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 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. Professor Władysław Findeisen had been the Director of the institute until he was elected the Rector of Warsaw University of Technology in 1981. His achievements are recognized worldwide. He is Doctor Honoris Causa of the City University London, Technical University of Gdańsk, Technical University of Ilmenau and Warsaw University of Technology. This year we celebrated his 80th birthday. The institute offers courses in a broad area of information technology, concentrating on control and decision support systems, at three levels of education. At 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 Control.

In 2006 the institute was involved in organizing three scientific events:

- IFIP Working Conference on Software Engineering Techniques — SET 2006: October 17–20, Warsaw, Poland,
- 16-th CISM-IFToMM Symposium on Robot Design, Dynamics, and Control ROMANSY 2006, June 20–24, 2006, Warsaw, Poland,

Prof. Mietek A. Brdyś, former member of our academic staff, together with the author of this note have been awarded a prize of Ministry of Science and Higher Education for the book 'Iterative Algorithms for Multilayer Optimizing Control'.

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 staff of the institute can be found in this report. I express my sincere appreciation to the faculty and staff of the institute for their efforts and contributions to our achievements in teaching and research.

I express my gratitude to all our partners, and in particular to our partners from abroad actively participating in international research programs. We would appreciate feedback concerning our activities. We shall be glad to answer any and all questions and we will be pleased to send reprints of our papers and reports upon request.

Piotr Tatjewski
Contents

1 General Information 2
   1.1 Directors ......................................................... 2
   1.2 Organization of the Institute .................................. 2
   1.3 Statistical Data ................................................. 28

2 Faculty and Staff 30
   2.1 Professors Emeriti ............................................... 30
   2.2 Senior Faculty .................................................... 32
   2.3 Supporting Faculty and Staff .................................. 42
   2.4 Ph.D. Students ................................................... 44
   2.5 Administrative and Technical Staff ............................. 49

3 Teaching Activities – Academic Year 2005/2006 51

4 Projects 53

5 Degrees Awarded 57
   5.1 D.Sc. Degrees .................................................... 57
   5.2 Ph.D. Degrees .................................................... 57

6 Publications 58
   6.1 Monographs ....................................................... 58
   6.2 Chapters in Scientific or Technical Books ....................... 58
   6.3 Scientific and Technical Papers in Journals .................... 60
   6.4 Scientific and Technical Papers in Conference Proceedings .... 62
   6.5 Abstracts .......................................................... 65
   6.6 Reports and Other Papers ....................................... 66
1 General Information

The following information about organization of the Institute reflects the situation on December 31, 2006.

1.1 Directors

Professor Piotr Tatjewski, Director
Professor Cezary Zieliński, Deputy Director for Research
Dr. Tomasz Traczyk, Deputy Director for Academic Affairs

1.2 Organization of the Institute

Systems Control Division

Division Head: Professor Krzysztof Malinowski
Professors: Włodzimierz Kasprzak, Krzysztof Malinowski, Andrzej Pacut, Cezary Zieliński
Professors, retired: Władysław Findeisen, Radosław Ładziński, Jacek Szymanowski
Assistant Professors: Piotr Arabas, Adam Czajka, Mariusz Kamola, Andrzej Karbowi- ski, Tomasz J. Kruk, Bartłomiej Kubica, Ewa Niewiadomska-Szynkiewicz, Wójciech Szynkiewicz, Paweł Wawrzyński, Adam Woźniak
Assistants: Adam Kozakiewicz, Tomasz Winiarski
Senior Lecturer: Andrzej Rydzewski, Michał Warchol
Ph.D. Students: Bartłomiej Anszperger, Jacek Błaszczyk, Marcin Chochoński, Małgorzata Gadomska, Andrzej Igielski, Michał Karpowicz, Tomasz Kornuta, Michał Kudelski, Piotr Kwaśniewski, Marek Majchrowski, Roman Bartosz Nowicki, Fumio Adam Okazaki, Michał Pawluk, Joanna Putz-Leszczynska, Andrzej Sikora, Maciej Sta- niak, Łukasz Stasiak, Przemysław Strzelecky, Piotr Trojanek, Rafał Wardziński, Artur Wilkowski, Tomasz Winiarski
Research of the division is conducted in 3 research groups:


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.

---

**Complex Systems Group**

**Software for complex systems simulation**

- **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.
1.2 Organization of the Institute

**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**

**QOSIPS System**

Participation in QOSIPS (Quality of Service and Pricing Differentiation for IP Services) project of 5FP

QOSIPS goals:
- Differentiation of IP services
- Quality of service
- Pricing support
- Integration with NSP operation systems
1.2 Organization of the Institute

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

Operations scheduling using Constraint Programming

Solution of a scheduling problem in an Oil Refinery Division

Goals:
- Simulation of an Oil Refinery Division
- Finding all feasible solutions
- Meeting all technical requirements
- Constraint scheduling methods
- Very fast computations
1.2 Organization of the Institute

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 e.g. 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

The research is centered on biologically inspired control and information technology, 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, hand shape and lines, 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, and in particular, learning algorithms, adaptive control, and multi-agent systems. Also, learning in neural networks and modeling granularity is investigated.
1.2 Organization of the Institute

Biometrics and Machine Learning Group

Biometrics
Handwritten signature-based identity verification

Verification of scanned signatures
- Integration of several independent methods of verification
- use of statistics, neural networks and Hidden Markov Models for signature features extraction
- Our solution give false acceptance rate of 12.5% with false rejection rate of 14.5%

Verification of on-line signatures
- signature as a multidimensional curve
- recognition based on handwriting dynamics, rather than paper image
- the use of neural networks, dynamic programming and time warping for classification purposes
- Our solution give false acceptance rate of 1% with false rejection rate of 1.9%

Biometrics and Machine Learning Group

Biometrics
Particle filter-based face tracking and identification

- reference object is stored as hue-saturation histogram in the HSV color space
- application of Condensation Tracking framework
- Bhattacharyya coefficient-based distance measure used to weight particles
- 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
1.2 Organization of the Institute

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

- Hiding information within biometric data
  - Analysis of information capacity for different biometric modalities
  - Implementation of cryptographic primitives for iris biometrics
  - Developing cryptographic schemes for secure biometric authentication
- Hardware implementations
  - Implementation for smart-cards
  - Implementation for USB-tokens
1.2 Organization of the Institute

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)

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.

