benchmark data repository

## Operations Research and Management Systems Group



### Design of Multicommodity Market Model – M<sup>3</sup>


#### Application of M<sup>3</sup> on the Communication Bandwidth Market



**M<sup>3</sup> model:**

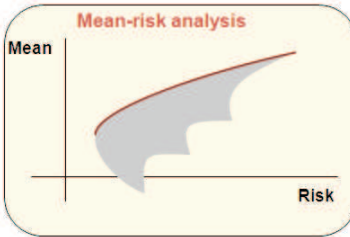
- may be used in information systems for market balancing in various infrastructure networks
- is a set of formal data models, which results in XML-derived information interchange specification
- may be used in a wide range of market-oriented network systems and may significantly facilitate communication, coordination and modelling procedures

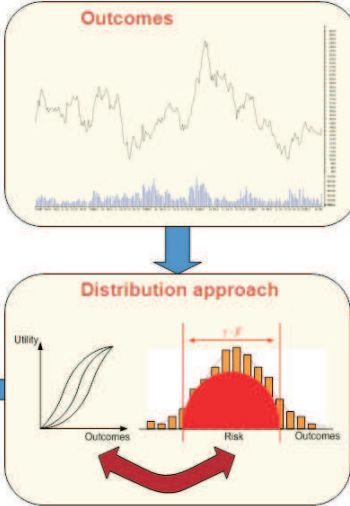
## Optimization and Decision Support Group



### Risk Measures and Optimization under Risk

- ∅ Focus on risk measures consistent with axiomatic models of preferences for choice under risk
- ∅ Risk preference modeling from strongest risk aversion through risk neutrality to strongest risk seeking
- ∅ Optimization with focus on linear programming: large dimensions, fast and stable numerical implementations



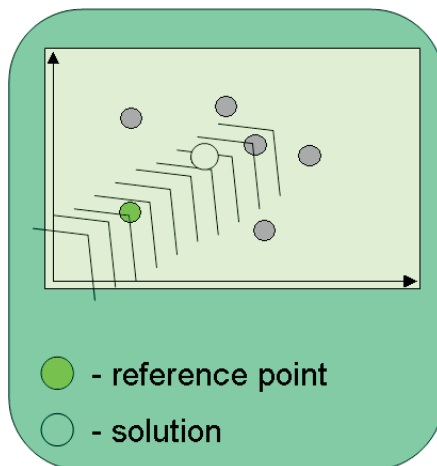


## Optimization and Decision Support Group



### Reference Point Method

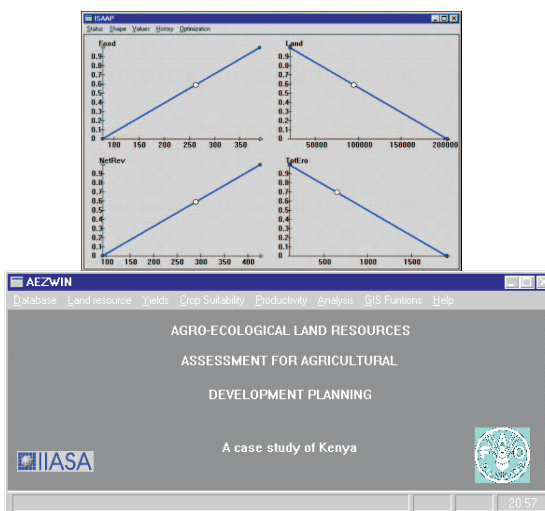
- interactive method for multicriteria model analysis
- guiding information by specification of the reference points
- a Pareto-optimal solution is selected for a given reference point



## Optimization and Decision Support Group



### Application of the reference point method for land resource assessment

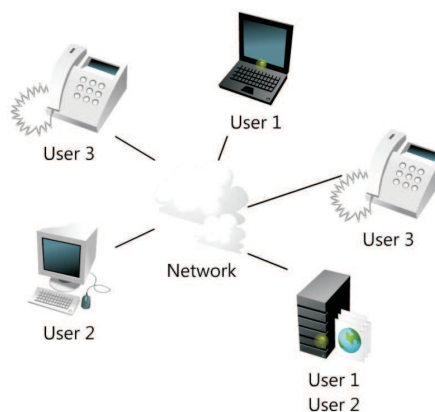


## Optimization and Decision Support Group



### Fair network design and optimization

- Optimization of networks (systems) which serve many users
- User = demand between a pair of nodes
- Shared resources (node/link capacities)
- Elastic demand – user can consume any bandwidth assigned
- The goal: resource assignment that is effective and fair (acceptable for all users)



## 1.4 Statistical Data

FACULTY and STAFF	2007		2008		2009	
	persons	FTE	persons	FTE	persons	FTE
<b>Academic Staff</b>	44(+2)	37.25(+2)	44(+1)	37.25(+1)	46(+1)	39.2(+1)
by titles/degrees						
Professors	4	3.75	4	3.5	4	3.5
D.Sc.-s	6	6	6	6	6	6
Ph.D.-s	25(+2)	21.5(+2)	27(+1)	23(+1)	29(+1)	25.2(+1)
M.Sc.-s	9	6	7	4.75	7	4.5
by positions						
Professors	9	8.75	9	8.5	10	9.5
Readers	1	1	3	2.5	3	2.5
Assistant Professors	23(+2)	20.5(+2)	23(+1)	20.5(+1)	22(+1)	19.95(+1)
Senior Lecturers	7	5	6	4	6	4
Lecturers	1	0.5	0	0	0	0
Assistants	3	1.5	3	1.75	5	3.25
<b>Ph.D. Students</b>	33		33		30	
<b>Technical Staff</b>	3	2.5	3	2.5	6	4.9
<b>Administrative Staff</b>	6	5.5	6	5.5	6	5.5

*FTE* – Full Time Employment units,

+ – corrections due to persons on long-term leave of absence

ACTIVITIES	2007	2008	2009
<b>Teaching activities</b>			
standard teaching potential, hours	8 182.49	9 239.63	8 167.75
# hours taught	14 331.60	13 570.60	13 236.80
<b>Degrees awarded</b>			
Ph.D.	2	3	7
M.Sc.	50	52	59
B.Sc.	54	57	58
<b>Research projects</b>			
granted by WUT	8	4	1
granted by State institutions	9	12	20
granted by international institutions	1	4	4
other	0	0	3
<b>Reviewed publications</b>			
monographs (authored or edited)	8	4	3
chapters in books	16	43	25
papers in journals	47	47	61
papers in conference proceedings	66	25	10
<b>Reports, abstracts and other papers</b>	13	7	10
<b>Conferences</b>			
participation (# of conferences)	45	39	23
participation (# of part. from ICCE)	81	59	49

RESOURCES	2006	2007	2008	2009
<b>Space (sq.m.)</b>				
laboratories	585	585	585	585
library + seminar room	74	74	74	74
faculty offices	724	724	724	724
<b>Computers</b>				
workstations*	9	15	5	0
personal computers*	165	269	331	307
<b>Library resources</b>				
books	4814	4862	4030	4058
booklets	1885	1960	1915	2050
journals subscribed	6	5	9	9

\* Classification into workstations and personal computers changes due to modification of technical standards.

## 2 Faculty and Staff

Presentation of our faculty starts with Professors Emeriti and continues with Senior Faculty, Supporting Faculty, Ph.D. Students, and Administrative Staff. Senior Faculty includes Professors, Readers, Assistant Professors, and Senior Lecturers. By Supporting Faculty we understand Lecturers, Assistants, and Research Associates, as well as Technical Staff. The personal information below regards the period of January 1 – December 31, 2008.

### 2.1 Professors Emeriti

**Władysław Findeisen** Professor (retired July 1999)

**Systems Control Division, Complex Systems Group**  
**room 524, tel. 660 7397 and 825 0995**  
W.Findeisen@ia.pw.edu.pl

*M.Sc. 1949, Ph.D. 1954. Full Professor since 1962.*

Founder and Director of ICCE (1955–1981), elected and re-elected Rector of WUT (1981–1985). Member of Polish Academy of Sciences (PAN) since 1971. Doctor Honoris Causa of The City University in London (1984), Warsaw University of Technology (1996), Gdańsk University of Technology (1997), Technische Universität Ilmenau (1998). Chairman of the Social Council to the Primate of Poland (1986–90), Vice-President of the Polish Academy of Sciences (PAN)(1990–1992), Senator of the Republic of Poland (1989–93), President of “Kasa Mianowskiego” (a foundation which sponsors foreign scientists in Poland) (since 1991).

**Radosław Ładziński** Professor (retired January 1998)

**Systems Control Division, Complex Systems Group**  
**room 570, tel. 660 7648**  
R.Ladzinski@ia.pw.edu.pl

*Born 1927, M.Sc. 1952, Ph.D. 1957 from WUT; the title of Professor of Technical Sciences awarded in 1968.*

With WUT since 1949. Vice-Dean of the Faculty of Electronics, (1964–1969), head of the Ph.D. Program in Control Engineering and Computer Science (1977–1981), chairman of the Electronics and Information Technology Committee for Ph.D. Degree in Control and Computer Engineering (1991–1996). As Professor Emeritus author of the programme and the first lecturer of the two basic Undergraduate Courses: *Dynamic System* and *Control*, both taught in English (1998–2007). Parallel working with Institute of Electrical Engineering of Polish Academy of Sciences (PAN) (1955–1962), and with Institute of Automatic Control of PAN (1963–1968). Post-Doctoral Scholar, Royal Institute of Technology, Stockholm, Sweden (1957), British Council Scholar, University of Cambridge, England (1959–60), Visiting Lecturer, Department of Mathematics, University of Ghana, Accra, Ghana (1962–63), Professor of Engineering Science, University of Mosul, Iraq (1970–74), Professor of Engineering Mathematics, Rivers State University of Science and Technology, Port Harcourt, Nigeria (1981–87), Member of Magdalene College, University of Cambridge, England.

*Interests:* Dynamic systems, control theory, and applied mathematics.



**Jerzy Pułaczewski** Senior Engineer (retired since October 2003)

**Systems Control Division, Robot Programming and Pattern Recognition Group**  
room 570, tel. 660 7648  
J.Pulaczewski@ia.pw.edu.pl

*M.Sc. 1958, Ph.D. 1965 from WUT.*

With WUT since 1956, Deputy Director of ICCE (1972–80 and 1993–96), Deputy Dean of the Faculty of Electronics (1981–87), Chairman of the Departmental Curriculum Committee (1981–90), member of the Senate of Warsaw University of Technology (1987–90). Scholarship in Moscow Electroenergy University (1958–59), the British Council scholarship at Cambridge University, UK (1965–66), visiting researcher at Minneapolis University, Minneapolis, MN (1980–81).

*Interests:* Digital control algorithms, process modeling and simulation, process control.

**Jacek Szymanowski** Professor (retired January 2000)

**Systems Control Division, Complex Systems Group**  
room 530, tel. 660 7922  
J.Szymanowski@ia.pw.edu.pl

*M.Sc. 1962, Ph.D. 1966, D.Sc. 1983 from WUT.*

With WUT since 1968. Visiting Professor, Laboratoire d'Automatique de Nantes, Ecole Centrale de Nantes, France, 1992, 1994, 1995, 1996, 1997. Retired since January 1999.

*Interests:* Simulation of control systems, linear and nonlinear programming, control applications of optimization techniques, operating systems.

**Andrzej P. Wierzbicki** Professor (retired March 2004)

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 24, tel. 6607750, 8255280  
A.Wierzbicki@ia.pw.edu.pl

*M.Sc. 1960, Ph.D. 1964, D.Sc. 1968 from WUT, titles of Professor awarded in 1975 and 1992.*

With WUT since 1961, half time since March 1997. Deputy Director of the ICCE (1971–1975), Deputy Dean (1971–1972) and then Dean of FEIT (1975–1978) member of the Senate (1975–1978), member or chairman of many university commissions.

Since 1978 working with the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria and served (1979–1984) as the chairman of the Systems and Decision Sciences Program. Visiting prof. at the University of Minnesota, Minneapolis, MN, Brown University, Providence, RI (1970–1971), Kyoto University, Japan (1989–1990), Fernuniversitaet Hagen (1985) and Japan Advanced Institute of Science and Technology (2004–2007).

Director of the National Institute of Telecommunications in Poland (1996–2004). Chairman of the Commission of Applied Research of the State Committee for Scientific Research (KBN) (1991–1994). Chairman of the Consulting Panel for Promotion and Policy of Science of State Committee for Scientific Research (KBN) (1994–2000), Member of the Consulting Panel for Computer Infrastructure of Science KBN (1994–2000), Chairman of the Consulting Panel for International Scientific Cooperation of State Committee for Scientific Research (KBN) (2000–2004). Chairman of the Scientific Council of the Industrial

Institute for Automation and Measurements (PIAP) (1991-2004), chairman of the Scientific Council of Scientific and Academic Computer Network NASK (1994-2004), and member of the Scientific Council of Institute of System Research (IBS PAN) (1992-2004). Member of the Committee of Automation and Robotics of Polish Academy of Sciences (PAN) (1970-2004). Member of the Committee for Future Studies “Poland 2000+” PAN (since 1986, deputy chairman since 2000). Member and deputy chairman of the Panel for Cooperation with IIASA of PAN.

Member of the Polish Association for the Club of Rome. Member of Polish Mathematical Society (PTM) (since 1975) and of Society of Polish Electrical Engineers (SEP) (1970–2004). Member of the Information Society Technology Advisory Group (ISTAG) of the European Commission (2000-2002). Recipient of George Cantor Award of the Int. Soc. of Multi-Criteria Decision Making for his results in multi-criteria optimization theory and decision support methodology (1992). Recipient of Tomasz Hofmokl Award of NASK for the promotion of informational society, 2005. Recipient of Best Paper Award at the Hawaii International Conference of Systems Science, 2005 for the paper: “Knowledge Creation and Integration: Creative Space and Creative Environments”.

*Interests:* Optimization theory and algorithms, decision theory, decision support systems, negotiation methods and experiences, applications in telecommunication, information society issues, knowledge creation and engineering.

## 2.2 Senior Faculty

**Piotr Arabas** Assistant Professor (part-time)

**Systems Control Division, Complex Systems Group**  
**room 573, tel. 22 234 7126**  
 P.Arabas@elka.pw.edu.pl

*M.Sc. 1996, Ph.D. 2004 from WUT*

With WUT since 2002.

*Interests:* Hierarchical systems, predictive control, management of telecommunication services.

**Adam Czajka** Assistant Professor (part-time)

**Systems Control Division, Biometrics and Machine Learning Group**  
**room 573, tel. 22 234 7126**  
 A.Czajka@ia.pw.edu.pl, www.ia.pw.edu.pl/~aczajka

*M.Sc. 2000, Ph.D. 2005 from WUT*

Received his M.Sc. in Computer Control Systems in 2000 and Ph.D. in Control and Robotics in 2005 from Warsaw University of Technology. Since 2003 he is with Warsaw University of Technology, and since 2002 with Research and Academic Computer Network NASK working for Biometric Laboratories. He is a member of the NASK Research Council (2006–). Voting representative of NASK in Technical Committee No. 182 on Information Security in IT Systems (2007–) and in Technical Committee on Biometrics (2009–) of Polish Normalization Committee (PKN). He is also a member of the IEEE (Institute of Electrical and Electronics Engineers, Inc., 2002–) and served as the Secretary of the IEEE Poland Section (2005-2009).

*Interests:* Biometrics, pattern recognition, systems security.

**Paweł Domański** Assistant Professor (part-time)

**Control and Software Engineering Division, Control Engineering Group**  
room 571, tel. 22 234 7861  
P.Domanski@ia.pw.edu.pl

*M.Sc. 1991, Ph.D. 1996 from WUT.*

With WUT since 1991, half time since 1997.

*Interests:* Adaptive control, intelligent control, fuzzy logic.

**Krzysztof Fleszar** Assistant Professor (until September 2009)

**Operations and Systems Research Division, Operations Research and Management**  
**Systems Group**  
room 561, tel. 22 234 7123  
K.Fleszar@ia.pw.edu.pl, www.ia.pw.edu.pl/~kfleszar

*M.Sc. 2000, Ph.D. 2004 from WUT.*

With WUT since 2003.

*Interests:* Combinatorial optimisation, scheduling and allocation, combinatorial auctions decision support, multi-dimensional optimisation.

**Janusz Granat** Assistant Professor

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 25A, tel. 22 234 7640  
J.Granat@ia.pw.edu.pl, www.ia.pw.edu.pl/~janusz

*M.Sc. 1986, Ph.D. 1997 from WUT.*

With WUT since 1987, chairman of IFIP Working Group TC 7.6, Optimization-Based Computer Modeling and Design

*Interests:* Decision support systems, multicriteria decision analysis, data warehouses, decision support in telecommunication industry.

**Jerzy Gustowski** Senior Lecturer

**Control and Software Engineering Division, Control Engineering Group**  
room 525, tel. 22 234 7699  
J.Gustowski@ia.pw.edu.pl

*M.Sc. 1979 from WUT.*

With WUT since 1979.

*Interests:* Low level software for computer control, interfacing, single-chip microcomputers, PLC controllers.

**Mariusz Kaleta** Assistant Professor

**Operations and Systems Research Division, Operations Research and Management  
Systems Group  
room 561, tel. 22 234 7123  
M.Kaleta@ia.pw.edu.pl**

*M.Sc. 2000, Ph.D. 2005, from WUT*

With WUT since 2003.