Reinforcement Learning algorithms usually behave poorly when time discretization increases. As a remedy we propose piecewise non-Markov policies. We tested this approach using a simulated planar model of cheetah.
1.2 Organization of the Institute

Biometrics and Machine Learning Group

Machine Learning

Ant Routing (AR) is typically considered under UDP in the transport layer. We extended AR to work under TCP
- demands on the AR adaptation are higher
- range of load levels for AR is higher than for non-adaptive policies (Fig. below)
- statistics-based modifications of AR better use ant-collected information
- TCP versions more robust to packet reordering improve AR convergence (Fig. left below)

Biometrics and Machine Learning Group

Machine Learning

Reinforcement Learning and SWARM Intelligence in ad-hoc networks

- Highly dynamic environment
- Strong need for adaptive mechanisms to solve routing problems, topology control, QoS provisioning, etc.
- We propose a novel network information management together with Reinforcement Learning and Swarm based algorithms
- NS2 network simulator is used in experiments

Wide area of ad-hoc networks applications

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. 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.
### 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

#### Control architecture for autonomous mobile robot teams

- **Database Knowledge**
- **Mission Commands**
- **Simultaneous Planning, Localization & Mapping (SLAM)**
- **Robot Pose Global Map**
- **Cognition / Task Planning**
- **Environment Model Local Map**
- **Wireless communication WLAN, Bluetooth**
- **Path Execution**
- **Actuator Commands**
- **Acting**

**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)
**1.2 Organization of the Institute**

### Robot Programming and Pattern Recognition Group

**Road traffic analysis. Autonomous navigation.**

- Supported by the project IST-11250 OMNI ("Open Model For Network-wide Heterogeneous Intersection-based Transport Management", 2000-2003) an “intelligent” visual sensor system was developed that performs queue length measurement and car counting – for every road lane in the image.

- Computer-vision based car driver assistance – road tracking and obstacle detection.

### Robot Programming and Pattern Recognition Group

**2-D object recognition in digital images**

Car's license plate recognition:
- Automatic image region detection;
- Single symbol detection.
- Symbol classification.

Various 2-D object recognition: i.e. fingerprint images, cartographic objects.
1.2 Organization of the Institute

Robot Programming and Pattern Recognition Group

Blind separation of mixed signals

The "cocktail party" problem:
• Only mixtures of source signals can be acquired,
• The goal is to separate the original sources.

• Illustration of deconvolving 2-D image mixtures:

• Three convolved mixtures of three sources at the system’s input.

• Three deconvolved images at the output.

Robot Programming and Pattern Recognition Group

The recognition of Polish speech

The automatic recognition of Polish spoken words:

• Spectral analysis,
• Feature detection in signal frames,
• Sub-phoneme modeling,
• Frame classification,
• Model-based word recognition.

Example: low resolution spectral images acquired for four different expressions of the word "koniec".
CONTROL AND SOFTWARE ENGINEERING DIVISION

Division Head: Professor Piotr Tatjewski

Professors: Piotr Tatjewski, Krzysztof Sacha

Assistant Professors: Rafał Cegiela, Paweł Domański, Maciej Ławryńczuk, Piotr Marusak, Marcin Szlenk, Andrzej Zalewski

Senior Lecturers: Jerzy Gustowski, Zygmun Komor, Urszula Kręglewska

Senior Engineer: Włodzimierz Macewicz

Ph.D. Students: Ali Mhammed Benniran, Anna Felkner, P. Górczyński, Maciej Grula, Radosław Kacperczyk, Piotr Kaczyński, Andrzej Ratkowski, Marek Strzelczyk, Krzysztof Sztyber

Research of the division is conducted in 2 research groups:


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 on fuzzy systems, neural nets, and genetic algorithms. Theoretical considerations are combined with simulation analysis and investigations. Computer Control Systems Laboratory features laboratory-scale processes and is equipped with programmable controllers, industrial computers and workstations with software tools, including Matlab with Toolboxes and professional SCADA systems.
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


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
1.2 Organization of the Institute

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

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
Sensors diagnostic system
mathematical modeling and simulation of a gas turbine engine and sensors, sensors diagnostic system design based on neural networks

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. 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.
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

Real time systems

Research topics:
- System analysis and design
- System and software architecture
- Real time operating system
  - Task scheduling
  - Communication and synchronization
- Industrial networks
  - Devicebuses
  - Fieldbuses
- PLC controllers
  - Automatic program generation

Systems and tools:
- QNX, OS/9
- Proﬁbus
- Siemens Step 7

Analysis and Modeling

CASE Tools

Real Time system

Design and Implementation
Operations Research and Management Systems Division

Division Head: Professor Eugeniusz Toczyłowski
Professor: Eugeniusz Toczyłowski
Assistant Professors: Krzysztof Fleszar, Mariusz Kaleta, Krzysztof Pieńkosz, Grzegorz Płoszański, Tomasz Traczyk
Assistant: Izabela Żółtowska
Ph.D. Students: Zdzisław Dybikowski, Przemysław Kacprzak, Andrzej Midera, Piotr Palka, Mariusz Rogulski, Kamil Smolira

Research of the division is concerned with operation research and structural discrete optimization methods for control and management of discrete processes, including applications in the deregulated electric power industry, computer integrated manufacturing and educational systems. 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.
1.2 Organization of the Institute

Operations Research and Management Systems Division

**Designing of infrastructure markets under constraints**

decentralized market structure

- Seller (producer)
- Seller (broker)
- Seller
- Exchange
- Bilateral market
- Balancing market
- Real-time delivery
- Buyer (consumer)
- Buyer (broker)
- Buyer

Infrastructure (resources, constraints)

- Object and subject market structure
- Market rules designing
- Strategic and tactical market planning

- Real-time operational control
- Market operator decisions support tools
- XML-based description of market

Operations Research and Management Systems Division

**Electrical energy market – decisions support for players**

- Market prediction:
  - Prices
  - Demand
  - Daily load
- Own data:
  - Generation costs
  - Productive ability
  - Constraints
- Competition:
  - Power plants characteristics
  - Fuel delivery
  - Breakdowns

- AIM:
  - Profit maximization
  - Risk measure minimization

- Market state
  - Long term planning
  - Short term planning

- Hourly contracts positions
- Sale/buy offers

- Bilateral market
- Power Exchange
- Real-time market
- Local markets
Operations Research and Management Systems Division

Library catalogue digitization

- Skew correction
- Binarization
- Noise elimination
- Segmentation

C.88548

and their inter-conference held in

Framing

Recognition

C.88548
Optimization and Decision Support Division

Division Head: Professor Włodzimierz Ogryczak
Professors: Włodzimierz Ogryczak, Wiesław Traczyk
Assistant Professors: Janusz Granat, Jerzy Paczyński, Andrzej Stachurski
Senior Lecturers: Tadeusz Rogowski, Jerzy Sobczyk
Lecturer: Grzegorz Wójcik
Assistant: Tomasz Śliwiński
Ph.D. Students: Krzysztof Bareja, Cezary Chudzian, Piotr Górczyński, Bartosz Kozłowski, Adam Krzemienowski, Piotr Rzepakowski, Tomasz Strąbski

Research of the division 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.
1.2 Organization of the Institute

Optimization and Decision Support Division

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

- reference point
  - solution

Application of the reference point method to land resource assessment
### 1.3 Statistical Data

<table>
<thead>
<tr>
<th>FACULTY and STAFF</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>persons FTE</td>
<td>persons FTE</td>
<td>persons FTE</td>
</tr>
<tr>
<td><strong>Academic Staff</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>by titles/degrees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professors</td>
<td>4 (+1) 35.90 (+1.5)</td>
<td>4 (+2) 37.48 (+2)</td>
<td>4 (+2) 37.5 (+2)</td>
</tr>
<tr>
<td>D.Sc.-s</td>
<td>4 4</td>
<td>5 5</td>
<td>6 6</td>
</tr>
<tr>
<td>Ph.D.-s</td>
<td>22 (+1) 20 (+1)</td>
<td>24 (+2) 21 (+2)</td>
<td>24 (+2) 21 (+2)</td>
</tr>
<tr>
<td>M.Sc.-s</td>
<td>12 7.9</td>
<td>11 7.48</td>
<td>9 6.5</td>
</tr>
<tr>
<td>by positions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professors</td>
<td>8 8</td>
<td>9 9</td>
<td>9 9</td>
</tr>
<tr>
<td>Assistant Professors</td>
<td>21 (+1) 19 (+1)</td>
<td>21 (+2) 19 (+2)</td>
<td>22 (+2) 20 (+2)</td>
</tr>
<tr>
<td>Senior Lecturers</td>
<td>6 5</td>
<td>6 5</td>
<td>7 5.5</td>
</tr>
<tr>
<td>Lecturers</td>
<td>1 0.5</td>
<td>1 0.5</td>
<td>1 0.5</td>
</tr>
<tr>
<td>Assistants</td>
<td>6 3.4</td>
<td>7 3.98</td>
<td>4 2.5</td>
</tr>
<tr>
<td><strong>Ph.D. Students</strong></td>
<td>34</td>
<td>36</td>
<td>37</td>
</tr>
<tr>
<td><strong>Technical Staff</strong></td>
<td>4 3</td>
<td>3 2.5</td>
<td>3 2.5</td>
</tr>
<tr>
<td><strong>Administrative Staff</strong></td>
<td>6 5.5</td>
<td>6 5.5</td>
<td>6 5.5</td>
</tr>
</tbody>
</table>

*FTE* – Full Time Employment units,

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

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching activities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>standard teaching potential, hours</td>
<td>9 467</td>
<td>8 212</td>
<td>8 327.25</td>
</tr>
<tr>
<td># hours taught</td>
<td>13 030</td>
<td>15 914.5</td>
<td>15 341.51</td>
</tr>
<tr>
<td><strong>Degrees awarded</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.Sc.</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>M.Sc.</td>
<td>47</td>
<td>47</td>
<td>51</td>
</tr>
<tr>
<td>B.Sc.</td>
<td>53</td>
<td>40</td>
<td>53</td>
</tr>
<tr>
<td><strong>Research projects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>granted by WUT</td>
<td>9</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>granted by State institutions</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>granted by international institutions</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>other</td>
<td>3</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><strong>Reviewed publications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>monographs (authored or edited)</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>chapters in books</td>
<td>7</td>
<td>18</td>
<td>31</td>
</tr>
<tr>
<td>papers in journals</td>
<td>24</td>
<td>15</td>
<td>32</td>
</tr>
<tr>
<td>papers in conference proceedings</td>
<td>27</td>
<td>55</td>
<td>44</td>
</tr>
<tr>
<td><strong>Reports, abstracts and other papers</strong></td>
<td>16</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td><strong>Conferences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>participation (# of conferences)</td>
<td>23</td>
<td>33</td>
<td>40</td>
</tr>
<tr>
<td>participation (# of part. from ICCE)</td>
<td>43</td>
<td>52</td>
<td>73</td>
</tr>
</tbody>
</table>


1.3 Statistical Data

<table>
<thead>
<tr>
<th>RESOURCES</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Space (sq.m.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laboratories</td>
<td>585</td>
<td>585</td>
<td>585</td>
<td>585</td>
</tr>
<tr>
<td>library + seminar room</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>faculty offices</td>
<td>724</td>
<td>724</td>
<td>724</td>
<td>724</td>
</tr>
<tr>
<td><strong>Computers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>workstations*</td>
<td>14</td>
<td>14</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>personal computers*</td>
<td>245</td>
<td>245</td>
<td>165</td>
<td>269</td>
</tr>
<tr>
<td><strong>Library resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>books</td>
<td>4601</td>
<td>4683</td>
<td>4732</td>
<td>4814</td>
</tr>
<tr>
<td>booklets</td>
<td>1570</td>
<td>1684</td>
<td>1779</td>
<td>1885</td>
</tr>
<tr>
<td>journals subscribed</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

* 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, Associate Professors, 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, 2006.

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


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.


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.


*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.


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

Andrzej P. Wierzbicki  Professor (retired March 2004)  
Optimization and Decision Support Division 
room 24, tel. 6607750, 8255280 
A.Wierzbicki@ia.pw.edu.pl


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–).

the Scientific Council of Institute of System Research (IBS PAN) (since 1992). Member of the Committee of Automation and Robotics of Polish Academy of Sciences (PAN) (since 1970). 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.