*Interests:* Discrete optimization, operations research and management, decision support in energy market.

**Mariusz Kamola** Assistant Professor (part-time)

**Systems Control Division, Complex Systems Group  
room 573, tel. 22 234 7126  
M.Kamola@ia.pw.edu.pl, www.ia.pw.edu.pl/~mkamola**

*M.Sc. 1997, Ph.D. 2004 from WUT.*

With WUT since 2002.

*Interests:* Modeling and simulation, optimization, parallel computation, IP networks.

**Andrzej Karbowski** Assistant Professor

**Systems Control Division, Complex Systems Group  
room 572, tel. 22 234 7632  
A.Karbowski@ia.pw.edu.pl, www.ia.pw.edu.pl/~karbowsk**

*M.Sc. 1983, Ph.D. 1990 from WUT.*

With WUT since 1983. Research visitor: Politecnico di Milano and Universita di Genova, 1992, Edinburgh Parallel Computing Centre, 2000. Member of IEEE.

*Interests:* Large scale systems, distributed computations, optimal control and management in risk conditions, decision support systems, neural networks, environmental systems management, control and decision problems in computer networks.

**Włodzimierz Kasprzak** Professor

**Systems Control Division, Robot Programming and Pattern Recognition Group  
room 554, tel. 22 234 7866  
W.Kasprzak@ia.pw.edu.pl, www.ia.pw.edu.pl/~wkasprza**

*M.Sc. 1981, Ph.D. 1987 from WUT, Dr-Ing. 1997 from Univ. of Erlangen-Nuremberg, D.Sc. 2001 from WUT.*

With WUT since 1997. Member of Polish Section of IAPR.

*Interests:* Computer vision, speech recognition, pattern classification, signal analysis, artificial intelligence.

**Zygmunt Komor** Senior Lecturer (part-time)

**Control and Software Engineering Division, Control Engineering Group**  
room 571, tel. 22 234 7861  
Z.Komor@ia.pw.edu.pl

*M.Sc. 1964, Ph.D. 1976 from WUT.*

With WUT since 1964.

*Interests:* Automatic control, control instrumentation design and implementation.

**Adam Kozakiewicz** Assistant Professor (part-time)

**Systems Control Division, Complex Systems Group**  
room 573a, tel. 22 234 7860  
akozakie@ia.pw.edu.pl

*M.Sc. 2001, Ph.D. 2008 from WUT*

With WUT since 2006.

*Interests:* Computer networks, distributed computation, network and systems security.

**Urszula Kręglewska** Senior Lecturer

**Control and Software Engineering Division, Control Engineering Group**  
room 553, tel. 22 234 7121  
U.Kreglewska@ia.pw.edu.pl, www.ia.pw.edu.pl/~ukreglew

*M.Sc. 1973 from WUT.*

With WUT in 1973–1993 and from 1994 to present, with Digital Equipment Poland 1993–1994.

*Interests:* Computer interfaces design.

**Tomasz J. Kruk** Assistant Professor

**Systems Control Division, Complex Systems Group**  
room 530, tel. 22 234 7922  
T.Kruk@ia.pw.edu.pl, www.ia.pw.edu.pl/~tkruk

*M.Sc. 1994 from Technical University of Gdańsk. Ph.D. 1999 from WUT.*

With WUT since 1999.

*Interests:* Operating systems, computer and network security, distributed systems.

**Adam Krzemienowski** Assistant Professor (on leave since Oct. 2009)

**Operations and Systems Research Division, Optimization and Decision Support Group**  
A.Krzemienowski@ia.pw.edu.pl

*Ph.D. 2007 from WUT.*

With WUT since 2007.

**Bartłomiej Kubica** Assistant Professor

**Systems Control Division, Complex Systems Group**  
room 573a, tel. 22 234 7860  
bkubica@elka.pw.edu.pl

*M.Sc. 2001, Ph.D. 2006 from WUT.*

With WUT since 2005.

*Interests:* Interval mathematics, optimization, numerical computations, parallel computing, multithreaded programming, real-time systems.

**Maciej Ławryńczuk** Assistant Professor

**Control and Software Engineering Division, Control Engineering Group**  
room 567, tel. 22 234 7673  
M.Lawrynczuk@ia.pw.edu.pl

*M.Sc. 1998, Ph.D. 2003 from WUT.*

With WUT since 2003. Winner of “Gold chalk” (“Złota kreda”) award.

*Interests:* Process control and optimization, predictive control, neural networks, modelling.

**Krzysztof Malinowski** Professor (Head of Division)

**Systems Control Division, Complex Systems Group**  
room 517, tel. 22 234 7397 and 8250995  
K.Malinowski@ia.pw.edu.pl, www.ia.pw.edu.pl/~malinows

*M.Sc. 1971, Ph.D. 1974, D.Sc. 1978, the title of Professor of Technical Sciences awarded in 1989, appointed to ordinary professorship in 1994.*

With WUT since 1971. Director of ICCE (1984–1996), Dean of the FEIT (1996–1999). Member of the Senate of the Warsaw University of Technology (1993–2002), Chairman of the Senate Committee on Academic Staff (1993–1996 and 1999–2002), Chairman of Senate Committee on Research (1996–1999). Corresponding Member of the Polish Academy of Sciences (PAN) (since 1998), Member of the Warsaw Scientific Society (TNW), Chairman of the Committee of Automation and Robotics of Polish Academy of Sciences (PAN), Professor in the Research and Academic Computer Network Institute (NASK), Action Director of NASK (July–November 2009), Chairman of Task Group for assessment of applications for projects founded by Action Line 2.3 of Operational Program ‘Innovative Economy’, Chairman of the Scientific Council of the Industrial Institute for Automation and Measurements (PIAP), Member of the IFAC Technical Committees on Optimal Control and on Large Scale Systems.

*Interests:* Hierarchical control, model-based predictive control of nonlinear systems, applications of optimization, management and control of computer networks.

**Piotr Marusak** Assistant Professor

**Control and Software Engineering Division, Control Engineering Group**  
**room 567, tel. 22 234 7673**  
 P.Marusak@ia.pw.edu.pl, www.ia.pw.edu.pl/~pmarusak

*M.Sc. 1997, Ph.D. 2003 from WUT.*

With WUT since 2002.

*Interests:* Predictive control of nonlinear systems, digital control algorithms, process modeling and simulation, fuzzy control.

**Ewa Niewiadomska-Szykiewicz** Professor (Leader of the Group)

**Systems Control Division, Complex Systems Group**  
**room 572, tel. 22 234 7632**  
 E.Niewiadomska@ia.pw.edu.pl, www.ia.pw.edu.pl/~ens

*M.Sc. 1986, Ph.D. 1995, D.Sc. 2005 from WUT.*

Research Assistant at the Institute of Geophysics of Polish Academy of Sciences in (1987–1988), with WUT since 1988, NASK since 2001, NASK Director for Research since 2009, IEEE Member.

*Interests:* Large scale systems, computer simulation, computer aided control systems design, environmental systems management, distributed computations, global optimization, telecommunication systems, ad hoc networks.

**Włodzimierz Ogryczak** Professor (Leader of the Group, Deputy Director of the Institute)

**Operations and Systems Research Division, Optimization and Decision Support Group**  
**room 24, tel. 22 234 6190**  
 W.Ogryczak@ia.pw.edu.pl, www.ia.pw.edu.pl/~wogrycza

*M.Sc. 1973, Ph.D. 1983 in Mathematics from Warsaw University, D.Sc. 1997 in Computer Science from PAN.*

With Warsaw University, Institute of Informatics 1973–2000, with WUT since 2000. H.P. Kizer Eminent Scholar Chair in Computer Science at Marshall University, USA (1989–1992), visiting professor at Service de Mathématique de la Gestion of Université Libre de Bruxelles, Brussels, Belgium (1994–1995). Member of INFORMS, International Society of MCDM, GARP, Expert of The State Accreditation Committee.

*Interests:* Computer solutions and interdisciplinary applications in the area of operations research, optimization and decision making with the main stress on: multiple criteria analysis and decision support, decision making under risk, linear, network and discrete programming, location and distribution problems.

**Andrzej Pacut** Professor (Leader of the Group)

**Systems Control Division, Biometrics and Machine Learning Group**  
**room 522, tel. 22 234 7733**  
 A.Pacut@ia.pw.edu.pl, www.ia.pw.edu.pl/~pacut

*M.Sc. 1969, Ph.D. 1975, D.Sc. 2000 from WUT.*

With Warsaw University of Technology since 1969, first with the Institute of Mathematics (until 1978) then with ICCE. Visiting Assistant Prof. at Lefschetz Center for Dynamical Systems of Brown University, Providence, RI (1980–1981), Visiting Associate Prof.

at Oregon State University, Corvallis, OR (1984 and 1986–1991). Deputy Director of ICCE 1985–1986 and 1993–2005. Senior Member of IEEE, member of INNS (Int. Neural Networks Society). Vice Chairman (2001–2005) and Chairman (2006–2009) of the IEEE Poland Section. Expert, Tech. Committee No. 182 on Information Security in IT Systems of Polish Normalization Committee (PKN) (2003–), Head of the NASK Biometric Laboratories (2003–), member of NASK Science Council.

*Interests:* Learning systems, system identification, biometrics, neural modeling, neural networks.

### **Jerzy Paczyński** Reader (part-time)

**Operations and Systems Research Division, Optimization and Decision Support Group**  
**room 26, tel. 22 234 7862**  
 J.Paczynski@elka.pw.edu.pl, www.ia.pw.edu.pl/~paczynsk

*M.Sc. 1963 from WUT, M.Sc. in Mathematics 1973 from Warsaw University, Ph.D. 1974 from WUT.*

With WUT since 1963. Deputy Director for Academic Affairs (1996–2005).

*Interests:* Modeling, modeling languages, transformations of formal languages — tools and applications, application of computer algebra and logic programming to systems theory and optimization.

### **Krzysztof Pieńkosz** Assistant Professor

**Operations and Systems Research Division, Operations Research and Management**  
**Systems Group**  
**room 560a, tel. 22 234 7864**  
 K.Pienkosz@ia.pw.edu.pl

*M.Sc. 1984, Ph.D. 1992 from WUT.*

With the Research Institute of Polish Gas and Oil Company 1984–1986, with WUT since 1986.

*Interests:* Operations research in particular discrete optimization, combinatorial algorithms, production planning and scheduling in manufacturing systems.

### **Grzegorz Płoszajski** Assistant Professor

**Operations and Systems Research Division, Operations Research and Management**  
**Systems Group**  
**room 560a, tel. 22 234 7864**  
 G.Ploszajski@ia.pw.edu.pl

*M.Sc. 1968 from WUT, M.Sc. in Mathematics 1974 from Warsaw University, Ph.D. 1974 from WUT.*

With WUT since 1969. Deputy Director for Information Technology of the Main Library of WUT since 1996. Committee Member of ‘Kasa Mianowskiego’ since 2004. Member of the Digitization Group established by the Ministry of Culture and National Heritage

*Interests:* Control and simulation of discrete production systems, production management, quality management, library automation, text algorithms, information retrieval.



**Tadeusz Rogowski** Senior Lecturer (part-time)

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 530, tel. 22 234 7922  
T.Rogowski@ia.pw.edu.pl

*M.Sc. 1972 from WUT.*

With WUT since 1972, Director of University Computer Center (1989-2002, 2008-).

*Interests:* Computer network, programming languages, operating systems.

**Krzysztof Sacha** Professor (Leader of the Group)

**Control and Software Engineering Division, Software Engineering Group**  
room 562, tel. 22 234 7756  
K.Sacha@ia.pw.edu.pl, [www.ia.pw.edu.pl/~sacha](http://www.ia.pw.edu.pl/~sacha)

*M.Sc. (1973), Ph.D. (1976), D.Sc. (1996) from WUT.*

With WUT since 1976. Designer in Minicomputer Research and Development Center ERA (1973), Software Engineering Consultant for Industrial Automation Enterprise PNEFAL (1987-90), University of Groningen (1991-1992), Technical University of Lingby (1993), Project Manager in Alerton Integracja Serwis (1999-2002), Advisor to the President of Social Insurance Institution (2004-2008). Member of IEEE Computer Society. Head of the Chair of Programming Methods at High School of Economy and Information Technology, Warsaw, Poland.

*Interests:* Software engineering, software quality evaluation, software specification and design methods, real-time systems.

**Kamil Smolira** Assistant Professor (since May 2009)

**Operations and Systems Research Division, Operations Research and Management Systems Group**  
room 526, tel. 22 234 7125  
K.Smolira@elka.pw.edu.pl, <http://www.ia.pw.edu.pl/~ksmolira>

*M.Sc. 2003, Ph.D. 2009 from WUT.*

With WUT since 2009.

*Interests:* Operations research and management, decision support in energy market.

**Jerzy Sobczyk** Senior Lecturer (part-time)

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 519, tel. 22 234 7863  
J.Sobczyk@ia.pw.edu.pl, [www.ia.pw.edu.pl/~jurek](http://www.ia.pw.edu.pl/~jurek)

*M.Sc. 1985 from WUT.*

With WUT since 1984. FEIT Network Administrator.

*Interests:* Computer networks, system and network administration, programming languages, web applications, parallel and distributed programming, multi-criteria optimization.

**Andrzej Stachurski** Assistant Professor

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 25a, tel. 22 234 7640  
A.Stachurski@ia.pw.edu.pl, www.ia.pw.edu.pl/~stachurs

*M.Sc. 1976, Ph.D. 1980 from WUT.*

Senior Assistant (1979–80) and then Assistant Professor (1980–92) at the Institute of System Research (IBS PAN), with WUT since 1992. Visiting Professor at the Calabria University, Italy, 1984, Åbo Swedish Academy in Turku, 1987, Jyväskylä University, Finland, 1988, JSPS invitee at the Department of Control Engineering, Osaka University, Japan, 1988–89. Member of Polish Society of Operations and Systems Research. Author and co-author of many scientific papers and reports on optimization algorithms, identification, applications of optimizations in macro-economy modeling and optimal design problems in structural engineering. Co-author of a textbook ‘Podstawy optymalizacji’ (‘Foundations of Optimization’) published in 1999. Reviewer of Control & Cybernetics, Optimization, Archives of Control Science, SIAM J. on Optimization, IEEE Concurrency.

*Interests:* Interests: nonlinear programming, large-scale optimization, applications to the optimal design problems in structural engineering, parallel and distributed calculations in Mathematical Programming.

**Marcin Szlenk** Assistant Professor

**Control and Software Engineering Division, Software Engineering Group**  
room 555, tel. 22 234 7997  
M.Szlenk@ia.pw.edu.pl

*M.Sc. 2000, Ph.D. 2006 from WUT.*

With WUT since 2005.

*Interests:* Software modelling and verification, formal methods in software engineering.

**Wojciech Szynekiewicz** Assistant Professor

**Systems Control Division, Robot Programming and Pattern Recognition Group**  
room 554, tel. 22 234 7866  
W.Szynekiewicz@ia.pw.edu.pl

*M.Sc. 1985, Ph.D. 1996 from WUT.*

With WUT since 1985. Deputy Director of the Research Center for Control and Information-Decision Technology (1999–2003).

*Interests:* Robotics, multiple robots coordination, robot sensor-based manipulation and motion planning, autonomous navigation, real-time systems.

**Tomasz Śliwiński** Assistant Professor

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 26, tel. 22 234 7862  
T.Sliwinski@ia.pw.edu.pl

*M.Sc. 1999, Ph.D. 2007 from WUT.*

With WUT since 2004.

*Interests:* Discrete optimisation, operations research, decision support.

**Piotr Tatjewski** Professor (Head of Division)

**Control and Software Engineering Division, Control Engineering Group  
room 524, tel. 22 234 7397 and 825 0995**

P.Tatjewski@ia.pw.edu.pl, www.ia.pw.edu.pl/~tatjewsk

*M.Sc. 1972, Ph.D. 1976, D.Sc. 1988, the title of Professor of Technical Sciences awarded in 2003, appointed to ordinary professorship in 2006*

With Warsaw University of Technology since 1972. Head of Process Control Group since 1991, Deputy Director of ICCE for Academic Affairs (1987–1991), Director of ICCE 1996–2008. Head of Control and Software Engineering Division, Head of the Undergraduate Degree Program in Computer Control Systems (1994–1996). DAAD scholarship in 1978 (TU Hanover), SERC research fellow at the City University, London (1986), visiting professor at the University of Birmingham (1992/1993). Member of Committee of Control and Robotics of Polish Academy of Sciences since 2004, since 2007 Chair of the Automatic Control Systems Section of this Committee, Member of the Control and Robotics Section of the Scientific Research Council (KBN) 1997–2004. Member of Programme Committee of the Journal PAK, Int. Journal of Applied Mathematics and Computer Science, Journal of Automation, Mobile Robots and Intelligent Systems, Expert of Ministry of Education and Science for Educational Standards (2005–2006). Member of EUCA (European Union Control Association) Administrative Council (2008–), member of IFAC Technical Committees TC 2.1 and TC 5.4.

*Interests:* Multi-layer control systems, process control and optimization, predictive control, decomposition methods in optimization and control, soft computing methods.