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

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.

Rafał Cegiela  Assistant Professor (on leave since September 2006)

Control and Software Engineering Division, Software Engineering Group
room 555, tel. 22 234 7997
R.Cegiela@ia.pw.edu.pl, www.ia.pw.edu.pl/~rcugiela

M.Sc. 1996, Ph.D. 2001 from WUT.

With WUT since 2001. Member of Information Systems Audit and Control Association (ISACA)

Interests: Software engineering, formal methods, IT project management and system audit.
Adam Czajka  Assistant Professor (since April 2006, 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

With WUT since 2003. Assistant Professor at NASK Biometric Laboratories (2002–). Member of NASK Science Council (2006–). Member of IEEE (2002–). Secretary of the IEEE Poland Section (2006–)

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 (on leave since October 2005)

Operations Research and Management Systems Division
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

Optimization and Decision Support Division
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, chairmen 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 Research and Management Systems Division**

*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.


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/~karbowks

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


*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.

Wlodzimierz 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

**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.
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.
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.

Bartłomiej Kubica Assistant Professor (since September 2006)
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, queueing systems, probability, network management

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

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

Committee on Research (1996–1999), Director of the University Priority Research Program in Control, Information Technology, and Automation (PATIA) (1994–1999). Correspondent Member of the Polish Academy of Sciences (PAN) (since 1998), Member of the Warsaw Scientific Society (TNW), Member of Technical Sciences Group of the Ministry of National Education Expert Committee, Member of the Committee of Automation and Robotics of Polish Academy of Sciences (PAN), Vice Director (Research) of the Research and Academic Computer Network Institute (NASK), 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.

**Ewa Niewiadomska-Szynkiewicz** Assistant 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.*


**Interests:** Large scale systems, hierarchical control, computer simulation, computer aided control systems design, environmental systems management, decision support systems, distributed computations, global optimization, telecommunication systems.

**Włodzimierz Ogryczak** Professor (Head of Division)  
**Optimization and Decision Support Division**  
room 24, tel. 22 234 7750, 8255280  
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.*


**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


Jerzy Paczyński  Assistant Professor
Optimization and Decision Support Division
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.


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 Research and Management Systems Division
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 Płoszański  Assistant Professor
Operations Research and Management Systems Division
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.


interests: Control and simulation of discrete production systems, production management, quality management, library automation, text algorithms, information retrieval.
Tadeusz Rogowski  Senior Lecturer (part-time)

Optimization and Decision Support Division  
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).

Interests: Computer network, programming languages, operating systems.

Andrzej Rydzewski  Senior Lecturer

Systems Control Division, Robot Programming and Pattern Recognition Group  
room 566, tel. 22 234 7649  
A.Rydzewski@ia.pw.edu.pl

M.Sc. 1974 from WUT.
With WUT since 1974.

Interests: Design of digital systems and microprocessor-based control and measurement 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


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

Jerzy Sobczyk  Senior Lecturer (part-time)

Optimization and Decision Support Division  
room 519, tel. 22 234 7863  
J.Sobczyk@ia.pw.edu.pl, www.ia.pw.edu.pl/~jurek

M.Sc. 1985 from WUT.
With WUT since 1984. FEIT Network Administrator.

Interests: Computer networks, programming languages, parallel and distributed programming, multi-criteria optimization.
Andrzej Stachurski  Assistant Professor
Optimization and Decision Support Division
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.

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 (since July 2006)
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.

Cezary Szwed  Assistant Professor (until September 2006)
Operations Research and Management Systems Division
room 561, tel. 22 234 7123
C.Szwed@ia.pw.edu.pl

M.Sc. 1993 from WUT. Ph.D. 1999 from WUT.
With WUT since 1999. Member of Polish Electricity Association since 2004.

Interests: Operation research, timetabling, discrete optimization, combinatorial algorithms.

Wojciech Szynkiewicz  Assistant Professor
Systems Control Division, Robot Programming and Pattern Recognition Group
room 554, tel. 22 234 7866
W.Szynkiewicz@ia.pw.edu.pl

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

Interests: Robotics, multiple robots coordination, robot sensor-based manipulation and motion planning, autonomous navigation, real-time systems.
Piotr Tatjewski  Professor (Director of the Institute, Head of Division)

Control and Software Engineering Division, Control Engineering Group
room 521, 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


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

Eugeniusz Toczylowski  Professor (Head of Division)

Operations Research and Management Systems Division
room 516, tel. 22 234 7950
E.Toczylowski@ia.pw.edu.pl


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

Tomasz Traczyk  Assistant Professor (Deputy Director of the Institute since August 2005)

Operations Research and Management Systems Division
room 22/23, tel. 22 234 7750, 22 825 5280
T.Traczyk@ia.pw.edu.pl, www.ia.pw.edu.pl/~tttraczyk

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

With WUT since 1984.

Interests: Database management systems (DBMS), applications of DBMS in management and control, fourth generation languages, CASE methods, information systems, Web-based and distributed systems, XML language and its applications, variant configuration, software configuration management.
Wiesław Traczyk  Professor

Optimization and Decision Support Division
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.


Interests: Knowledge engineering, expert systems, artificial intelligence.

Michał Warchol  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, www.ia.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  Assistant Professor

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 Second-level Distance Learning (2005-).

Interests: Control of complex systems, servomechanisms, robot control, multi-criteria optimization, game theory, multiagent systems, 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 (Deputy Director of the Institute since September 2006, 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

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

2.3 Supporting Faculty and Staff

Adam Czajka  Assistant (until March 2006, 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  
(for CV see p. 33)

Adam Kozakiewicz  Assistant (since December 2006, part-time)  
Systems Control Division, Complex Systems Group  
room 573a, tel. 22 234 7860  
akozakie@ia.pw.edu.pl

M.Sc. 2001 from WUT.  
With WUT since 2006.  
Interests: Computer networks, distributed computation, network and systems security.
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

M.Sc. 1983 from WUT.
With WUT since 1983.

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

Marcin Szlenk  Assistant (part-time, until July 2006)
Control and Software Engineering Division, Software Engineering Group
room 556, tel. 22 234 7124
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.