**Eugeniusz Toczyłowski** Professor (Head of Division)

**Operations and Systems Research Division, Operations Research and Management  
Systems Group**

**room 516, tel. 22 234 7950**

E.Toczyłowski@ia.pw.edu.pl

*M.Sc. 1973, Ph.D. 1976, D.Sc. 1989 from WUT, the title of Professor of Technical Sciences awarded in 2004.*

With WUT since 1973. Head of Operations Research and Management Systems Division, Vice-Dean of the Faculty of Electronics at WUT (1990–1993), chairman of the Rector's Committee for University Computerization (1993–1999), Advisor to the Dean on Strategic Planning (1993–1996). Head of the Undergraduate Program in Information Systems for Decision Support. Member of the Section on Decision Support (since 1992) and the Section on Knowledge Engineering and Operations Research (2003–) of the Committee of Automation and Robotics of Polish Academy of Sciences, Member of the Scientific Council of the Systems Research Institute (IBS PAN) (since 2002), Member of Consulting Council EnergoProject S.A. (2003–), Member of Steering Committee of the Energy Market (2003–).

*Interests:* Structural approaches to discrete optimization, operations research and management, management information systems, auction theory, competitive market design under constraints.

**Tomasz Traczyk** Reader (Deputy Director of the Institute since August 2005)

**Operations and Systems Research Division, Operations Research and Management  
Systems Group  
room 22/23, tel. 22 234 7750  
T.Traczyk@ia.pw.edu.pl, www.ia.pw.edu.pl/~ttraczyk**

*M.Sc. 1984, Ph.D. 1992 from WUT.*

With WUT since 1984.

*Interests:* Database management systems (DBMS), applications of DBMS in management and control, information systems, Web-based and distributed systems, XML language and its applications, variant configuration, software configuration management, long-term digital archives.

**Wiesław Traczyk** Professor (part-time)

**Operations and Systems Research Division, Optimization and Decision Support Group  
room 523, tel. 22 234 7791  
W.Traczyk@ia.pw.edu.pl**

*M.Sc. 1959, Ph.D. 1964, D.Sc. 1969 from WUT, the title of Professor awarded 1983.*

With WUT since 1957, Vice-Dean of the Faculty of Electronics (1971–1975), Deputy Director (1975–1981) and Director of ICCE (1981–1984). Member of the Senate of Warsaw University of Technology (1981–1984), Chairman of the Senate Committee of Finances (1981–84). Professor of the University in Port Harcourt, Nigeria (1984–1987), Professor of the Institute of Telecommunications (1997–2006). Chairman of FEIT Committee for Ph.D. Degrees in Automatic Control and Computer Sciences (1990–2005). Head of ICCE Optimization and Decision Support Division (1997–2002).

*Interests:* Knowledge engineering, expert systems, artificial intelligence.

**Michał Warchoń** Senior Lecturer, part-time

**Systems Control Division, Complex Systems Group  
room 560, tel. 22 234 7665  
M.Warchol@ia.pw.edu.pl, www.ia.pw.edu.pl/~warchol**

*M.Sc. 1991, Ph.D. 2002 from WUT.*

With WUT since 1991.

*Interests:* Predictive control, synthesis of control systems, symbolic calculations, operating systems.

**Paweł Wawrzyński** Assistant Professor

**Systems Control Division, Biometrics and Machine Learning Group  
room 572a, tel. 22 234 7120  
P.Wawrzynski@elka.pw.edu.pl, http://staff.elka.pw.edu.pl/~pwawrzyn**

*M.Sc. 2001 from WUT and 2004 from Warsaw University, Ph.D. 2005 from WUT.*

With WUT since 2005.

*Interests:* Reinforcement learning, neural networks; modeling of memory, consciousness, and perception; adaptive control, learning robots.

**Adam Woźniak** Reader

**Systems Control Division, Complex Systems Group**  
**room 560, tel. 22 234 7665**  
A.Wozniak@ia.pw.edu.pl, www.ia.pw.edu.pl/~wozniak

*M.Sc. 1970, Ph.D. 1975 from WUT.*

With WUT since 1970. Advisor to the Dean of Faculty for Departmental Libraries (1987–1993 and 1999–2002), Member of WUT Library Council (since 1999), Member of WUT Committee for Student Admissions (2001–2002), Dean’s Coordinator for Graduate Distance Learning (2005–2008).

*Interests:* Control of complex systems, servomechanisms, robot control, multi-criteria optimization, game theory, multiagent systems including mechanism design and auctions, decision support systems.

**Andrzej Zalewski** Assistant Professor

**Control and Software Engineering Division, Software Engineering Group**  
**room 555, tel. 22 234 7997**  
A.Zalewski@ia.pw.edu.pl

*M.Sc. 1997, Ph.D. 2003 from WUT.*

With WUT since 2002. Member of Information Systems Audit and Control Association (ISACA).

*Interests:* Software engineering, real-time systems, timing requirements, concurrent systems, performance analysis for computer systems, IT project economics.

**Cezary Zieliński** Professor (Director of the Institute, Leader of the Group)

**Systems Control Division, Robot Programming and Pattern Recognition Group**  
**room 565, tel. 22 234 5102, 8255280**  
C.Zielinski@ia.pw.edu.pl, www.ia.pw.edu.pl/~zielinski

*M.Sc. 1982, Ph.D. 1988, D.Sc. 1996 from WUT.*

With WUT since 1985. Research visitor at Loughborough University of Technology, UK (1990, 1992), Senior Fellow at Nanyang Technological University, Singapore (1999–2001), Secretary of Priority Research Program in Control, Information Technology, and Automation (PATIA) (1994–1999). Program Committee Member of PAK (Pomiary, Automatyka, Kontrola). Member of the Forecast Committee of the Polish Academy of Sciences: Poland 2000 Plus (2003–2007). Senior Member of IEEE (2002–). Vice Dean for Research and International Cooperation FEIT (2002–2005), Head of ICCE Robot Programming and Pattern Recognition Group since 1996. Member of the board of EURON (European Robotics Network of Excellence, 2004–2008). Deputy Director of ICCE for Research (2005–2008), Director of ICCE (2008–). Secretary of the Control and Robotics Committee of the Polish Academy of Sciences (2007–).

*Interests:* Robot programming methods, open-structure robot controllers, behavioral control, digital and microprocessor systems.

**Izabela Żółtowska** Assistant Professor

Operations and Systems Research Division, Operations Research and Management  
Systems Group  
room 570, tel. 22 234 7648  
I.Zoltowska@elka.pw.edu.pl, home.elka.pw.edu.pl/~imilenko

*M.Sc. 2000, Ph.D. 2006 from WUT.*

With WUT since 2005.

*Interests:* Operations, planning and economics of electric energy systems, optimization theory and its applications.

**2.3 Supporting Faculty and Staff****Przemysław Kacprzak** Assistant (since Oct. 2009)

Operations and Systems Research Division, Operations Research and Management  
Systems Group  
room 526, tel. 22 234 7125  
P.Kacprzak@elka.pw.edu.pl, <http://home.elka.pw.edu.pl/~pkacprza>

*M.Sc. 2004 from WUT.*

With WUT since 2009.

*Interests:* Operations research, energy markets.

**Tomasz Kornuta** Assistant (part time)

Systems Control Division, Robot Programming and Pattern Recognition Group  
room 012, tel. 22 234 7117  
T.Kornuta@elka.pw.edu.pl, <http://tkornuta.googlepages.com>

*M.Sc. 2005 from WUT.*

With WUT since 2008.

*Interests:* Robot programming methods, behavioral control, computer vision, pattern classification, artificial intelligence

**Włodzimierz Macewicz** Senior Software Engineer

Control and Software Engineering Division, Software Engineering Group  
room 525, tel. 22 234 7699  
W.Macewicz@ia.pw.edu.pl, [www.ia.pw.edu.pl/~wujek](http://www.ia.pw.edu.pl/~wujek)

*M.Sc. 1983 from WUT.*

With WUT since 1983.

*Interests:* Computer networks, data bases, operating systems, programming languages, text processing.

**Piotr Pałka** Assistant (since Oct. 2009)

**Operations and Systems Research Division, Operations Research and Management  
Systems Group  
room 526, tel. 22 234 7125  
P.Palka@ia.pw.edu.pl, <http://home.elka.pw.edu.pl/~ppalka>**

*M.Sc. 2005, Ph.D. 2009 from WUT.*

With WUT since 2009.

*Interests:* Multi-agent systems, mechanism design, market design, incentive compatibility.

**Andrzej Ratkowski** Assistant (since Oct. 2009)

**Control and Software Engineering Division, Software Engineering Group  
room 555, tel. 22 234 7997  
A.Ratkowski@ia.pw.edu.pl**

*M.Sc. 2005 from WUT.*

With WUT since 2009.

*Interests:* Software engineering, Service Oriented Architecture, performance engineering.

**Przemysław Mirosław Strzelczyk** Assistant (until Sept. 2009, part-time)

**Systems Control Division, Biometrics and Machine Learning Group  
room 518A, tel. 22 234 7805  
pstrzelc@ia.pw.edu.pl**

*M.Sc. 2005 from WUT.*

Received his M.Sc. in Information Technology in 2005 from Warsaw University of Technology. Since 2008 he is with Warsaw University of Technology, and since 2004 with Research and Academic Computer Network NASK working for Biometric Laboratories. He is a graduate student member of the IEEE (Institute of Electrical and Electronics Engineers, Inc., 2007-) and serves as the Publicity Committee Officer of the IEEE Poland Section (2007-).

*Interests:* Biometrics, pattern recognition, systems security.

**Piotr Trojanek** Software Engineer (since Apr. 2009)

**Systems Control Division, Robot Programming and Pattern Recognition Group  
room 566, tel. 22 234 7649  
P.Trojanek@elka.pw.edu.pl, [robotics.ia.pw.edu.pl/PiotrTrojanek](mailto:robotics.ia.pw.edu.pl/PiotrTrojanek)**

*M.Sc. 2005 from WUT.*

With WUT since 2009.

*Interests:* Robot programming, real-time systems.

**Tomasz Winiarski** Assistant (part-time)

**Systems Control Division, Robot Programming and Pattern Recognition Group**  
room 012, tel. 22 234 7117

T.Winiarski@ia.pw.edu.pl, <http://robotics.ia.pw.edu.pl/tomaszwiniarski>

*M.Sc. 2002, Ph.D. 2009 from WUT.*

With WUT since 2004.

*Interests:* Robot control systems, artificial intelligence.

## 2.4 Ph.D. Students

**Krzysztof Bareja** Ph.D. Student

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 556, tel. 22 234 7124

K.Bareja@elka.pw.edu.pl

*Supervisor:* Włodzimierz Ogryczak

**Marcin Chochowski** Ph.D. Student

**Systems Control Division, Biometrics and Machine Learning Group**  
room 518a, tel. 22 234 7805

mchochow@elka.pw.edu.pl, [www.ia.pw.edu.pl/~mchochow](http://www.ia.pw.edu.pl/~mchochow)

*Supervisor:* Andrzej Pacut

**Adam Działak** Ph.D. Student

**Control and Software Engineering Division, Control Engineering Group**  
room 567, tel. 22 234 7673

A.Dzialak@ia.pw.edu.pl

*Supervisor:* Piotr Tatjewski

**Anna Felkner** Ph.D. Student (until Oct. 2009)

**Control and Software Engineering Division, Software Engineering Group**  
room 556, tel. 22 234 7124

A.Felkner@elka.pw.edu.pl

*Supervisor:* Krzysztof Sacha

**Andrzej Grudzień** Ph.D. Student (since Nov. 2008)

**Control and Software Engineering Division, Software Engineering Group**  
room 556, tel. 22 234 7124

A.Grudzien@ia.pw.edu.pl

*Supervisor:* Krzysztof Sacha



**Szymon Kijas** Ph.D. Student (since Oct. 2009)

**Control and Software Engineering Division, Software Engineering Group**  
room 563, tel. 22 234 7124  
S.Kijas@ia.pw.edu.pl

*Supervisor:* Krzysztof Sacha

**Przemysław Kacprzak** Ph.D. Student

**Operations and Systems Research Division, Operations Research and Management**  
Systems Group  
room 526, tel. 22 234 7125  
P.Kacprzak@ia.pw.edu.pl

*Supervisor:* Eugeniusz Toczyłowski  
For short cv and activities see p. 48.

**Michał Karpowicz** Ph.D. Student (until Oct. 2009)

**Systems Control Division, Complex Systems Group**  
room 573a, tel. 22 234 7860  
M.Karpowicz@ia.pw.edu.pl

*Supervisor:* Krzysztof Malinowski

**Kamil Kołtyś** Ph.D. Student

**Operations and Systems Research Division, Operations Research and Management**  
Systems Group  
room 526, tel. 22 234 7125  
K.Koltys@ia.pw.edu.pl

*Supervisor:* Eugeniusz Toczyłowski

**Tomasz Kornuta** Ph.D. Student

**Systems Control Division, Robot Programming and Pattern Recognition Group**  
room 012, tel. 22 234 7117  
T.Kornuta@elka.pw.edu.pl

*Supervisor:* Cezary Zieliński  
For short cv and activities see p. 48.

**Bartosz Kozłowski** Ph.D. Student (until Feb. 2009)

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 556, tel. 22 234 7124

*Supervisor:* Włodzimierz Ogryczak

**Małgorzata Kudelska** Ph.D. Student

**Systems Control Division, Biometrics and Machine Learning Group**  
room 572a, tel. 22 234 7120  
M.Gadomska@elka.pw.edu.pl

*Supervisor:* Andrzej Pacut

**Michał Kudelski** Ph.D. Student

Systems Control Division, Biometrics and Machine Learning Group  
room 572a, tel. 22 234 7120  
M.Kudelski@elka.pw.edu.pl

*Supervisor:* Andrzej Pacut

**Robert Kuźmiuk** Ph.D. Student

Operations and Systems Research Division, Operations Research and Management  
Systems Group  
room 526, tel. 22 234 7125  
R.Kuzmiuk@ia.pw.edu.pl

*Supervisor:* Eugeniusz Toczyłowski

**Piotr Kwaśniewski** Ph.D. Student

Systems Control Division, Complex Systems Group  
room 573a, tel. 22 234 7860  
P.Kwasniewski@elka.pw.edu.pl

*Supervisor:* Krzysztof Malinowski

**Marcin Paweł Ludzia** Ph.D. Student (until Oct. 2009)

Control and Software Engineering Division, Software Engineering Group  
room 563, tel. 22 234 7124  
M.Ludzia@ia.pw.edu.pl

*Supervisor:* Krzysztof Sacha

**Marek Majchrowski** Ph.D. Student (until Oct. 2009)

Systems Control Division, Robot Programming and Pattern Recognition Group  
room 012, tel. 22 234 7117  
M.Majchrowski@elka.pw.edu.pl

*Supervisor:* Cezary Zieliński

**Michał Majdan** Ph.D. Student

Operations and Systems Research Division, Optimization and Decision Support Group  
room 563, tel. 22 234 7124  
M.Majdan@ia.pw.edu.pl

*Supervisor:* Włodzimierz Ogryczak

**Paweł Markowski** Ph.D. Student

Operations and Systems Research Division, Optimization and Decision Support Group  
room 556, tel. 22 234 7124  
P.Markowski@ia.pw.edu.pl

*Supervisor:* Włodzimierz Ogryczak

**Michał Marks** Ph.D. Student

**Systems Control Division, Complex Systems Group**  
room 573, tel. 22 234 7126  
M.Marks@ia.pw.edu.pl

*Supervisor:* Ewa Niewiadomska-Szynkiewicz

**Jacek Michałek** Ph.D. Student (since Oct. 2009)

**Systems Control Division, Biometrics and Machine Learning Group**  
room 518a, tel. 22 234 7805  
J.Michalek@ia.pw.edu.pl

*Supervisor:* Andrzej Pacut

**Łukasz Mirtecki** Ph.D. Student (since Feb. 2009)

**Systems Control Division, Biometrics and Machine Learning Group**  
room 518a, tel. 22 234 7805  
L.Mirtecki@ia.pw.edu.pl

*Supervisor:* Andrzej Pacut

**Piotr Modliński** Ph.D. Student (since Mar. 2008)

**Operations and Systems Research Division, Operations Research and Management**  
Systems Group  
room 526, tel. 22 234 7125  
P.Modlinski@ia.pw.edu.pl

*Supervisor:* Eugeniusz Toczyłowski

**Paweł Olender** Ph.D. Student

**Operations and Systems Research Division, Optimization and Decision Support Group**  
P.Olender@elka.pw.edu.pl

*Supervisor:* Włodzimierz Ogryczak

**Piotr Pałka** Ph.D. Student (until Oct. 2009)

**Operations and Systems Research Division, Operations Research and Management**  
Systems Group  
room 526, tel. 22 234 7125  
P.Palka@ia.pw.edu.pl

*Supervisor:* Eugeniusz Toczyłowski  
For short cv and activities see p. 49.

**Bartosz Papis** Ph.D. Student (since Oct. 2009)

**Systems Control Division, Biometrics and Machine Learning Group**  
B.Papis@elka.pw.edu.pl

*Supervisor:* Andrzej Pacut

**Adam Połomski** Ph.D. Student

**Operations and Systems Research Division, Optimization and Decision Support Group**  
A.Polomski@elka.pw.edu.pl

*Supervisor:* Włodzimierz Ogryczak

**Joanna Putz-Leszczyńska** Ph.D. Student

**Systems Control Division, Biometrics and Machine Learning Group**  
room 518a, tel. 22 234 7805  
jputz@elka.pw.edu.pl

*Supervisor:* Andrzej Pacut

**Andrzej Ratkowski** Ph.D. Student

**Control and Software Engineering Division, Software Engineering Group**  
A.Ratkowski@elka.pw.edu.pl

*Supervisor:* Krzysztof Sacha  
For short cv and activities see p. 49.

**Piotr Rzepakowski** Ph.D. Student

**Operations and Systems Research Division, Optimization and Decision Support Group**  
room 556, tel. 22 234 7124  
P.Rzepakowski@elka.pw.edu.pl

*Supervisor:* Włodzimierz Ogryczak

**Anna Sibilska-Mroziewicz** Ph.D. Student (until Mar. 2008)

**Systems Control Division, Robot Programming and Pattern Recognition Group**  
A.Sibilska@ia.pw.edu.pl

*Supervisor:* Cezary Zieliński

**Łukasz Stasiak** Ph.D. Student (until Oct. 2009)

**Systems Control Division, Biometrics and Machine Learning Group**  
room 518a, tel. 22 234 7805  
lstasiak@elka.pw.edu.pl

*Supervisor:* Andrzej Pacut

**Przemysław Mirosław Strzelczyk** Ph.D. Student

**Systems Control Division, Biometrics and Machine Learning Group**  
room 518a, tel. 22 234 7805  
pstrzelc@elka.pw.edu.pl

*Supervisor:* Andrzej Pacut  
For short cv and activities see p. 49.

**Łukasz Szejba** Ph.D. Student (until Oct. 2009)

**Control and Software Engineering Division, Control Engineering Group**  
room 556, tel. 22 234 7124  
L.Szejba@ia.pw.edu.pl

*Supervisor:* Piotr Tatjewski

**Piotr Sztandera** Ph.D. Student

**Control and Software Engineering Division, Software Engineering Group**  
room 563, tel. 22 234 7124  
P.Sztandera@ia.pw.edu.pl

*Supervisor:* Krzysztof Sacha

**Maciej Szumski** Ph.D. Student (since March 2008)

**Control and Software Engineering Division, Control Engineering Group**  
room 567, tel. 22 234 7673  
M.Szumski@ia.pw.edu.pl

*Supervisor:* Piotr Tatjewski

**Piotr Trojanek** Ph.D. Student

**Systems Control Division, Robot Programming and Pattern Recognition Group**  
room 012, tel. 22 234 7117  
P.Trojanek@elka.pw.edu.pl

*Supervisor:* Cezary Zieliński  
For short cv and activities see p. 49.

**Artur Wilkowski** Ph.D. Student

**Systems Control Division, Robot Programming and Pattern Recognition Group**  
room 563, tel. 22 234 7124  
A.Wilkowski@elka.pw.edu.pl

*Supervisor:* Włodzimierz Kasprzak

## 2.5 Administrative and Technical Staff

**Alicja Trojanowska** Secretary, Student affairs.

room 23, tel. 22 234 7750  
A.Trojanowska@ia.pw.edu.pl

**Maria Graszka** Office support (part-time).

room 529, tel. 22 234 7865  
M.Graszka@ia.pw.edu.pl

**Elżbieta Matyjasiak** Secretary, Main office.

room 521, tel. 22 234 7397, 22 825 0995  
E.Matyjasiak@ia.pw.edu.pl

*M.Sc. 2002 from Warsaw School of Management and Marketing.*

**Jolanta Niedbała** Office support (part-time).

**room 529, tel. 22 234 7865**  
J.Niedbalo@ia.pw.edu.pl

**Jadwiga Osowska** Manager, Finances.

**room 556, tel. 22 234 7122**  
J.Osowska@ia.pw.edu.pl

*M.Sc. 1975 from WUT.*

**Agnieszka Paprocka** Finances Support.

**room 556, tel. 22 234 7122**  
A.Paprocka@ia.pw.edu.pl

**Ryszard Tchórz** Technical support.

**room 559, tel. 22 234 7698**

**Beata Woźniak** Manager, Administration.

**room 521a, tel. 22 234 7397**  
B.Wozniak@ia.pw.edu.pl

*M.Sc. 1993 from Warsaw University.*

### 3 Teaching Activities – Academic Year 2008/2009

#### 3.1 Undergraduate and Graduate Studies

Course Title	Course code	Hours per week	Class	Lecturer
Adaptive and Learning Systems	SAU	2 – 1 –	SIDJB, SIDJC, PP-SID	P. Wawrzyński (spring)
Administration of UNIX and TCP/IP	ASU	2 – 2 –	OSK, OT	J. Sobczyk (spring/fall)
Algorithms and Data Structures	AISD1	2 – 1 –	sem. 3	A. Zalewski (spring)
Artificial Intelligence	EAI	2 – – –	ANGL, ECETC, OT	W. Kasprzak (spring)
Biometric Identity Verification	BIT	2 – 1 –	SIDJB, SIDJC, PP-SID	A. Czajka (spring)
Commercial Data Bases 2	KBD2	2 – – 2	BDSI, OT	T. Traczyk (fall)
Computer Networks	ECONE	2 1 1 –	ANGL, OT	J. Sobczyk (spring)
Computer Networks (I)	SKM	2 – 1 1	SKOR, OT	J. Sobczyk (spring/fall)
Control	ECONT	2 1 1 –	ANGL, OT	P. Domański (spring/fall)
Data Bases 2	BD2	2 – – 1	BDSI, OT	T. Traczyk (spring/fall)
Decision Support	WDEC	2 – 2 –	MKPWD, OT, PP-SID	J. Granat (spring/fall)
Decision Support Under Risk Conditions	WDWR	2 – – 1	PZ-I, OT	W. Ogryczak (spring)
Decyzje w warunkach współzawodnictwa	DWW	2 – – 1	PZ-I, PZ-SID, OT	A. Woźniak (spring)
Digital Circuits	EDC1	2 – 2 –	ANGL	C. Zieliński (spring)
Discrete and Network Optimisation	ODS	2 – – 1	PZ-I, PZ-A, PZ-O, OT	E. Toczyłowski (fall)
Distributed Operating Systems	RSO	2 – 1 –	PZ, OT, PZ-I, PZ-SID, PZ-ISI	T. Kruk (spring)
Dynamic Systems	EDYSY	2 – 2 –	ANGL, OT	M. Ławryńczuk, P. Marusak (spring/fall)
Event programming (I)	PROZ	2 – – 1	ATP, OT	M. Kamola (fall)
Fundamentals of Control Systems	PSTE	2 – 1 –	sem. 4	P. Tatjewski (spring) K. Malinowski (fall)
Fundamentals of Digital Technology	PTCY	2 – 2 –	sem. 2	C. Zieliński (fall)
Fundamentals of Operation Research	POBO	2 – 1 –	sem. 4	K. Pieńkosz (spring) G. Płoszajski (fall)
Fundamentals of Optimization	POPTY	2 – 2 –	MKPWD, OT	A. Stachurski (spring/fall)
Fundamentals of Parallel Computation	PORR	2 – – 2	SKOR, PZ-A, PZ-I	A. Karbowski
Fundamentals of Programming	PRI	2 1 2 –	sem. 1	J. Paczyński (spring)
Image and Speech Recognition	EIASR	2 1 – 1	ANGL., OT	W. Kasprzak (fall)
Information Project Management	ZPI	2 – – 1	BDSI, OT	K. Pieńkosz (spring/fall)
Introduction to Robotics	WR	2 – 2 –	MUS, SCRJC, OT	W. Szykiewicz (spring/fall)
Knowledge Engineering	IW	2 – – 1	ISO, OT	W. Traczyk (spring/fall)
Management IT Systems	SIZ	2 – – 2	MKPWD, OT	J. Granat (spring/fall)
Modelling and Control of Robotics	EMUMA	2 – 1 –	ANGL	C. Zieliński, P. Tatjewski (spring/fall)
Mobile robots	EMOR	2 – – –	ANGL, ECETC, OT	W. Szykiewicz (spring)
Numerical Methods (J)	MNUM	2 – – 1	PSTER, OT	P. Tatjewski (spring/fall)
Numerical Methods	ENUME	2 – 2 –	ANGL, OT	P. Tatjewski (fall)
Object Oriented Programming	PROBE	2 – 2 –	sem. 2	M. Warchoł (fall)

Course Title	Course code	Hours per week	Class	Lecturer
Operating System	EOPSY	2 1 1 -	ANGL, OT	T. Kruk (fall)
Optimization Techniques	EOPT	2 - - -	ANGL, ECETC, OT	P. Tatjewski, M. Ławryńczuk, P. Marusak (spring)
Operating Systems	SOI	2 - 2 -	OSK, OT	T. Kruk (fall)
Optimization and Decision Support	OWD	2 - - 1	PZ-A, PZ-I, OT	W. Ogryczak (fall)
Parallel Numerical Methods	EPNM	2 - - 2	ANGL., OT	A. Stachurski (fall)
Principles of Computer Science	EPCOS	2 - - -	ANGL, OT	W. Kasprzak (fall)
Process Management and Scheduling	ZAH	2 - 2 -	MKPWD, OT, MUS, PP-SID	E. Toczyłowski (spring/fall)
Programmable Controllers	SP	2 - 1 -	MUS, OT	J. Gustowski (spring/fall)
Programming 1	EPRO1	2 1 1 -	ANGL, OT	J. Paczyński (fall)
Programming 2	EPRO2	2 - 2 -	ANGL, OT	A. Stachurski (spring/fall)
Real-time Systems	SCZR	2 - 2 -	PSTER, OT	K. Sacha (spring/fall)
Robot Programming Methods	EPRM	2 - - -	ANGL, ECETC, OT	C. Zieliński (spring)
Software Engineering	IOP	2 - 1 -	OSK, OT	K. Sacha (spring/fall)
Software Specification and Design	SPOP	2 - 1 -	OSK, PZ-SID, PZ-I, OT	M. Szlenk (spring/fall)
Synthesis of Decision Rules	SRD	2 - 2 -	MKPWD, MUS, OT, PP-SID	K. Malinowski (spring)

### Table explanations

#### Hours per week

The digits in a four-digit code denote number of hours per week of, consecutively: lectures, tutorials, laboratory hours and project hours (for instance, [2 -1 1] corresponds to two hours of lectures, no tutorials, one hour of laboratory and one hour of project per week).

#### Class

symbol	level	description
OT	all levels	free electives
ANGL	all levels	taught in English
MUS	B.Sc.	specialization in Control Systems and Methods
MKPWD	B.Sc.	specialization in Computer Methods of Decision Support
BDSI	B.Sc.	specialization in Databases and Information Systems
OSK	B.Sc.	specialization in Computer System Programming
ISO	B.Sc.	specialization in Intelligent Computation Systems
PSTER	B.Sc.	specialization in Control
SKOR	B.Sc.	specialization in Computer Networks and Distributed Computations
ATP	B.Sc.	specialization in Programming Algorithms
SYK	B.Sc.	specialization in Computer Systems
SCRJC	B.Sc., M.Sc.	specialization in Control Systems
PZ-P	M. Sc., Ph.D.	advanced classes, fundamental
PZ-A	M. Sc., Ph.D.	advanced classes, control
PZ-I	M. Sc., Ph.D.	advanced classes, informatics
PZ-SID	M.Sc., Ph.D.	advanced classes, Decision and Information Systems
PP-SID	M.Sc., Ph.D.	fundamental classes, Decision and Information Systems



### 3.2 Extramural Graduate Studies

Postgraduate studies **IT Resources Management: architectures, processes, standards, quality** are designed to provide students with current knowledge necessary for successful management of IT in modern organizations. The programme comprises: IT project management, quality standards and assurance systems, development methodologies, system testing, IT audit, business process modeling, system architectures and managerial skills. The classes take form of lectures, workshops, exercises and laboratories. First two editions have attracted 86 students of various background.

Postgraduate studies **Engineering of Management Information Systems and Decision Support Systems** are intended for IT specialists, who want to broaden their skills in field of MIS and DSS. The programme contains: management information systems (with special attention on SAP system and ABAP language), modeling of processes and data structures, engineering of information systems, decision support and business intelligence systems, data management systems, applications of MIS and DSS (including service science and MRP). The classes take form of lectures and laboratories.

### 3.3 Graduate Distance Learning

Starting from academic year 2005/2006 our institute is involved in graduate distance learning programme of WUT (named **OKNO**). We co-ordinate two specialisations: Engineering of Internet Systems and Decision and Management Support Systems. The graduates of the first one are prepared for designing, implementing and taking care of complex information technology and computing systems using possibilities offered by contemporary computer networks. They have also ability to manage the layers of technology involved in the next generation of massive system deployments. The graduates of the latter are prepared for designing and implementing software systems which assist in managing, planning and decision making. Their skills and knowledge enable to manage the layers of technology involved in the new generation of intelligent systems empowering every aspect of business operations. First Ms.Sc. degree was awarded in the year 2008.

## 4 Projects

- [PR1] Seventh Framework Programme (NMP-2007-3.2-1): **Self Reconfigurable Intelligent Swarm Fixtures (SwarmItFIX) FP7-214678**. Granting period: 16.09.2008 – 15.09.2011. Partners: DIMEC University of Genova (Italy, coordinator), Exechon (Sweden), PIAGGO Aero Industries Spa. (Italy), ZTS-VVU Vyskumno-vyvojovy Ustav Kosice a.s. (Slovakia), Centro Ricerche FIAT S.C.P.A. (Italy).

A step beyond flexible/reconfigurable fixtures for higher continuous adaptation of production resources respect to production objectives and technical conditions in the knowledge-based factory is achievable today by synergic convergence of the NMP themes of flexible fixtures, parallel robots and new/smart materials with the ICT themes of robot swarms with networked embedded control. Today's smartest adaptable fixtures have limited adjustment capability, are mostly operated manually, are usually setup off-line with help of external measuring equipment, e.g. laser. Significant increase in effectiveness and decrease in cost may come from on-line fully actuated configuration/reconfiguration, large adaptability to different shapes and the capability to dynamically concentrate the support in the region where manufacturing is actually performed, doing that on-line and without moving/removing the part from the fixture. We are developing the new concept of self adaptable swarm fixtures composed of mobile agents that can freely move on a bench and reposition below the supported part behaving as a swarm, all without moving/removing the part from the fixture. Each fixture agent is composed of a mobile platform, a parallel robot fixed to the mobile platform, an adaptable head with phase-change fluid and an adhesion arrangement, to sustain/clamp the supported part perfectly adapting to the part local geometry. A hybrid control system is adopted and each robot is treated as an autonomous agent exhibiting its own behaviours. Behaviour based translocation of the robots to destination positions is adopted to reduce planner complexity, with no need to plan exact trajectories and no significant increase in complexity when extra units are removed/added. The area of manufacturing of thin metal sheets is considered (aircrafts and automotive bodies). The project objective is to develop a swarm fixture for a large range of sheet shapes to fully replace the specialized fixtures today used.

- [PR2] Program of Development of WUT supported by EU (European Social Fund), National Cohesion Strategy, Operational Programme Human Capital. No. 50031281302. Task no.28: **Development of the 2nd level studies in Automation and Robotics**. Head of the task: Piotr Tatjewski, secretary: Maciej Ławryńczuk. Granting period 2008 – 2012.

The aim of the task is to co-ordinate programs of 2nd level (postgraduate) studies in Automation and Robotics at four faculties of WUT (Electronics and Information Technology, Electrical Engineering, Mechatronics, Power and Aeronautical Engineering). In particular, development of the common part of the program and supporting specialized programs for different faculties exploiting their expertise. The main part of the task is to support development or modernization of 26 courses at participating faculties, including purchasing certain computer equipment.

- [PR3] Program of Development of WUT supported by EU (European Social Fund), National Cohesion Strategy, Operational Programme Human Capital. No. 5003121203. Task 21, Subtask: **Adaptation of the curriculum of Postgraduate Training 'Engineering of Management Information Systems' to current labour market needs and knowledge-based economy**. Granting period: 2008 – 2012. Subtask leader: Tomasz Traczyk. Contractors: Włodzimierz Ogryczak, Janusz Granat, Mariusz Kaleta, Marcin Szlenk, Tomasz Traczyk.

- [PR4] Program of Development of WUT supported by EU (European Social Fund), National Cohesion Strategy, Operational Programme Human Capital. No. 50031214203. Task 21, Subtask: **Adjustment of the postgraduate professional training in ‘IT Resource Management: Architectures, Processes, Standards, Quality’ to the evolving needs of the contemporary labor market and knowledge-based economy.** Granting period: 2008 – 2012. Subtask leader: Krzysztof Sacha.

The main goal of this project is to elaborate an improved curriculum of the training and to prepare teaching materials for the courses listed in the curriculum.

- [PR5] MNiI Grant No. N N514 128733 **Active sensing, interpretation of sensory information and manipulation in service robots.** Granting period: 31.10.2007 – 30.10.2010. Principal investigator: Cezary Zieliński.

This work focuses on the control requirements for service robots, especially on the sensing and manipulative capabilities. Active sensing involves purposeful motion of the robot to obtain relevant information from the environment. Once the measurements are obtained they need to be transformed into symbolic form in the interpretation process. The other aspect of this research is two handed manipulation and multi-fingered grasping. A multi-fingered gripper is developed for that purpose. Force sensing and visual servoing are used to perform service tasks. Moreover, the Human-Machine Interface is under investigation. Both speech understanding and recognition of gestures are studied. The experiments are conducted on a two-handed robot system equipped with cameras and force sensors. The control software is based on the MRROC++ robot programming framework.