Tomasz Śliwiński  Assistant (part-time)
Optimization and Decision Support Division
room 26, tel. 22 234 7862
T.Sliwinski@ia.pw.edu.pl

M.Sc. 2000 from WUT
With WUT since 2004

Interests: Discrete optimisation, operations research, decision support.

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

M.Sc. 2— from WUT
With WUT since 2004

Interests: Robot control systems, artificial intelligence.

Grzegorz Wójcik  Lecturer (part-time)
Optimization and Decision Support Division
room 519, tel. 22 234 7863
G.Wojcik@ia.pw.edu.pl, www.ia.pw.edu.pl/~grzesio

M.Sc. 1994 from WUT.

Interests: Computer networks management, information systems.
Izabela Żółtowska Assistant (part-time) Operations Research and Management Systems Division room 526, tel. 22 234 7125 
I.Zoltowska@elka.pw.edu.pl, home.elka.pw.edu.pl/~imilenko

M.Sc. 2000 from WUT.
With WUT since 2005.
Interests: Operations, planning and economics of electric energy systems, optimization theory and its applications.

2.4 Ph.D. Students

Bartłomiej Anszperger Ph.D. Student (until March 2006) 
Systems Control Division, Complex Systems Group

Supervisor: Krzysztof Malinowski

Krzysztof Bareja Ph.D. Student (since October 2006) 
Optimization and Decision Support Division 
room 556, tel. 22 234 7124 
K.Bareja@elka.pw.edu.pl

Supervisor: Włodzimierz Ogryczak

Jacek Błaszczyk Ph.D. Student 
Systems Control Division, Complex Systems Group 
room 573a, tel. 22 234 7860 
J.Blaszczyk@ia.pw.edu.pl

Supervisor: Krzysztof Malinowski

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

Supervisor: Andrzej Pacut

Cezary Chudzian Ph.D. Student 
Optimization and Decision Support Division 
C.Chudzian@elka.pw.edu.pl

Supervisor: Wiesław Traczyk

Zdzisław Dybikowski Ph.D. Student 
Operations Research and Management Systems Division 
room 526, tel. 22 234 7125 
Z.Dybikowski@elka.pw.edu.pl

Supervisor: Eugeniusz Toczyłowski
Anna Felkner  Ph.D. Student
Control and Software Engineering Division, Software Engineering Group
room 556, tel. 22 234 7124
A.Felkner@elka.pw.edu.pl

Supervisor: Krzysztof Sacha

Małgorzata Gadomska  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

Piotr Górczyński  Ph.D. Student
Optimization and Decision Support Division
room 556, tel. 22 234 7124
P.Gorczynski@ia.pw.edu.pl

Supervisor: Andrzej P. Wierzbicki

Maciej Grula  Ph.D. Student (since October 2006)
Control and Software Engineering Division, Software Engineering Group
room 556, tel. 22 234 7124
M.Grula@elka.pw.edu.pl

Supervisor: Krzysztof Sacha

Andrzej Igielski  Ph.D. Student
Systems Control Division, Biometrics and Machine Learning Group
room 572a, tel. 22 234 7120
A.Igielski@elka.pw.edu.pl

Supervisor: Andrzej Pacut

Radosław Kacperczyk  Ph.D. Student (until February 2006)
Control and Software Engineering Division, Software Engineering Group
room 556, tel. 22 234 7124
R.Kacperczyk@ia.pw.edu.pl, until March 2006

Supervisor: Krzysztof Sacha

Przemysław Kacprzak  Ph.D. Student
Operations Research and Management Systems Division
room 526, tel. 22 234 7125
P.Kacprzak@ia.pw.edu.pl

Supervisor: Eugeniusz Toczyłowski

Piotr Kaczyński  Ph.D. Student (since October 2006)
Control and Software Engineering Division, Control Engineering Group
room 567, tel. 22 234 7673
P.Kaczynski@elka.pw.edu.pl

Supervisor: Piotr Tatjewski
Michał Karpowicz Ph.D. Student
Systems Control Division, Complex Systems Group
room 573a, tel. 22 234 7860
M.Karpowicz@ia.pw.edu.pl

Supervisor: Krzysztof Malinowski

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

Adam Kozakiewicz Ph.D. Student (until February 2006)
Systems Control Division, Complex Systems Group
room 573a, tel. 22 234 7860
akozakie@ia.pw.edu.pl

Supervisor: Krzysztof Malinowski

Bartosz Kozłowski Ph.D. Student
Optimization and Decision Support Division
room 556, tel. 22 234 7124

Supervisor: Włodzimierz Ogryczak

Adam Krzemienowski Ph.D. Student (until February 2006)
Optimization and Decision Support Division
room 556, tel. 22 234 7124
akrzemie@ia.pw.edu.pl

Supervisor: Włodzimierz Ogryczak

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

Piotr Kwaśniewski Ph.D. Student (since October 2006)
Systems Control Division, Complex Systems Group
room 573a, tel. 22 234 7860
P.Kwasniewski@elka.pw.edu.pl

Supervisor: Krzysztof Malinowski

Marek Majchrowski Ph.D. Student (since October 2006)
Systems Control Division, Robot Programming and Pattern Recognition Group
room 012, tel. 22 234 7117
M.Majchrowski@elka.pw.edu.pl

Supervisor: Cezary Zieliński
Andrzej Midera Ph.D. Student
Operations Research and Management Systems Division
room 526, tel. 22 234 7125
A.Midera@ia.pw.edu.pl

Supervisor: Eugeniusz Toczyłowski

Roman Bartosz Nowicki Ph.D. Student
Systems Control Division, Biometrics and Machine Learning Group
room 572a, tel. 22 234 7120

Supervisor: Andrzej Pacut

Fumio Adam Okazaki Ph.D. Student
Systems Control Division, Robot Programming and Pattern Recognition Group
room 556, tel. 22 234 7124
A.Okazaki@elka.pw.edu.pl

Supervisor: Włodzimierz Kasprzak

Piotr Pałka Ph.D. Student
Operations Research and Management Systems Division
room 526, tel. 22 234 7125
P.Palka@ia.pw.edu.pl

Supervisor: Eugeniusz Toczyłowski

Michał Pawluk Ph.D. Student
Systems Control Division, Robot Programming and Pattern Recognition Group
room 012, tel. 22 234 7117
mpawluk@elka.pw.edu.pl, www.ia.pw.edu.pl/~robotyka