- [PR6] MNiI Grant No. N N514 127833 **A method of position-force control for utilisation in service robots.** Granting period: 31.10.2007 – 30.10.2009. Principal investigator: Cezary Zieliński. Investigator: Tomasz Winiarski.

This project concentrates on position-force control of manipulators. Diverse position-force control algorithms are implemented and their performance is being compared. Those investigations should lead to the formulation of basic motion primitives that will enable the expression of any task involving end-effector motion in free space, in contact with an object, and in the intermediate phase between free motion and contact. The elaborated control methods are tested on a real robot. The control software is based on the MRROC++ robot programming framework.

- [PR7] MNiI Grant No. N N514 128333 **Analysis of methods of hand-eye senso-motoric coordination in service robots.** Granting period: 31.10.2007 – 30.10.2009. Principal investigator: Cezary Zieliński. Investigator: Maciej Staniak.

This project concentrates on visual servo controllers. This kind of coordination is of fundamental importance when acquiring and releasing objects or when executing tasks needing contact between tools and objects. Different structures of visual servos are compared and hybrid control methods are being elaborated. Produced control methods are tested on a real robot. The control software is based on the MRROC++ robot programming framework.

- [PR8] MNiI Grant no PBZ-MIN/011/013/2004 **Models of threats in the urban agglomeration within Crisis Management System, dedicated for Warsaw.** Granting period: 29.06.2006 – 29.06.2009. 11 research institutions. Coordinator Military University of Technology, Faculty of Cybernetics. Principal investigators from ICCE: Ewa Niewiadomska-Szynkiewicz, Krzysztof Malinowski. Investigators: Michał Karpowicz, Andrzej Sikora.

The general objective of the grant is to develop and implement the Crisis Management System (CMS) dedicated for urban agglomeration of Warsaw. The Expected results are: a set of threat models (e.g. predictive) and algorithms covering threats defined in the catalogue of urban threat, a demonstrable distributed software components of CMS for threat analysis supporting. A real urban threat is described by: a type of threat, a source of threat, critical infrastructures, possible losses, methods of counteractions, etc. The following type of threads are considered: military, chemical, biological, radiological, fire, flood, network infrastructures (service), terrorist, environmental catastrophes. The focus is on the synergy effect of complex threats. Due to the complexity of the system the distributed software environment is proposed as a simulation framework. The general idea of CMS software system is as follows: it will consist of autonomy of simulators in a wide and heterogeneous 'open architecture' network, the event-driven, continues and astronomical time management will be considered. coherent simulation – same time and events for all software applications and users, reusability of simulators and other components. The simulator will be used to predict states or factors values for next periods and simulate the course and effects of terrorist action. The goal of ICCE team is to realize 18th task of the project: Prediction and simulation of floods of the Vistula river and crisis management in Warsaw during flood. The expected final result of this task is the component of CMS for flood modeling, simulation, prediction and decision support concerned with flood management in the agglomeration of Warsaw.

- [PR9] MNiSW grant No. PBZ-MNiSw-02/II/2007: **Models of trade in the telecommunication bandwidth market**. Granting period: 02.01.2008 – 31.12.2010. Investigators: Przemysław Kacprzak, Mariusz Kaleta, Kamil Kołtyś, Robert Kuźmiak, Piotr Pałka, Eugeniusz Toczyłowski, Tomasz Traczyk, Izabela Żółtowska.

The aim of the project is to design innovative mechanisms for bandwidth trade in the market of telecommunications transport network. The mechanisms should be designed in the form of auctions and exchanges, that enhance the efficiency of resource allocation and support the development of bandwidth market toward competition. The expected results of the project will be: the analysis of the state of global research and application of bandwidth trading models; the innovative proposals for models and mechanisms for bandwidth trading; the platform for comparative analysis of specific options of research; project of the physical, operational and information architecture of the system supporting the processes of bandwidth trade.

- [PR10] MNiSW grant No. PBZ-MEiN-1/2/2006: **Energetic safety of the country**. Granting period: 01.04.2007 - 30.03.2010. Consortium of 4 technical universities. Coordinator: Gdansk University of Technology, Department of Electrical Power Engineering. Principal investigators from ICCE: Eugeniusz Toczyłowski, Przemysław Kacprzak, Mariusz Kaleta, Piotr Pałka, Mariusz Rogulski, Kamil Smolira, Tomasz Traczyk, Izabela Żółtowska.

In 2009, the detailed task was formulated as follows: "Balancing market: proposal of functional and legal solutions". This topic is a continuation of works conducted in previous years and is focused on summary and proposals of directions for balancing market evolution. It is compatible with the main goal of the project which is to investigate the possibilities for improving energetic safety of the country within the range of generating, transmission and dispatching electrical energy on market conditions. A wide range of safety issues are considered, including strategic safety pertaining to investments, long-term safety pertaining to system utilization, mid-term and short-term safety related to system operating in normal and failure states. ICCE tasks can be grouped in two streams: 1) developing multi-commodity trade mechanisms for balancing electrical energy market and cross-border capacity auctions from the point of view of system safety conditions;

2) developing open data standards for scientific researches in the area of electrical energy market mechanisms. Variants of balancing the electrical energy systems based on multi-commodity mechanism are to be developed. Preliminary open environment for experiments and benchmark data repository of market balancing mechanism are proposed.

[PR11] MNiSW grant No. N N514 416934: **Parallel and distributed global optimization algorithms for large scale systems**. Granting period: 21.04.2008 – 20.04.2010. Principal investigator: Ewa Niewiadomska-Szynkiewicz, investigators: Krzysztof Malinowski, Adam Woźniak, Andrzej Karbowski, Mariusz Kamola, Bartłomiej Kubica, Michał Marks, Jacek Błaszczak.

The research is concerned with high performance computing (HPC). The general objective of the project is to develop, implement and test novel optimization methods. The designed and implemented solvers will be applied to solve real-life problems such as control of complex physical systems. Due to the complexity of the considered problems the attention is focused on parallel and distributed computation and issues associated with reduction of computer memory usage. A new data format for storing triangular and symmetric matrices is investigated. Particularly the research is addressed to: fast and minimal storage linear and nonlinear continuous optimization solvers, hierarchical methods applying various approaches to problem decomposition, deterministic and stochastic global optimization and algorithms applying interval arithmetic tools. The project addresses theoretical investigations, computer implementation of developed numerical algorithms and simulation experiments. The expected results of the project are novel optimization algorithms and their computer implementation accompanied with theoretical and experimental investigations. Two libraries of solvers involving parallel and distributed optimization algorithms applying recursive packed formats for storing matrices are planned. The first is the library of fast and effective linear and nonlinear solvers. The second library, called EPOCS (Environment for Parallel Optimization of Complex Systems) will be dedicated to complex convex and nonconvex optimization problems. The integrated software platform EPOCS will provide tools for calculating local and global solutions on parallel and multi-core computers or computer clusters. It will contain algorithms for local and global optimization, and solvers based on interval analysis. The graphical interface will be provided to optimization problem definition and results presentation. The effectiveness of optimization algorithms will be tested through numerical experiments. Both planned libraries will be the useful tools for research and education. The results of the project will be described in the research papers, a book devoted to parallel computing, and presented on conferences.

[PR12] MNiSW grant No. N N514 414734: **Scalar Mechanisms for Efficient Resource Allocation**. Granting period: 08.05.2008 – 26.10.2009. Principal investigator: Krzysztof Malinowski, investigator: Michał Karpowicz.

The project is concerned with the formal analysis of the properties of the solutions to the games induced by the distributed resource allocation algorithms. Its goal relates to the problem of implementation of the choice rules, defined on the families of relational structures, in the form of mappings called mechanisms. A choice rule is said to be implemented by a mechanism under a given game solution concept if the mechanism defines a game with the solutions, compatible with the selected concept, generating outcomes defined by choice rule. The research conducted within the project, mostly with use of the apparatus of set-theory and convex analysis, is aimed at investigating the necessary and sufficient conditions for implementation of the Pareto-optimal choice rules in Nash equilibria. In particular, the implementation problem is studied in the context of network resource allocation in the setting of price-anticipating agents. Necessary and sufficient

conditions are formulated here for the auction algorithms based upon flow maximization games with efficient pure-strategy Nash equilibria. The conditions are then applied to design distributed network resource allocation algorithms.

- [PR13] MNiSW Grant No. N N516 186035: **Decision support in problems with numerous and structured criteria**. Granting period: 30.10.2008 – 30.12.2010. Principal investigator: Włodzimierz Ogryczak, investigator: Bartosz Kozłowski.

This project elaborates on how to deal with multicriteria decision problems characterized by numerous and structured criteria. Appropriate identification of the preferences of the DM is a critical aspect of the optimization problem. Based on objective satisfaction levels, the approximation of preferences on the whole set of decision alternatives is possible to be constructed. Developed approach enables usage of typical Reference Point Method achievement functions based on aspiration and reservation levels as well as a novel concept of the solidarity point. The method can be used on every level of hierarchical structure criteria.

- [PR14] MNiSW Grant No. N N514 415534: **Optimization models for supporting effective electricity trade using multicommodity turnover mechanisms**. Granting period 25.05.2008 – 25.05.2009. Principal investigator: Eugeniusz Toczyłowski, investigator: Przemysław Kacprzak.

The main goal of this project is development and evaluation of optimization models for supporting effective electricity markets. Multicommodity turnover mechanisms allows for joint balancing of many interdependent commodities considering infrastructure, individual and other (e.g. environmental) constraints. Proposed models will allow to achieve greater efficiency of market systems. Electricity markets were chosen because of their unique requirements and constraints. Proposed models could be used for other infrastructure markets (gas, telecommunication) after adaptation. The result of this project will include models for crossborder auctions, joint balancing of energy and options and creation of customized offers.

- [PR15] MNiSW Grant No. N N516 430733 **Universal Trust: new trust management algorithms and protocols**. Granting period: 31.10.2007 – 30.10.2010. Coordinator: Polish Japanese Institute of Information Technology. Principal investigator: Włodzimierz Ogryczak, investigator: Michał Majdan.

The research aims to enhance the functionality of distributed information systems by providing a standard service for managing trust. uTrust (universal Trust) project is a first step on this path. The goal of uTrust is to develop a universal and formalized approach for trust management in a wide range of distributed information systems. Basing on this approach, the practical goal of the project is to provide a universal library of trust management functions.

- [PR16] MNiSW grant No. 6ZR9 2007C/06956 **Development, realization and implementation of a trading decision support system on energy markets ‘8@decision’**. Granting period: 1.10.2008 – 22.04.2009. Coordinators: ICCE, Octagonet SA. Principal investigators: Jarosław Arabas, Paweł Domański.

The role of the system is to support trading decision making taking into consideration the uncertainty of the business environment and of the technical factors. The system is design to perform the following operations:

- *long-term planning*: financial result planning for the market corporate operations over the year and longer horizon,

- *mid-term planning*: risk analysis and the optimization of the company participation in different market segment (monthly and quarterly horizon perspective),
- *short-term planning*: operational support considering of the trading decision risks (daily or even hourly perspective).

[PR17] MNiSW Grant No. N N516 375736: **Methods and architectures of information interchange for electronic trade on infrastructural markets**. Granting period: 28.04.2009 – 27.01.2012. Principal investigators: Tomasz Traczyk, Eugeniusz Toczyłowski, Włodzimierz Ogryczak, Janusz Granat, Mariusz Kaleta, Henryk Rybiński (II), Zbigniew Nahorski (IBS PAN), Jacek Malinowski (IBS PAN). Investigators: Piotr Pałka, Kamil Smolira, Przemysław Kacprzak, Piotr Modliński, Kamil Kołtyś, Rafał Wilk, Łukasz Mączewski, Dominik Ryzko (II PW), Przemysław Więch (II PW).

Development of methods of electronic communication between entities taking part in trade on infrastructural markets. Research work include architecture and protocols of data interchange, and structure of the information, as well as methods for offers searching and negotiations in the Network.

Implementation of the results of this work may stimulate a progress on infrastructural markets, particularly development of multi-commodity Internet auctions, including distributed auctions (without central managing entity), and real-time auctions. Methods worked out can be applied in many segments of infrastructural markets, e.g. in power industry, telecommunications, and other infrastructural sectors of economy. Application of based on strong theory, formalized, verified and well described methods of M3 platform may trigger qualitative changes, which improve effectiveness, transparency, and consistency of market mechanisms. It may also help new entities to have access to the market, which formerly could be impossible due to existing informational or organizational barriers. Application of the result of the work can stimulate development of new markets and services, which finally can contribute to acceleration of growth and improvement of effectiveness of given sector of economy.

[PR18] MNiSW Grant No. N N516 069837: **Transformational Design of Business Processes in Service Oriented Architecture**. Granting period: 06.10.2009 – 05.08.2010. Principal investigator: Krzysztof Sacha. Investigator: Andrzej Ratkowski.

The research is concerned with a business processes design method and its implementation to the environment of Service Oriented Architecture. The main concept of this method is application to designed business process number of transformations in order to gain concrete result starting from an abstract process. Another desired effect is to reach better quality of a designed process in non-functional aspects. Processes are expressed and designed in a SOA related tool – Business Process Execution Language (BPEL). Each single transformation applied to BPEL process has to improve its quality without changing its behavior. The goal of the research is to define effective method to verify behavior equivalence after the transformation has been applied. To reach this goal the BPEL process has to be translated into LOTOS language and its behavior has to be examined with algebra process formalism. Another problem is how to define set of non-changing behaviour transformations that are similar to refactorings used in software engineering and how to examine processes behavior before and after transformation. To gain consistent design method there are quality metrics calculated for BPEL design process and is proposed a decision making strategy to decide which transformation should be applied in order to reach the best version of final process.

- [PR19] MNiSW Grant No. N N514 237137: **Trajectory optimization in robotic systems with the use of learning based techniques**. Granting period: 13.10.2009 – 12.10.2011. Principal investigator: Paweł Wawrzyński. Investigator: Tomasz Winiarski.

The objective of the project is to create a methodology of movement trajectory optimization in robotic systems that would work as movements are repeated. This would correspond to a natural ability of humans to improve efficiency of their physical activities as these are repeated. The methodology has potential of significant increase of robot work efficiency, like the movement efficiency of a person is increased since he or she grabs a tennis racket for the first time to the moment he/she becomes a tennis Olympic champion. The above methodology will be based on reinforcement learning techniques. When designed and implemented, it will be applied to optimize movements that consist solving the Rubik's cube by a robotic system that includes two modified IRp-6 robots.

- [PR20] MNiSW Grant No. N N516 070637: **Ant Algorithms for Adaptive Routing in Telecommunication Networks**. Granting period: 02.10.2009 – 30.09.2010. Principal investigator: Andrzej Pacut. Investigator: Małgorzata Joanna Kudelska.

The aim of the project is to analyze and optimize ant routing algorithms for communication networks. The robustness of these algorithms to parameter changes and the adaptation process to several scenarios of load level changes will be examined. Moreover, a modeling scheme of the packet end-to-end delay distribution will be proposed. The packet delay distribution will be modeled as a mixture of statistical distributions and these models will be built in every node of the network in an on-line manner. The models will be then used to improve the ant routing algorithms. On the base of the delay models it will be possible to build a path quality indicator that will be a better representation of the packet delays than just a mean value that is used most often. The packet delay models will be also used to develop a modification of the TCP protocol, which would be more robust to packet reordering. The delay model will be used to compute the probability that a packet assumed lost by the TCP agent will still arrive and in fact has not been lost. Thank to such mechanism, it will be possible to decrease the number of needless retransmissions in a network controlled by ant routing algorithms. Moreover, we expect that using the modified TCP will extend the range of load levels under which the ant algorithms are able to find efficient routing policies. The analysis and results of the operation of the proposed mechanisms will be presented.

- [PR21] MNiSW Grant No. N N516 070937: **Learning mechanisms with geographical localization of knowledge for adaptive routing control in mobile ad-hoc networks**. Granting period: 02.10.2009 – 30.09.2010. Principal investigator: Andrzej Pacut. Investigator: Michał Adam Kudelski.

The aim of the project is to introduce and analyze an innovative approach to managing the knowledge gathered by routing agents in ad-hoc networks during the learning process. Namely, the concept of distributed geographical localization of knowledge will be proposed. In the proposed approach, the knowledge gathered by ant agents in an ad-hoc network will be connected with locations in the network rather than with individual nodes. It is expected that the proposed solution will increase the robustness of the learning algorithm to dynamic topology changes in the network and improve its adaptation capabilities. The expected final result of the project is a complex adaptive routing mechanism for ad-hoc networks based on the ant algorithm with geographical localization of knowledge. The analysis of the operation of the proposed mechanism will be presented as well.



- [PR22] MNiSW Grant No. N N514 414434: **Incentive compatibility analysis in distributed market systems using multicommodity turnover mechanisms**. Granting period 6.06.2008 - 20.05.2009. Principal investigator: Eugeniusz Toczyłowski. Investigator: Piotr Pałka.

Many of market analyses are accomplished with assumption of perfect competition and absence of market power. This is a strong assumption, as there exist a number of the oligopolistic markets often strongly tied-up with a natural monopolistic economy (e.g. electricity energy markets, bandwidth allocation on telecommunication markets, railway slot allocation etc.). On such markets the market power does exist, and, which is more important, can be easily exploited by some market participants. Therefore, incentive compatibility analysis, and elaboration of incentive compatible mechanisms is an important regulation issue.

Thus, we propose the Parametric Pricing Rule, which has good properties for multi-commodity exchange with infrastructure constraints under oligopoly conditions. We figure, that the parametric pricing rule has cost for adopting. Such cost results from budget imbalance, and means that auction operator has to surcharge to obtain budget balance. We propose the algorithm to reduce the budget imbalance. Finally, we compare the classical, double pricing rule with the parametric pricing rule. The results of the comparison are as follows - under oligopoly conditions, the costs resulting from parametric pricing rule (the budget imbalance costs) are less than costs resulting from dual pricing rule (the speculation costs).

- [PR23] MNiSW Grant No. R01 012 02: **Intelligent system for diagnosis and supervisory control of industrial processes ‘DiaSter’**. Granting period 18.05.2007 – 17.11.2009. General principal investigator: Jan Maciej Kościelny (Faculty of Mechatronics, WUT), principal investigator from ICCE: Piotr Tatjewski, investigators from ICCE: Piotr Marusak, Maciej Ławryńczuk.

The aim of the project was to build program package DiaSter for advanced modeling, simulation, diagnostics and control of technical processes, capable to perform the following tasks: modeling and identification of processes using different classes of models (including fuzzy and neural), data mining in large technical data bases, construction of industrial simulators, industrial diagnostics of elements and processes, tuning of control loops, supervisory feedback control and set-point optimization. The group from ICCE headed by Prof. Tatjewski was responsible for development of software for model-based predictive control (MPC) based on linear and nonlinear process models and for development of selected optimization routines, general purpose routines and specialized ones, for on-line set-point optimization cooperating with predictive controllers.

- [PR24] MNiSW Grant No. N N514 408536: **Effective algorithms of optimizing predictive control with neural and fuzzy model sof nonlinear processes**. Granting period: 30.06.2009 – 29.12.2011. Principal investigator: Piotr Tatjewski, investigators: Piotr Marusak, Maciej Ławryńczuk.

The aim of the research project are numerically effective algorithms for model-based optimizing predictive feedback control. Technique of model-based predictive control (MPC) is now a dominating technique of advanced control, having a strong influence both on the direction of development of industrial control systems as well as on research in this area. In the project, research concerning predictive feedback control algorithms acting in cooperation with on-line economic optimization of the set-points will be performed. Nonlinear process models will be considered, as the on-line economic optimization results usually in the necessity of even strong moves of the set-points, therefore the approach based on point-linear process models is not adequate. Due to a number of advantages,

in the proposed algorithms nonlinear models mainly in the form of neural networks and fuzzy models (in Takagi-Sugeno structures) will be considered. Important, from practical point of view, topics of the research will be numerical effectiveness, robust stability, tolerance on faults in the control system.

- [PR25] MNiSW Grant No. O R00 0026 07: **The platform for secure implementation of biometric systems for verification and identification.** Granting period: 17.07.2009 – 16.07.2011. The project is conducted within the 7th competition for development projects in the field of security and country's defense, of the Ministry of Science and Higher Education. Coordination: ICCE WUT. Principal investigators: NASK, Polish Security Printing Works and University of Warsaw. Principal investigator and project coordinator: Andrzej Pacut, investigators from ICCE: Włodzimierz Kasprzak, Włodzimierz Ogryczak, Przemek Strzelczyk.

The use of biometric systems becomes an inevitable element to ensure appropriate level of security. This applies to passports, visas, some electronic transactions and in near future other documents or network identifiers. The requirements for application of biometrics apply to common documents, issued by polish authorities but by other countries' as well. Those task are to be faced by The Ministry of Foreign Affairs, The Ministry of the Interior and Administration and The Ministry of infrastructure. This creates the demand for purchase appropriate devices, defining quality requirements for them, selection of appropriate technologies for biometric data comparison, but also defining the procedures for secure registration (collection) and verification of biometric data. Appropriate legislative procedures also need to be defined. The application of biometric techniques must fulfill many security requirements so that it improves the security instead of decreasing it. Considering the pan-European scope of those aspects the developed solutions must be harmonized with international standards, but at the same time fit Polish legislation.

- [PR26] Ministry of Economy Grant No. 501E1031005 DBF-I-2/DGE/CEiDG/09: **Assessment of the feasibility study of the project of central register of individual entrepreneurs.** Granting period: 19.06.2009 – 25.06.2009. Principal investigator: Andrzej Zalewski.

- [PR27] Ministry of Economy Grant No. 501E10310006 II-/88/P/75001/09/DGE: **Assessment of the feasibility study of the project of a virtual environment for entrepreneurs incubation for collaboration with e-administration.** Granting period: 23.07.2009 – 30.07.2009. Principal investigator: Andrzej Zalewski.

- [PR28] Rector's Grant No. 503/W/0050: **A robot soccer team for RoboCup competition.** Granting period: 16.04.2009 – 31.12.2009. Principal investigator: Wojciech Szynekiewicz, investigators: Paweł Poławski, Piotr Florczyk, Krzysztof Sielewicz, Michał Wałęcki, Bartosz Markocki, Maciej Gąbka, Kamil Muszyński, Piotr Trojanek.

Robotic soccer has become a standard "real-world" test-bed for autonomous multi-robot systems. The goal of the project was to design and develop a team of mobile robots playing soccer. The robot hardware consists of two main components: mechanical part and electronics. The mechanical system is composed of an omnidirectional mobile base and a ball kicking system. The electronics comprises Atmel ATmega microcontroller, motor controllers, and RF module.

- [PR29] Statutory Grant No. 504G036300: **Development of methodology of control, decision support and production management.** Granting period 1.09.2008 – 31.12.2009 and 1.10.2009 – 31.12.2010. Principal investigators: Ewa Niewiadomska-Szynekiewicz, Andrzej Pacut, Włodzimierz Ogryczak, Krzysztof Sacha, Piotr Tatjewski, Eugeniusz Toczyłowski, Cezary Zieliński.

## 5 Degrees Awarded

### 5.1 Ph.D. Degrees

Advisor: **Piotr Tatjewski**

MAREK STRZELCZYK

*Zastosowanie algorytmów ewolucyjnych do zadań optymalizacji z modelem niepewności w postaci scenariuszy wielowariantowych*

Thesis defended on January 13, 2009

KRZYSZTOF SZTYBER

*Odporne algorytmy regulacji predykcyjnej w warunkach niepewności modelu*

Thesis defended on April 21, 2009

KONRAD WOJDAN

*System optymalizacji bieżącej punktu pracy procesów technologicznych inspirowany działaniem układu immunologicznego*

Thesis defended on November 10, 2009

Advisor: **Eugeniusz Toczyłowski**

KAMIL SMOLIRA

*Analiza mechanizmów bilansowania na rynkach czasu rzeczywistego*

Thesis defended on January 13, 2009

PIOTR PAŁKA

*Analiza zgodności motywacji mechanizmów wieloagentowej platformy wymiany towarowej*

Thesis defended on December 1, 2009

Advisor: **Cezary Zieliński**

TOMASZ WINIARSKI

*Specification and Implementation of Force Control Tasks for Robot Manipulators*

Thesis defended on December 1, 2009

MACIEJ STANIAK

*Structures of Visual Servos for Manipulator Control*

Thesis defended on December 8, 2009

### 5.2 M.Sc. Degrees

Advisor: **Jarosław Arabas (Inst. of Comp. Science)**

M. TALAK

*Metody sztucznej inteligencji w wewnętrznym wykrywaniu plagiatów*

Degree awarded on October 2009

Advisor: **Piotr Arabas**

K. STUDZIŃSKI

*Tools for Self-similar Traffic Generation and Analysis*

Degree awarded on October 2009

P. ADAMCZAK

*System aukcyjny dla potrzeb operacyjnych w lotnictwie cywilnym*

Degree awarded on September 2009

Advisor: **Krzysztof Chabko (Inst. of Comp. Science)**

K. NARKOVIC

*Symulacja podpowierzchniowego rozpraszania światła w czasie rzeczywistym*

Degree awarded on October 2009

Advisor: **Andrzej Ciemski (Inst. of Comp. Science)**

T. WIECHECKI

*Wpływ optymalizacji wykorzystania zasobów na zwiększenie efektywności pracy magazynu*

Degree awarded on March 2009

M. KARBOWY

*Współczesne techniki integracji systemów informatycznych*

Degree awarded on October 2009

Advisor: **Adam Czajka**

J. MICHAŁEK

*Test żywotności dla celów biometrii tęczówki z wykorzystaniem dynamiki źrenicy*

Degree awarded on March 2009

Advisor: **Paweł Domański**

M. LITNIEWSKI

*Analiza wielokryterialnych metod doboru optymalnego portfela*

Degree awarded on March 2009

Advisor: **Janusz Granat**

J. SZLICHTA

*Gromadzenie wiedzy o projektach informatycznych i jej wykorzystanie w podejmowaniu decyzji*

Degree awarded on March 2009

S. OLSZEWSKI

*Wielokryterialne wyszukiwanie informacji w serwisach WWW*

Degree awarded on March 2009

A. GOSK

*Charakterystyka wybranych metod optymalizacji zapytań w bazie Teradata*

Degree awarded on July 2009 (with honors)

Advisor: **Mariusz Kamola**

P. JAWORSKI

*Aukcyjny system rezerwacji częstotliwości radiowych*

Degree awarded on October 2009

P. ZYSKOWSKI

*Chaotic behavior propagation in computer networks – case study*

Degree awarded on November 2009

Advisor: **Andrzej Karbowski**

M. WANATOWSKI

*Metody optymalizacji równoległej z dekompozycją bezpośrednią w zadaniach z ograniczeniami funkcyjnymi*

Degree awarded on March 2009

Advisor: **Włodzimierz Kasprzak**

A. NIENAŁTOWSKI

*Wyszukiwarka internetowa wspomagana modelem sekwencji słów*

Degree awarded on December 2008 (within the WUT distance learning programme (OKNO))

M. KOZIŃSKI

*Wizyjne rozpoznawanie gestów dłoni do celów sterowania robotem*

Degree awarded on April 2009

P. PRZYBYSZ

*Rozpoznawanie zadań mówionych*

Degree awarded on April 2009

R. BRZEŻAŃSKI

*Oprogramowanie do sterowania robotami mobilnymi z elementami grafiki 3D i analizy obrazów ręki*

Degree awarded on April 2009 (within the WUT distance learning programme (OKNO))

K. CZAPNIK

*Rozpoznawanie gestów dłoni w sekwencji obrazów cyfrowych*

Degree awarded on June 2009

M. MULAWA

*System detekcji i obsługi kodów graficznych QR w zastosowaniach mobilnych*

Degree awarded on June 2009

Ł. CZAJKA

*Rozpoznawanie obrazów zawierających obiekty przekazywane robotowi przez człowieka*

Degree awarded on September 2009

M. ORZECZOWSKI

*System agentowy umożliwiający dostęp do danych w języku naturalnym*

Degree awarded on October 2009

T. SZCZEPAŃSKI

*Projekt szkieletowego systemu ekspertowego*

Degree awarded on September 2009

Advisor: **Bartłomiej Kubica**

R. DĄBROWSKI

*Reprezentacje macierzy przedziałowych optymalizujące algorytmy cache – oblivions*

Degree awarded on September 2009

K. JASTRZĘBSKI

*Different parallelism approaches to interval computations*

Degree awarded on October 2009

Ł. SZCZAP

*Different parallelism approaches to interval computations*

Degree awarded on October 2009

Advisor: **Maciej Ławryńczuk**

D. CZUB

*Sieci neuronowe w zagadnieniach modelowania i algorytmach regulacji predykcyjnej*

Degree awarded on March 2009

S. PANAS

*Projektowanie algorytmów regulacji predykcyjnej z modelami neuronowymi*

Degree awarded on June 2009

Advisor: **Piotr Marusak**

P. OSTRÓWKA

*Sterowanie predykcyjne nieliniowych obiektów z ograniczonymi wyjściami*

Degree awarded on September 2009

Advisor: **Julian Myrcha (Inst. of Comp. Science)**

K. RYMUZA

*Problematyka interoperacyjności na tle procesów informatyzacyjnych w administracji publicznej*

Degree awarded on October 2009

Advisor: **Ewa Niewiadomska-Szynkiewicz**

J. KORYCKI

*Zastosowanie środowiska do symulacji OMNet++ do analizy wybranych problemów w sieciach teleinformatycznych*

Degree awarded on May 2009

A. GERULA

*Algorytmy hierarchiczne do wyznaczania ścieżek transmisji danych w sieciach ad-hoc*

Degree awarded on October 2009

M. ANTONIK

*Ant-based routing algorithms for mobile ad hoc networks*

Degree awarded on October 2009

Advisor: **Włodzimierz Ogryczak**

M. GÓRECKI

*Uporządkowane średnie ważone jako kryteria wyboru optymalnych lokalizacji*

Degree awarded on July 2009

J. JAGUSZTYN - GROCHOWSKA

*Hedging w oparciu o miarę CVaR*

Degree awarded on September 2009 (with honors)

J. CHOŚCIŁOWICZ

*Wybrane zagadnienia niezawodności i jakości usług w korporacyjnych rozległych sieciach komputerowych*

Degree awarded on October 2009 (within the WUT distance learning programme (OKNO))

K. SOBIECH

*Modele jednostronne replikacji indeksu w analizie portfelowej*

Degree awarded on September 2009

B. DURAS

*Optymalizacja wartościowanej porządkowej średniej ważonej dla wspomagania rozdziału zasobów w sieciach z awariami*

Degree awarded on October 2009

Advisor: **Krzysztof Pieńkosz**

T. KALETĄ

*Algorytmy rozkroju pasa materiału*

Degree awarded on October 2009

D. DULĘBA

*Algorytmy heurystyczne dla jednowymiarowego problemu pakowania z ograniczoną podzielnością elementów*

Degree awarded on October 2009

Advisor: **Grzegorz Płoszajski**

G. CHEĆIŃSKI

*Wybrane zagadnienia zarządzania finansowego przedsiębiorstwem w warunkach ryzyka w aspekcie dydaktycznym*

Degree awarded on March 2009

B. WĘGRZYN

*Algorytmy korekcji deformacji obrazu spowodowanych niepełnym odkształceniem kart skanowanych książek*

Degree awarded on March 2009

Advisor: **Grzegorz Protaziuk (Inst. of Comp. Science)**

K. FLONT

*Efektywne algorytmy klasyfikacji danych pochodzących ze spektrometru masowego SELDI-TOF*

Degree awarded on September 2009

P. GOLCZ

*Klasyfikacja emocjonalna tekstów*

Degree awarded on October 2009

Advisor: **Tadeusz Rogowski**

G. GRABKA

*Technologie usług głosowych w bezprzewodowych sieciach WIFI i WIMAX*

Degree awarded on November 2009 (within the WUT distance learning programme (OKNO))

Advisor: **Przemysław Rokita (Inst. of Comp. Science)**

M. WOJTKOWSKI

*Metoda elementów dyskretnych*

Degree awarded on October 2009

Advisor: **Krzysztof Sacha**

M. BAKALARZ

*Weryfikacja oraz generacja kodu do sterowania PLC dla automatów czasowych zapisanych w postaci diagramu UML*

Degree awarded on March 2009

Advisor: **Marcin Szlenk**

J. SIEMIŃSKA

*Definiowanie metod zwinnych w środowisku Rational Metod Composer*

Degree awarded on March 2009

G. PUSZ

*Generowanie aplikacji wykonanej w technologii EJB z modelu zapisanego w UML*

Degree awarded on June 2009

Advisor: **Wojciech Szynkiewicz**

K. PORCZYK

*Śledzenie ruchomego celu przez robota mobilnego*

Degree awarded on October 2009

P. WILKOWSKI

*Wykorzystanie algorytmu detekcji i lokalizacji w zadaniu chwytania*

Degree awarded on October 2009

M. KAWKA

*Budowa i oprogramowanie grupy autonomicznych robotów mobilnych*

Degree awarded on October 2009



Advisor: **Piotr Tatjewski**

W. ŁĄCZ

*Predykcyjne sterowanie nadrzędne wartościami zdanymi regulatorów bezpośredniego działania*

Degree awarded on March 2009

Advisor: **Tomasz Traczyk**

M. BAŃKOWSKA

*Analiza porównawcza języków procedur składowanych PL/SQL, SQL PL, PL/pgSQL I T-SQL*

Degree awarded on October 2009

Advisor: **Adam Woźniak**

P. NAJGEBAUER

*Inequality analysis in the local public good provision problem*

Degree awarded on October 2009

Advisor: **Andrzej Zalewski**

A. KĄTCKA

*Modelowanie choreografii usług w architekturze MDA*

Degree awarded on March 2009

P. MICHALAK

*Język programowania systemów usługowych*

Degree awarded on October 2009

A. IZDEBSKI

*Metodyka badania wydajności oprogramowania działającego w środowisku usługowym z wykorzystaniem modelu sieci kolejek*