Supervisor: Cezary Zieliński

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

Mariusz Rogulski Ph.D. Student (until September 2006)
Operations Research and Management Systems Division
room 526, tel. 22 234 7125
M.Rogulski@ia.pw.edu.pl

Supervisor: Eugeniusz Toczyłowski
Piotr Rzepakowski Ph.D. Student (since October 2006)  
**Optimization and Decision Support Division**  
room 556, tel. 22 234 7124  
P.Rzepakowski@elka.pw.edu.pl

*Supervisor:* Włodzimierz Ogryczak

**Andrzej Sikora** Ph.D. Student  
**Systems Control Division, Complex Systems Group**  
room 573, tel. 22 234 7126  
A.Sikora@ia.pw.edu.pl

*Supervisor:* Krzysztof Malinowski

**Kamil Smolira** Ph.D. Student  
**Operations Research and Management Systems Division**  
room 526, tel. 22 234 7125  
K.Smolira@elka.pw.edu.pl

*Supervisor:* Eugeniusz Toczyłowski

**Maciej Staniak** Ph.D. Student  
**Systems Control Division, Robot Programming and Pattern Recognition Group**  
room 012, tel. 22 234 7117  
M.Staniak@ia.pw.edu.pl

*Supervisor:* Cezary Zieliński

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

*Supervisor:* Andrzej Pacut

**Tomasz Strąbski** Ph.D. Student  
**Optimization and Decision Support Division**

*Supervisor:* Włodzimierz Ogryczak

**Marek Strzelczyk** Ph.D. Student (until September 2006)  
**Control and Software Engineering Division, Control Engineering Group**  
room 567, tel. 22 234 7673  
M.Strzelczyk@elka.pw.edu.pl

*Supervisor:* Piotr Tatjewski

**Przemysław 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
Krzysztof Sztyber  Ph.D. Student
Control and Software Engineering Division, Control Engineering Group
room 567, tel. 22 234 7673
K. Sztyber@ia.pw.edu.pl

Supervisor: Piotr Tatjewski

Piotr Trojanek  Ph.D. Student (since October 2006)
Systems Control Division, Robot Programming and Pattern Recognition Group
room 012, tel. 22 234 7117
P.Trojanek@elka.pw.edu.pl

Supervisor: Cezary Zieliński

Rafał Wardziński  Ph.D. Student
Systems Control Division, Biometrics and Machine Learning Group
room 518a, tel. 22 234 7805
rafal@elka.pw.edu.pl

Supervisor: Andrzej Pacut

Artur Wilkowski  Ph.D. Student
Systems Control Division, Robot Programming and Pattern Recognition Group
room 556, tel. 22 234 7124
A.Wilkowski@elka.pw.edu.pl

Supervisor: Włodzimierz Kasprzak

Tomasz Winiarski  Ph.D. Student
Systems Control Division, Robot Programming and Pattern Recognition Group
room 012, tel. 22 234 7117
T.Winiarski@ia.pw.edu.pl

Supervisor: Cezary Zieliński

2.5 Administrative and Technical Staff

Elżbieta Głowacka  Secretary, Student affairs.
room 23, tel. 22 234 7750, 22 825 5280
E.Głowacka@ia.pw.edu.pl

Maria Graszka  Office support.
room 23, tel. 22 234 7750, 22 825 5280
M.Graszka@ia.pw.edu.pl

Małgorzata Jaworska  Finances support (until March 2006, part-time).
room 563, tel. 22 234 7122
M.Jaworska@ia.pw.edu.pl

M.Sc. 2001 from Łódź University.

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 Niedbało  Office support (part-time).

Jadwiga Osowska  Manager, Finances.

Agnieszka Paprocka  Finances Support (since October 2006, part-time).

Ryszard Tchórz  Technical support.

Beata Woźniak  Manager, Administration.

M.Sc. 1975 from WUT.

M.Sc. 1993 from Warsaw University.
### 3 Teaching Activities – Academic Year 2005/2006