Degree awarded on October 2009

A. DOMAGALIK

*Testowanie akceptacyjne procesów biznesowych w architekturze usługowej*

Degree awarded on October 2009

### 5.3 B.Sc. Degrees

Advisor: **Piotr Arabas**

D. GRZEGORCZYK

*Aplikacja pomiarowa dla sieci DiffServ*

Degree awarded on February 2009

Advisor: **Adam Czajka**

R. BRIZE

*Rozpoznawanie tęczywki metodą Daugman'a*

Degree awarded on June 2009

Advisor: **Janusz Granat**

M. DOROCIŃSKI

*Zorientowana zdarzeniowo analiza danych multimodalnych*

Degree awarded on March 2009

J. HURKAŁA

*Architektura systemu przetwarzającego zdarzenia ze stron WWW*

Degree awarded on March 2009

A. HURKAŁA

*Internetowe usługi informacyjne zorientowane zdarzeniowo (EventWeb)*

Degree awarded on March 2009

P. GŁUSZCZYK

*Zorientowana zdarzeniowo analiza danych sensorowych*

Degree awarded on March 2009

Advisor: **Jerzy Gustowski**

K. MATLAK

*Stanowisko laboratoryjne manipulatora elektrycznego*

Degree awarded on June 2009

M. PAWLUS

*Rozproszony system sterowania sieci AS-i. Stanowisko laboratoryjne*

Degree awarded on June 2009

P. KRAJEWSKI

*SCL-strukturalny język programowania platformy S7*

Degree awarded on June 2009

M. LUBAŚ

*Obiekty wirtualne sterowane przez PLC*

Degree awarded on June 2009

R. SMAGOWSKI

*S7-Graph – graficzny język sterowania sekwencyjnego*

Degree awarded on October 2009

P. DOBRZYŃSKI

*Rozproszony system sterowania - sieć Profibus technologia OPC*

Degree awarded on October 2009

Advisor: **Mariusz Kaleta**

J. WIŚNIEWSKI

*Implementacja API do obsługi podpisu elektronicznego XAdES w języku Java*

Degree awarded on February 2009

A. KHOZHAMURATOV

*System wieloagentowy do symulacji gry rynkowej*

Degree awarded on June 2009

Advisor: **Mariusz Kamola**

B. PIECH

*Projektowanie i implementacja narzędzi wspomagających refaktoryzację w języku BPEL4WS*

Degree awarded on February 2009

T. ZAWADZKI

*Automatyczna generacja dokumentacji serwisów WebMethods w postaci diagramów UML*

Degree awarded on October 2009

K. RYBAK

*Środowisko badawcze dla problemu nieuczciwego pozycjonowania stron WWW w wyszukiwarkach internetowych*

Degree awarded on September 2009

Advisor: **Włodzimierz Kasprzak**

P. BRANIEWSKI

*Rozpoznawanie swobodnych kodów tekstowych w obrazach cyfrowych*

Degree awarded on September 2009

Advisor: **Tomasz Kornuta**

M. SZYMCZAK

*Mechanizm akwizycji obrazu w strukturze ramowej FraDIA*

Degree awarded on September 2009

Advisor: **Adam Kozakiewicz**

H. ZĘGOTA

*SIP Platform with conference services; Configuration of telecom layer and preparation for deployment of web based GUI*

Degree awarded on June 2009

A. KOSTRZEWA

*SIP Platform with conference services High level architecture with web based control panel and GUI*

Degree awarded on September 2009

Advisor: **Bartłomiej Kubica**

P. GRZEŚ

*Porównanie algorytmu optymalizacji globalnej z wykorzystaniem arytmetyki przedziałowej i afo-  
nicznej*

Degree awarded on September 2009

Advisor: **Maciej Ławryńczuk**

P. PAWŁOWSKI

*Przybornik do efektywnego uczenia radialnych sieci neuronowych*

Degree awarded on February 2009

J. GODLEWSKI

*Krytyczne porównanie gradientowych i heurystycznych algorytmów uczenia sieci neuronowych*

Degree awarded on February 2009

Advisor: **Piotr Marusak**

E. BONEVICH

*Sposoby uwzględniania ograniczeń wyjść obiektu w algorytmach predykcyjnych. Symulacyjne badania porównawcze*

Degree awarded on September 2009

Advisor: **Ewa Niewiadomska-Szynkiewicz**

M. NIEMCZUK

*System do tworzenia zapasowych kopii danych z urządzeń mobilnych*

Degree awarded on February 2009

P. OSIŃSKI

*Comparative study of SSI cluster systems*

Degree awarded on March 2009

D. PIOTROWSKI

*Przegląd i badania symulacyjne mechanizmów aukcyjnych*

Degree awarded on June 2009

Advisor: **Michał Nowacki (Inst. of Comp. Science)**

P. DRAŻYK

*iPhone Universal SDK*

Degree awarded on September 2009

P. ZARZYCKI

*iPhone Application SDK*

Degree awarded on September 2009

Advisor: **Robert Nowak (Inst. of Electronic Systems)**

M. MICHALAK

*Optymalizacja sekwencji DNA kodujących białka*

Degree awarded on October 2009

Advisor: **Krzysztof Pieńkosz**

K. TOMŻYŃSKI

*Heurystyczne algorytmy rozwiązywania problemu plecakowego z ograniczoną liczbą pakowanych elementów*

Degree awarded on February 2009

Advisor: **Grzegorz Płoszajski**

E. MAJKOWSKI

*Ekstrakcja danych ze spisów treści zeskanowanych programami OCR*

Degree awarded on February 2009

W. SZYMAK

*Wspomaganie tworzenia metadanych technicznych i strukturalnych w zadaniu digitalizacji dóbr kultury*

Degree awarded on February 2009

Advisor: **Krzysztof Sacha**

Ł. SZANIAWSKI

*Projektowanie aplikacji w technologii EJB 3.0*

Degree awarded on June 2009

Advisor: **Andrzej Stachurski**

M. BRZEZIŃSKI

*Różne aspekty optymalizacji stron internetowych Forma E-kursu*

Degree awarded on March 2009

K. WNUK

*Metody wyznaczania punktów zwrotnych na giełdzie oparte na liczbach Fibonacciego*

Degree awarded on March 2009

P. GOŁASZEWSKI

*Implementacje i testowanie metod quasi-newtonowskich korzystających z afinicznych operatorów projekcyjnych*

Degree awarded on March 2009

J. MAZUREK

*Porównanie efektywności algorytmów klasteryzacyjnych i genetycznych w zadaniach poszukiwania globalnego optimum*

Degree awarded on September 2009

Advisor: **Tomasz Starecki (Inst. of Electronic Systems)**

P. GAWRON

*Design of a communication interface in a home automation system*

Degree awarded on October 2009 (with honors)

G. NIEMIROWSKI

*USB interface-based controller for testing prototype devices*

Degree awarded on October 2009

Advisor: **Marcin Szlenk**

M. SZYMANIUK

*Witryna WWW Ośrodka Języka Angielskiego SJO PW*

Degree awarded on February 2009

P. BORYSIUK

*Regression - Unit Testing Automation in PTK Centertel*

Degree awarded on September 2009

K. KIELBASA

*Modelowanie i generowanie kodu aplikacji w technologii Flex*

Degree awarded on September 2009

Advisor: **Wojciech Szynkiewicz**

K. CZAJKOWSKI

*Planowanie i symulacje chwytów za pomocą sztucznej trójpalczastej ręki*

Degree awarded on September 2009

Advisor: **Piotr Tatjewski**

A. BIERNACKI

*Oprogramowanie i symulacja układów regulacji predykcyjnej z modelami obiektów typu Hammersteina*

Degree awarded on February 2009

Advisor: **Eugeniusz Toczyłowski**

Ł. KARBOWSKI

*Algorytmy i modele aukcji iterowanych*

Degree awarded on October 2009 (with honors)

Advisor: **Tomasz Traczyk**

M. MAZUR

*Działająca przez WWW przeglądarka do plików FITS dla eksperymentu  $\pi$  of the sky*

Degree awarded on June 2009

M. RYBIŃSKI

*Zaprojektowanie i wykonanie bazy danych i aplikacji wspierających dokumentowanie zagrożonego detalu architektury w ramach projektu 'Ginący detal'*

Degree awarded on October 2009

Advisor: **Paweł Wawrzyński**

A. PILASZKIEWICZ

*Q-routing w mobilnych sieciach AD-HOC*

Degree awarded on October 2009

Advisor: **Tomasz Winiarski**

T. ZUPKA

*Eliminacja wpływu siły grawitacji na odczyty z czujnika sił i momentów sił*

Degree awarded on February 2009

M. KULESZA

*Sprzęg czujnika siły ATI-IA F/T 3084 Gamma z komputerem PC*

Degree awarded on May 2009

M. ŻBIKOWSKI

*Graficzne środowisko symulacyjne systemu wielomanipulatorowego*

Degree awarded on June 2009

T. BEM

*Robot playing checkers*

Degree awarded on September 2009 (with honors)

Advisor: **Andrzej Zalewski**

M. GÓRECKI

*Automatyzacja porównywania wyników zapytań do baz danych z wcześniej zdefiniowanymi oczekiwaniami*

Degree awarded on February 2009

G. ŁACH

*Kooperacja procesów biznesowych między organizacjami w architekturze usługowej*

Degree awarded on September 2009

Advisor: **Cezary Zieliński**

M. STRUGIŃSKI

*Graphical User Interface generator for MRROC++ system*

Degree awarded on June 2009

P. SAKOWICZ

*Automatyczna kalibracja systemu robot-kamera*

Degree awarded on July 2009

## 6 Publications

### 6.1 Monographs

- [B1] Programowanie równoległe i rozproszone. (Eds. A.Karbowski, E.Niewiadomska-Szynkiewicz) (publ. Oficyna Wydawnicza PW). Warszawa, 2009. ISBN 978-83-7207-803-2.
- [B2] W.Kasprzak: Rozpoznawanie obrazów i sygnałów mowy (publ. Oficyna Wydawnicza PW). Warszawa, 2009. ISBN 978-83-7207-770-7.
- [B3] A.Stachurski: Wprowadzenie do optymalizacji (publ. Oficyna Wydawnicza PW). 2009. ISBN 978-83-7207-801-8.
- [B4] P.Wawrzyński: Systemy adaptacyjne i uczące się (publ. Oficyna Wydawnicza PW). 2009.

### 6.2 Chapters in Scientific or Technical Books

- [C1] J.Błaszczuk, A.Karbowski, E.Niewiadomska-Szynkiewicz, M.Warchoł: Programowanie równoległe na komputerach wieloprocessorowych (wielordzeniowych) z pamięcią wspólną (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 78-125.
- [C2] R.Dąbrowski, B.Kubica: Comparison of Interval CC Libraries in Global Optimization (in: Evolutionary Computation and Global Optimization 2009; publ.: Oficyna Wydawnicza PW). 2009. pp. 51-62.
- [C3] P.Gawkowski, M.Ławryńczuk, P.Marusak, P.Tatjewski: Towards a Fault-Robust GPC Implementation. (in: Diagnosis of Processes and Systems; publ.: PWNT Pomorskie Wydawnictwo Naukowo-Techniczne w Gdańsku). 2009. pp. 131-140.
- [C4] M.Kamola, J.Błaszczuk, B.Kubica, E.Niewiadomska-Szynkiewicz: Programowanie rozproszone w środowiskach sieciowych oparte na wywołaniach zdalnych procedur (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 234-346.
- [C5] A.Karbowski: Architektury maszyn równoległych (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 25-50.
- [C6] A.Karbowski, E.Niewiadomska-Szynkiewicz: Język Fortran (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 395-418.
- [C7] A.Karbowski, E.Niewiadomska-Szynkiewicz, B.Kubica: Mechanizmy wirtualnej pamięci wspólnej (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 347-372.
- [C8] A.Karbowski: Miary efektywności zrównoleglenia (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 19-24.
- [C9] A.Karbowski, E.Niewiadomska-Szynkiewicz, M.Warchoł: Programowanie równoległe na komputerach wieloprocessorowych z pamięcią lokalną oraz w sieciach komputerowych oparte na przesyłaniu komunikatów (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 186-233.
- [C10] A.Karbowski, K.Malinowski: Przykłady równoległych metod obliczeniowych (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 373-394.



- [C11] A.Karbowski, K.Malinowski: Wprowadzenie (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 13-18.
- [C12] A.Karbowski, M.Warchoł: Wprowadzenie do programowania równoległego (in: Programowanie równoległe i rozproszone; publ.: Oficyna Wydawnicza PW). 2009. pp. 51-77.
- [C13] W.Kasprzak, A.Wilkowski, K.Czapnik: Hand Gesture Recognition in Image Sequences Using Active Contours and HMMs (in: Image Processing and Communications Challenges; publ.: Akademicka Oficyna Wydawnicza EXIT). 2009. pp. 248-255.
- [C14] B.Kubica: Performance Inversion of Interval Newton Narrowing Operators (in: Evolutionary Computation and Global Optimization 2009; publ.: Oficyna Wydawnicza PW). 2009. pp. 111-118.
- [C15] B.Kubica: Shared-Memory Parallelization of an Interval Equations Systems Solver - Comparison of Tools (in: Evolutionary Computation and Global Optimization 2009; publ.: Oficyna Wydawnicza PW). 2009. pp. 121-128.
- [C16] M.Ławryńczuk: Neural Networks in Model Predictive Control (in: Intelligent Systems for Knowledge Management; publ.: Springer Verlag). 2009. pp. 31-63.
- [C17] M.Ławryńczuk, P.Marusak, P.Tatjewski: Regulacja predykcijna i optymalizacja punktów pracy w systemie DiaSter (in: Systemy wykrywające, analizujące i tolerujące usterki; publ.: PWNT Pomorskie Wydawnictwo Naukowo-Techniczne w Gdańsku). 2009. pp. 19-30.
- [C18] A.Marusak, P.Marusak, A.Masłowski: Automatyka i robotyka (in: Poradnik inżyniera elektryka; publ.: Wydawnictwa Naukowo - Techniczne). 2009. Vol. 1. pp. 648-737.
- [C19] E.Niewiadomska-Szynkiewicz, K.Malinowski, M.Karpowicz, A.Sikora, J.Żelaziński: Zagrożenie powodziowe (in: Modele zagrożeń aglomeracji miejskiej wraz z systemem zarządzania kryzysowego na przykładzie miasta stołecznego Warszawy; publ.: Wydawnictwo Wojskowej Akademii Technicznej). 2009. pp. 53-102.
- [C20] W.Ogryczak, T.Śliwiński: Sequential Algorithms for Max-Min Fair Bandwidth Allocation (in: N.Mastorakis, V.Mladenov: Proceedings of the European Computing Conference, vol.1; publ.: Springer Science). 2009. pp. 511-522.
- [C21] P.Osiński, E.Niewiadomska-Szynkiewicz: Comparative Study of Single Systems Image Clusters (in: Evolutionary Computation and Global Optimization 2009; publ.: Oficyna Wydawnicza PW). 2009. pp. 145-154.
- [C22] M.Syfert, P.Chrzanowski, B.Fajdek, M.Ławryńczuk, P.Marusak, K.Patan: Zastosowanie systemu DiaSter (in: Modelowanie, diagnostyka i sterowanie nadrzędne procesami. Implementacja w systemie DiaSter; publ.: Wydawnictwa Naukowo - Techniczne). 2009. pp. 383-443.
- [C23] P.Tatjewski, L.Trybus, M.Ławryńczuk, P.Marusak, Z.Świder, A.Stec: Metody sterowania nadrzędnego (in: Modelowanie, diagnostyka i sterowanie nadrzędne procesami. Implementacja w systemie DiaSter; publ.: Wydawnictwa Naukowo - Techniczne). 2009. Vol. 14. pp. 317-374.
- [C24] A.Wilkowski, W.Kasprzak: Hand Posture Recognition System Based on Deformable Templates (in: Image Processing and Communications Challenges; publ.: Akademicka Oficyna Wydawnicza EXIT). 2009. pp. 239-247.
- [C25] A.Wilkowski: HMM-Based System for Recognizing Gestures in Image Sequences and Its Application in Continuous Gesture Recognition (in: Human-Computer Systems Interaction; publ.: Springer Verlag). 2009. pp. 135-146.