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Course code</th>
<th>Hours per week</th>
<th>Class</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration of UNIX and TCP/IP</td>
<td>ASU</td>
<td>2 – 2</td>
<td>OSK, OT</td>
<td>J. Sobczyk (spring)</td>
</tr>
<tr>
<td>Algorithms and Data Structures</td>
<td>AISD1</td>
<td>2 – 1</td>
<td>sem. 3</td>
<td>A. Zalewski (spring)</td>
</tr>
<tr>
<td>Commercial Data Bases 2</td>
<td>KBD2</td>
<td>2 – 2</td>
<td>BDSI, OT</td>
<td>T. Traczyk (spring)</td>
</tr>
<tr>
<td>Computer Networks</td>
<td>ECONE</td>
<td>2 1 1</td>
<td>ANGL, OT</td>
<td>J. Sobczyk (spring)</td>
</tr>
<tr>
<td>Computer Networks (I)</td>
<td>SKM</td>
<td>2 – 1 1</td>
<td>SKOR, OT</td>
<td>J. Sobczyk (fall)</td>
</tr>
<tr>
<td>Control</td>
<td>ECONT</td>
<td>2 1 1</td>
<td>ANGL, OT</td>
<td>R. Ładziński (spring)</td>
</tr>
<tr>
<td>Data Bases 2</td>
<td>BD2</td>
<td>2 – 1 1</td>
<td>BDSI, OT</td>
<td>T. Traczyk</td>
</tr>
<tr>
<td>Decision Support</td>
<td>WDEC</td>
<td>2 – 2</td>
<td>MKPWD, OT, PP-SID</td>
<td>J. Granat</td>
</tr>
<tr>
<td>Decisions Under Competition Circumstances</td>
<td>DWW</td>
<td>2 – 1</td>
<td>MKPWD, OT, PZ-PZ-I, PZ-SID</td>
<td>A. Woźniak (spring)</td>
</tr>
<tr>
<td>Decision Support Under Risk Conditions</td>
<td>WDWR</td>
<td>2 – 1</td>
<td>PZ-I, OT</td>
<td>W. Ogryczak (spring)</td>
</tr>
<tr>
<td>Digital Circuits</td>
<td>EDC1</td>
<td>2 – 2</td>
<td>ANGL</td>
<td>C. Zieliński (spring)</td>
</tr>
<tr>
<td>Discrete and Network Optimisation</td>
<td>ODS</td>
<td>2 – 1</td>
<td>PZ-I, PZ-A, PZ-O, OT</td>
<td>E. Toczyłowski (fall)</td>
</tr>
<tr>
<td>Distributed Operating Systems</td>
<td>RSO</td>
<td>2 – 1</td>
<td>PZ, OT, PZ-I, PZ-SID, PZ-ISI</td>
<td>T. Kruk (spring)</td>
</tr>
<tr>
<td>Dynamic Systems</td>
<td>EDYSY</td>
<td>2 – 2</td>
<td>ANGL, OT</td>
<td>R. Ładziński (fall)</td>
</tr>
<tr>
<td>Event Programming (I)</td>
<td>PROZ</td>
<td>2 – 1</td>
<td>ATP, OT</td>
<td>W. Kasprzak (fall)</td>
</tr>
<tr>
<td>Fundamentals of Control Systems</td>
<td>PSTE</td>
<td>2 – 1</td>
<td>sem. 4</td>
<td>P. Tatjewski (spring)</td>
</tr>
<tr>
<td>Fundamentals of Digital Technology</td>
<td>PTCY</td>
<td>2 – 2</td>
<td>sem. 2</td>
<td>K. Pieńkosz (fall)</td>
</tr>
<tr>
<td>Fundamentals of Operation Research</td>
<td>POBO</td>
<td>2 – 1</td>
<td>sem. 4</td>
<td>G. Płoszajski (fall)</td>
</tr>
<tr>
<td>Fundamentals of Optimization</td>
<td>POPTY</td>
<td>2 – 2</td>
<td>MKPWD, OT</td>
<td>A. Stachurski</td>
</tr>
<tr>
<td>Fundamentals of Parallel Computation</td>
<td>PORR</td>
<td>2 – 2</td>
<td>SKOR, PZ-A, PZ-I</td>
<td>A. Karbowski</td>
</tr>
<tr>
<td>Fundamentals of Programming</td>
<td>PRI</td>
<td>2 1 2</td>
<td>sem. 1</td>
<td>J. Paczyński (spring)</td>
</tr>
<tr>
<td>Image and Speech Recognition</td>
<td>EIASR</td>
<td>2 1 1</td>
<td>ANGL, OT</td>
<td>W. Kasprzak (fall)</td>
</tr>
<tr>
<td>Image and Speech Recognition</td>
<td>ROSM</td>
<td>2 – 1</td>
<td>PZ-P, ISO, OT, MUS</td>
<td>W. Kasprzak (fall)</td>
</tr>
<tr>
<td>Information Project Management</td>
<td>ZPI</td>
<td>2 – 1</td>
<td>BDSI, OT</td>
<td>K. Pieńkosz</td>
</tr>
<tr>
<td>Intelligent Robot Systems</td>
<td>ISR</td>
<td>2 – 1</td>
<td>MUS, PZ-A, PZ-SID, OT</td>
<td>C. Zieliński (spring)</td>
</tr>
<tr>
<td>Introduction to Robotics</td>
<td>WR</td>
<td>2 – 2</td>
<td>MUS, SCRJC,OT</td>
<td>W. Szykiewicz</td>
</tr>
<tr>
<td>Knowledge Engineering</td>
<td>IW</td>
<td>2 – 1</td>
<td>ISO, OT</td>
<td>W. Traczyk</td>
</tr>
<tr>
<td>Methods of Artificial Intelligence</td>
<td>MSI</td>
<td>2 – 1</td>
<td>ISO, PZ-P, PZ-O</td>
<td>C. Zieliński, A.Pacut</td>
</tr>
<tr>
<td>Numerical Methods (J)</td>
<td>MNUM</td>
<td>2 – 1</td>
<td>PSTER, OT</td>
<td>P. Tatjewski</td>
</tr>
<tr>
<td>Numerical Methods</td>
<td>ENUME</td>
<td>2 – 2</td>
<td>ANGL, OT</td>
<td>P. Tatjewski (spring)</td>
</tr>
<tr>
<td>Object Oriented Programming</td>
<td>PROBE</td>
<td>2 – 2</td>
<td>sem. 2</td>
<td>W. Kasprzak (fall)</td>
</tr>
<tr>
<td>Operating System</td>
<td>EOOPSY</td>
<td>2 1 1</td>
<td>ANGL, OT</td>
<td>T. Kruk (fall)</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>IOP</td>
<td>2 – 1</td>
<td>OSK, OT</td>
<td>K. Sacha</td>
</tr>
<tr>
<td>Software Specification and Design</td>
<td>SPOP</td>
<td>2 – 1</td>
<td>OSK, PZ-SID, PZ-I, OT</td>
<td>K. Sacha</td>
</tr>
<tr>
<td>Management IT Systems</td>
<td>SIZ</td>
<td>2 – 2</td>
<td>MKPWD, OT</td>
<td>J. Granat</td>
</tr>
<tr>
<td>Microcomputer Systems</td>
<td>SMK</td>
<td>2 – 1</td>
<td>SYK, OT</td>
<td>A. Rydzewski (spring)</td>
</tr>
<tr>
<td>Neural Networks</td>
<td>SNR</td>
<td>2 – 1</td>
<td>ISO, PZ, PZ-I, PZ-SID, OT</td>
<td>A. Pacut (spring)</td>
</tr>
<tr>
<td>Course Title</td>
<td>Course code</td>
<td>Hours per week</td>
<td>Class</td>
<td>Lecturer</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------</td>
<td>----------------</td>
<td>------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Operating Systems</td>
<td>SOI</td>
<td>2 – 2</td>
<td>OSK, OT</td>
<td>T. Kruk (fall)</td>
</tr>
<tr>
<td>Optimization and Decision Support</td>
<td>OWD</td>
<td>2 – 1</td>
<td>PZ-A, PZ-I, OT</td>
<td>W. Ogryczak (spring)</td>
</tr>
<tr>
<td>Parallel Numerical Methods</td>
<td>EPNM</td>
<td>2 – 2</td>
<td>ANGL., OT</td>
<td>A. Stachurski (fall)</td>
</tr>
<tr>
<td>Principles of Computer Science</td>
<td>EFCOS</td>
<td>2 – 2</td>
<td>ANGL., OT</td>
<td>W. Kasprzak (fall)</td>
</tr>
<tr>
<td>Process Automation Techniques</td>
<td>TAP</td>
<td>2 – 1</td>
<td>MUS, PZ-A, OT</td>
<td>P. Tatjewski (fall)</td>
</tr>
<tr>
<td>Process Control</td>
<td>STP</td>
<td>2 1 – 1</td>
<td>PSTER, OT, SCRJC</td>
<td>P. Tatjewski</td>
</tr>
<tr>
<td>Process Management and Scheduling</td>
<td>ZAH</td>
<td>2 – 2</td>
<td>MKPWD, OT, MUS, PP-SID</td>
<td>E. Toczyłowski (spring)</td>
</tr>
<tr>
<td>Programmable Controllers</td>
<td>SP</td>
<td>2 – 1</td>
<td>MUS, OT</td>
<td>J. Gustowski (spring)</td>
</tr>
<tr>
<td>Programming 1</td>
<td>EPRO1</td>
<td>2 1 1</td>
<td>ANGL, OT</td>
<td>J. Paczyński (fall)</td>
</tr>
<tr>
<td>Programming 2</td>
<td>EPRO2</td>
<td>2 – 2</td>
<td>ANGL, OT</td>
<td>A. Stachurski (fall)</td>
</tr>
<tr>
<td>Real-time Systems</td>
<td>SCZR</td>
<td>2 – 2</td>
<td>PSTER, OT</td>
<td>K. Sacha</td>
</tr>
<tr>
<td>Synthesis of Decision Rules</td>
<td>SRD</td>
<td>2 – 2</td>
<td>MKPWD, MUS, OT, PP-SID</td>
<td>K. Malinowski (spring)</td>
</tr>
<tr>
<td>Theory of Optimization</td>
<td>TOP</td>
<td>2 – 1</td>
<td>MKPWD, PZ-P, OT</td>
<td>W. Ogryczak (fall)</td>
</tr>
<tr>
<td>Uncertainty, Modeling, and Prediction</td>
<td>POZ</td>
<td>2 – 1</td>
<td>MUS, OT, PP-SID</td>
<td>A. Pacut (fall)</td>
</tr>
</tbody>
</table>