### 6.3 Scientific and Technical Papers in Journals

- [J1] M.Dzida, T.Śliwiński, M.Zagożdżon, W.Ogryczak, M.Pióro: Path Diversity Protection in Two-Layer Networks (in: Journal of Telecommunications and Information Technology). 2009. Vol. 3/2009. pp. 14-19.
- [J2] P.Gawkowski, M.Ławryńczuk, P.Marusak, J.Sosnowski, P.Tatjewski: Fault Sensitivity of Explicit DMC and GPC Algorithms (in: Journal of Automation, Mobile Robotics and Intelligent Systems). 2009. Vol. 1. pp. 52-56.
- [J3] P.Kacprzak, M.Kaleta, P.Pałka, I.Żółtowska: Modelowanie asymetrycznych zapotrzebowań w wielotowarowych aukcjach (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 1190-1198.
- [J4] M.Kaleta: Alokacja kosztów subsydiowania w grach kooperatywnych opartych na programowaniu liniowym (in: Automatyka). 2009. Vol. 2. pp. 333-341.
- [J5] M.Kaleta, P.Pałka, E.Toczyłowski, T.Traczyk: Electronic Trading on Electricity Markets within a Multi-Agent Framework (in: Lecture Notes in Artificial Intelligence). 2009. Vol. 5796. pp. 788-799.
- [J6] M.Kaleta, T.Śliwiński: Modelowanie i analiza symulacyjna procesów biznesowych dla dzierżawy zasobów (in: Logistyka). 2009. Vol. 2/2009. pp. 1-16.
- [J7] M.Kaleta, K.Smolira, E.Toczyłowski: Optymalizacja struktury procesów rynkowych (in: Automatyka). 2009. Vol. 2. pp. 343-351.
- [J8] M.Kaleta, E.Toczyłowski: Rola informatyki w zwiększaniu efektywności rynku energii (in: Rynek Energii). 2009. Vol. 1(80). pp. 66-73.
- [J9] M.Kaleta, P.Pałka, E.Toczyłowski: Wieloagentowa platforma handlu dla lokalnego rynku energii elektrycznej (in: Rynek Energii). 2009. Vol. I(III). pp. 16-22.
- [J10] M.Kaleta, K.Smolira, E.Toczyłowski: Wspomaganie projektowania struktury czasowej procesów rynku energii elektrycznej (in: Rynek Energii). 2009. Vol. I(III). pp. 55-62.
- [J11] M.Kaleta: Zastosowania modeli i gier kooperatywnych w problemach rynku energii elektrycznej (in: Rynek Energii). 2009. Vol. II(IV)-2009. pp. 302-307.
- [J12] M.Kamola, P.Arabas: Wykorzystanie technologii Vecta Star do przekazu audiowizualnego wysokiej rozdzielczości (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 1508-1513.
- [J13] N.Koh, C.Zieliński, M.Ang, Jr: The Matrix-Based Framework: Its Role as a Job-Agent Supervisory Controller (in: Advanced Robotics). 2009. Vol. 23(2009). pp. 1663-1686.
- [J14] K.Kołyś, P.Pałka, K.Pieńkosz, E.Toczyłowski: Efektywność obliczeniowa agregacji ofert przy alokacji zasobów sieciowych (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 1166-1174.
- [J15] K.Kołyś, K.Pieńkosz, E.Toczyłowski, I.Żółtowska: Model aukcji przepustowości z możliwością zakupu wirtualnej sieci prywatnej (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 1183-1189.
- [J16] A.Kozakiewicz, K.Malinowski: Network Traffic Routing Using Effective Bandwidth Theory (in: European Transactions on Telecommunications). 2009. Vol. 20. pp. 660-667.

- [J17] A.Kozakiewicz, A.Felkner, T.Kruk: Simulation of Critical ICT Infrastructure for Municipal Crisis Management (in: Lecture Notes in Computer Science). 2009. Vol. 5508. pp. 344-351.
- [J18] A.Krzemienowski: Risk Preference Modeling with Conditional Average: An Application to Portfolio Optimization (in: Annals of Operations Research). 2009. Vol. 165 (2009). pp. 67-95.
- [J19] M.Kudelski, A.Pacut: Ant Routing with Distributed Geographical Localization of Knowledge in Ad-Hoc Networks (in: Lecture Notes in Computer Science). 2009. Vol. 5484. pp. 111-116.
- [J20] P.Kwaśniewski, E.Niewiadomska-Szynkiewicz: Coordinated Geographical Power Save for Wireless Sensor Networks (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 1342-1348.
- [J21] M.Lechman, A.Grudzień, T.Traczyk: Zastosowanie języka XVCL do budowy repozytorium diagramów klas (in: Studia Informatica). 2009. Vol. 2A(83). pp. 48-58.
- [J22] J.Lubacz, P.Pałka, W.Stańczuk, E.Toczyłowski: Metodyka oceny modeli rynkowej alokacji przepustowości w sieciach telekomunikacyjnych (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 869-879.
- [J23] J.Lubacz, K.Malinowski, E.Toczyłowski: Modele wymiany handlowej na rynku zasobów transportowych sieci (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 1611-1621.
- [J24] M.Ławryńczuk: A Predictive Control Economic Optimiser and Constraint Governor Based on Neural Models (in: Lecture Notes in Computer Science). 2009. Vol. 5495. pp. 79-88.
- [J25] M.Ławryńczuk: Analityczny nieliniowy algorytm regulacji predykcijnej z modelami neuronowymi (in: Pomiary Automatyka Robotyka PAR). 2009. Vol. 2/2009. pp. 506-518.
- [J26] M.Ławryńczuk: Computationally Efficient Nonlinear Predictive Control Based on RBF Neural Multi-models (in: Lecture Notes in Computer Science). 2009. Vol. 5495. pp. 89-98.
- [J27] M.Ławryńczuk: Efficient Nonlinear Predictive Control Based on Structured Neural Models (in: International Journal of Applied Mathematics and Computer Science). 2009. Vol. 2. pp. 233-246.
- [J28] M.Ławryńczuk: Efficient Nonlinear Predictive Control of a Biochemical Reactor Using Neural Models (in: Bioprocess and Biosystems Engineering). 2009. Vol. 32 (2009). pp. 301-312.
- [J29] M.Ławryńczuk: Explicit Nonlinear Predictive Control of a Distillation Column Based on Neural Models (in: Chemical Engineering and Technology). 2009. Vol. 10. pp. 1578-1587.
- [J30] K.Marasek, J.Walczak, T.Traczyk, G.Płoszajski, A.Kaźmierski: Koncepcja elektronicznego archiwum wieczystego (in: Studia Informatica). 2009. Vol. 2B(84). pp. 275-307.
- [J31] M.Marks, E.Niewiadomska-Szynkiewicz: High Accuracy Localization based on RSSI Measurements (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 1332-1341.

- [J32] M.Marks, E.Niewiadomska-Szynkiewicz: Multiobjective Approach to Localization in Wireless Sensor Networks (in: Journal of Telecommunications and Information Technology). 2009. Vol. 3/2009. pp. 59-67.
- [J33] P.Marusak: Advantages of an Easy to Design Fuzzy Predictive Algorithm in Control Systems of Nonlinear Chemical Reactors (in: Applied Soft Computing). 2009. Vol. 9(2009). pp. 1111-1125.
- [J34] P.Marusak, P.Tatjewski: Effective Dual-Mode Fuzzy DMC Algorithms with On-line Quadratic Optimization and Guaranteed Stability (in: International Journal of Applied Mathematics and Computer Science). 2009. Vol. 1. pp. 127-141.
- [J35] P.Marusak: Efficient Model Predictive Control Algorithm with Fuzzy Approximations of Nonlinear Models (in: Lecture Notes in Computer Science). 2009. Vol. 5495. pp. 448-457.
- [J36] P.Marusak: Machine Tuning of Stable Analytical Fuzzy Predictive Controllers (in: Lecture Notes in Computer Science). 2009. Vol. 5495. pp. 430-439.
- [J37] P.Marusak: Regulatory predykcyjne z założoną trajektorią przyrostów sterowania i uwzględnianiem ograniczeń nałożonych na wyjścia obiektu regulacji (in: Pomiar Automatyka Robotyka PAR). 2009. Vol. 2/2009. pp. 496-505.
- [J38] E.Niewiadomska-Szynkiewicz, P.Kwaśniewski, I.Windyga: Comparative Study of Wireless Sensor Networks Energy-Efficient Topologies and Power Save Protocols (in: Journal of Telecommunications and Information Technology). 2009. Vol. 3/2009. pp. 68-75.
- [J39] E.Niewiadomska-Szynkiewicz, M.Marks: Optimization Schemes for Wireless Sensor Network Localization (in: International Journal of Applied Mathematics and Computer Science). 2009. Vol. 2. pp. 291-302.
- [J40] W.Ogryczak, T.Śliwiński: Decision Support under Risk by Optimization of Scenario Importance Weighted OWA Aggregations (in: Journal of Telecommunications and Information Technology). 2009. Vol. 3/2009. pp. 5-13.
- [J41] W.Ogryczak: Inequality Measures and Equitable Locations (in: Annals of Operations Research). 2009. Vol. 167. pp. 61-86.
- [J42] W.Ogryczak, T.Śliwiński: On Efficient WOWA Optimization for Decision Support Under Risk (in: International Journal of Approximate Reasoning). 2009. Vol. 50(2009). pp. 915-928.
- [J43] P.Pałka, E.Toczyłowski: Mechanizmy wyceny dóbr za pomocą uogólnionej metody Yoona i metody analizy parametrycznej (in: Automatyka). 2009. Vol. 2. pp. 539-550.
- [J44] P.Pałka, K.Kołtyś, E.Toczyłowski, I.Żółtowska: Model for Balancing Aggregated Communication Bandwidth Resources (in: Journal of Telecommunications and Information Technology). 2009. Vol. 3/2009. pp. 43-49.
- [J45] P.Pałka, E.Toczyłowski: Reguły wyceny w wielotowarowej aukcji przepustowości sieci (in: Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne). 2009. Vol. 8-9/2009. pp. 1175-1182.
- [J46] P.Pałka, E.Toczyłowski: Wpływ mechanizmu wyceny energii na łagodzenie siły rynkowej na hurtowym rynku energii (in: Rynek Energii). 2009. Vol. II(IV)-2009. pp. 96-101.

- [J47] P.Pałka, M.Kaleta, E.Toczyłowski, T.Traczyk: Wykorzystanie standardu FIPA na potrzeby M3 - otwartego modelu wymiany wielotowarowej (in: *Studia Informatica*). 2009. Vol. 2B(84). pp. 127-140.
- [J48] P.Rzepakowski: Incorporating Customer Preference Information into the Forecasting of Service Sales (in: *Journal of Telecommunications and Information Technology*). 2009. Vol. 3/2009. pp. 50-58.
- [J49] A.Sikora, E.Niewiadomska-Szynkiewicz: Parallel and Distributed Simulation of Ad Hoc Networks (in: *Journal of Telecommunications and Information Technology*). 2009. Vol. 3/2009. pp. 76-84.
- [J50] A.Sikora, E.Niewiadomska-Szynkiewicz: Simulation of Wireless Sensor Networks and Mobile Ad Hoc Networks with Parallel Processing (in: *Przegląd Telekomunikacyjny- wiadomości telekomunikacyjne*). 2009. Vol. 8-9/2009. pp. 1471-1480.
- [J51] K.Smolira, M.Kaleta, E.Toczyłowski: Możliwości usprawnienia struktury procesów rynku bilansującego energii (in: *Rynek Energii*). 2009. Vol. II(IV)-2009. pp. 116-121.
- [J52] A.Stachurski: On the Structure of Variable Metric Updates (in: *International Journal of Pure and Applied Mathematics*). 2009. Vol. 4 2009. pp. 469-476.
- [J53] W.Szynkiewicz, J.Błaszczak, K.Malinowski: Optymalizacja w zastosowaniu do planowania ruchu ściśle współpracujących robotów (in: *Pomiary Automatyka Robotyka PAR*). 2009. Vol. 2/2009. pp. 71-89.
- [J54] E.Toczyłowski, I.Żółtowska: A New Pricing Scheme for a Multi-Period Pool-Based Electricity Auction (in: *European Journal of Operational Research*). 2009. Vol. 197(2009). pp. 1051-1062.
- [J55] E.Toczyłowski: Zgodność motywacji w mechanizmach rynku energii (in: *Rynek Energii*). 2009. Vol. II(IV)-2009. pp. 88-95.
- [J56] P.Wawrzyński: A Cat-Like Robot Real-Time Learning to Run (in: *Lecture Notes in Computer Science*). 2009. Vol. 5495. pp. 380-390.
- [J57] P.Wawrzyński: Real-Time Reinforcement Learning by Sequential Actor-Critics and Experience Replay (in: *Neural Networks*). 2009. Vol. 22(2009). pp. 1484-1497.
- [J58] A.Wilkowski, W.Kasprzak: Constrained contour matching in Hand Posture Recognition (in: *Image Processing and Communication*). 2009. Vol. 2-3. pp. 31-41.
- [J59] T.Winiarski, C.Zieliński: Specification of Multi-robot Controllers on an Example of a Haptic Device (in: *Lecture Notes in Control and Information Sciences*). 2009. Vol. 396. pp. 227-242.
- [J60] C.Zieliński, P.Trojanek: Stigmergic cooperation of autonomous robots (in: *Mechanism and Machine Theory*). 2009. Vol. 44(2009). pp. 656-670.
- [J61] I.Żółtowska: Planowanie kontraktów przy uwzględnianiu ryzyka awarii w grupie jednostek wytwórczych (in: *Rynek Energii*). 2009. Vol. II(IV)-2009. pp. 284-289.

## 6.4 Scientific and Technical Papers in Conference Proceedings

- [P1] A.Felkner: Inference System for Role-Based Trust Management Languages (in: XI International PhD Workshop OWD 2009). 2009. pp. 75-79.
- [P2] A.Felkner, K.Sacha: The Semantics fo Role-Based Trust Management Languages (in: Preprint of the Proceedings of the 4th IFIP TC2 Central and East European Conference on Software Engineering Techniques CEE-SET 2009). 2009. pp. 192-203.
- [P3] P.Gawkowski, M.Ławryńczuk, P.Marusak, P.Tatjewski, J.Sosnowski: On Improving Dependability of the Numerical GPC Algorithm (in: Proceedings of the European Control Conference 2009). 2009. pp. 1377-1382.
- [P4] M.Ławryńczuk, P.Marusak, P.Tatjewski: On Cooperation of Set-Point Optimisation and Predictive Control Based on Hammerstein Models (in: 7th Workshop on Advanced Control and Diagnosis Proceedings). 2009. z. CD. pp. 1-6.
- [P5] M.Makowski, J.Granat, H.Ren: Multiple Criteria Analysis Made Easy for a Large Group of Diversified Stakeholders (in: CSM'2009 22nd Workshop on Methodologies and Tools for Complex System Modeling). 2009. pp. 33-35.
- [P6] W.Ogryczak: Multicriteria Equitable Optimization and Robust Solution Concepts (in: WCSMO-8 Eight World Congress on Structural and Multidisciplinary Optimization). 2009. z. CD. pp. 1-10.
- [P7] W.Ogryczak: On Principles of Fair Resource Allocation for Importance Weighted Agents (in: Proceedings International Workshop on Social Informatics SOCINFO 2009; publ.: IEEE Computer Society Press). 2009. pp. 57-62.
- [P8] P.Tatjewski, M.Ławryńczuk, P.Marusak: Integrated Predictive Optimiser and Constraint Supervisor for Processes with Basic Feedback Control (in: Proceedings of the European Control Conference 2009). 2009. pp. 3359-3364.
- [P9] P.Tatjewski: Supervisory Advanced Control and On-line Set-Point Optimization (in: 7th Workshop on Advanced Control and Diagnosis Proceedings). 2009. z. CD. pp. 1-10.
- [P10] T.Traczyk: ebXML - XML w służbie handlu (in: Systemy informatyczne. Projektowanie, implementowanie, eksploatawanie; publ.: Stowarzyszenie Polskiej Grupy Użytkowników Systemu Oracle). 2009. pp. 67-77.

## 6.5 Abstracts

- [A1] J.Granat, M.Makowski, W.Ogryczak: Pairwise-outperformance Aggregation in Multiple Criteria Analysis of Discrete Alternatives (in: CSM'2009 22nd Workshop on Methodologies and Tools for Complex System Modeling). 2009. pp. 17-18.
- [A2] A.Krzemienowski: Multivariable Conditional Value-at-Risk as a Risk Measure (in: CwU'2009: IIASA/GAMM Workshop on Coping with Uncertainty: Managing Safety of Heterogeneous Systems). 2009. p. 19.
- [A3] B.Kozłowski: A Method for Obtaining User Preferences in Multicriteria Problems with Hierarchy (in: CSM'2009 22nd Workshop on Methodologies and Tools for Complex System Modeling). 2009. pp. 26-27.
- [A4] W.Ogryczak: Robust Decision under Risk for Imprecise Probabilities (in: CwU'2009: IIASA/GAMM Workshop on Coping with Uncertainty: Managing Safety of Heterogeneous Systems). 2009. pp. 23-23.

- [A5] H.Ren, J.Granat, M.Makowski: Web-site for Multiple Criteria Analysis of Discrete Alternatives (in: CSM'2009 22nd Workshop on Methodologies and Tools for Complex System Modeling). 2009. pp. 43-44.

## 6.6 Reports and Other Papers

- [R1] J.Granat, M.Makowski, W.Ogryczak: Multiple Criteria Analysis of Discrete Alternatives with a Simple Preference Specification: Pairwise-outperformance based Approaches (publ. International Institute of Applied System Analysis). 2009.
- [R2] B.Kubica: Intel TBB as a Tool for Parallelization of an Interval Solver of Nonlinear Equations Systems (publ. Instytut Automatyki i Informatyki Stosowanej PW). 2009.
- [R3] M.Makowski, J.Granat, W.Ogryczak: Overview of Methods Implemented in MCA: Multiple Criteria Analysis of Discrete Alternatives with a Simple Preference Specification (publ. International Institute of Applied System Analysis). 2009.
- [R4] M.Staniak: Combining Visual Servos - switching approach (publ. Instytut Automatyki i Informatyki Stosowanej PW). 2009.
- [R5] E.Toczyłowski, M.Kaleta, K.Smolira, P.Kacprzak, P.Pałka: Opracowanie perspektywicznych rozwiązań w zakresie efektywnego mechanizmu bilansowania z uwzględnieniem wielotowarowego charakteru rynku energii elektrycznej – etap II (publ. Instytut Automatyki i Informatyki Stosowanej PW). 2009.
- [R6] T.Traczyk (Ed.): Metody i architektury wymiany informacji dla handlu elektronicznego na rynkach infrastrukturalnych, część I (publ. Instytut Automatyki i Informatyki Stosowanej PW). 2009.