**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).

**Semester**

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


The objective of EURON (European Robotics Network) is the implementation and maintenance of a network of excellence within the 6th Framework Programme that enables the coordination of research and education, fosters the collaboration between academic and industrial institutions, encourages publications and conferences in the area of robotics. The aim is to provide the foundation that allows Europe to remain at the forefront of robotics both in terms of research and industrial products.


The primary goal of this project was to develop a prototype version of a four-legged walking machine. The robot was designed and assembled from readily available components. The mechanical part – comprised of a central body and four legs – was constructed out of aluminium for the strength to weight ratio of the material. Each leg has three degrees of freedom actuated by three servo motors, thus the total degrees of freedom of the robot is twelve. The robot controller hardware is based mainly on FPGA modules and a single-board RISC microcontroller. This prototype has progressed through the design and fabrication stages of development, and is currently in the early stages of testing.


The research project was jointly performed by two research groups - one from the Institute of Control and Computation Engineering (ICCE) and one from the Institute of Telecommunications (ITele). The main motivation of this project was to equip robot agents with intelligent speech sensor and actuator capabilities. Our group from ICCE was engaged in the subject „Speech feature detection and coding in speech analysis”. The group from ITele elaborated the subject: “Corpus speech synthesis of polish speech”. We decided to apply the so called “mel cepstral coefficients” (MFCC) as the basis for our speech features. The feature vector consists of 26 coefficients, with 12 MFCC coefficients, one energy coefficients and 13 corresponding gradient coefficients. We have tested different combinations of MFCC -, energy- and gradients features to find the optimum set, by comparing command recognition qualities if applying different feature vectors. The next task was to make the features nearly speaker-independent. We studied the dependence of different phonemes from basic speaker frequency, so called F0. An appropriate feature normalisation scheme was proposed. Finally, a two-step clustering and vector quantization algorithm was proposed. In the first step the feature set is clustered into an exhaustive set of acoustic classes (corresponding to tri-phones), and their representatives are detected. In the second step, an integration of phonetic descriptions of speech samples, made by a human expert, with these acoustic classes is performed. Both speech
synthesis and speech analysis algorithms have been implemented in a C++ programming environment and they have been installed in the robot programming environment MRROC++ at ICCE.


The aim of the project was to continue research on algorithms for dynamic optimization of large-scale problems supporting completion of advanced PhD thesis. In particular, method of sequential quadratic programming (SQP) with many replaceable modules (different quadratic programming solvers, matrix solvers and Hessian approximations) and method of nonlinear interior point based on utilisation of general purpose open source nonlinear programming (NLP) solver IPOPT were implemented in object oriented C++ library for solution of discrete-time optimal control problems, called OCT (Optimal Control Toolbox). The effectiveness and robustness of both mentioned algorithms have been carefully tested and compared using performance profiles methodology on significant set of optimal control test problems with large number of decision variables.


The goal of the project was to develop models and algorithms for a group of difficult discrete optimization problems. The approach is based on a structural analysis of the problems towards application of Danzig-Wolfe decomposition and column generation scheme together with other optimisation algorithms. Effective solution procedures were found for such problems as: solving linear programs with the ordered weighted averaging objective, resource allocation with max-min fairness for multicommodity network flows, unit commitment for power generation, scheduling multiple items of different types on a single flexible flow line and preemptive jobs scheduling on parallel machines with setup times and renewable resources.


The goal of the research is to develop structures and algorithms of multipurpose predictive control, in particular concerning optimizing predictive control and control in reconfigurable structures. The first topic concerns a case when dynamics of disturbances (uncontrolled process inputs) is comparable with dynamics of the controlled process, thus making classical multilayer approach not efficient. Closer cooperation or even integration of regulatory control and current set-point optimization is the subject of the research. The second topic is to develop design procedures leading to multipurpose reconfigurable predictive control, when both structure and parameters of the controller can be on-line adopted to the changes in control targets and/or external influences. The hierarchical approach is considered, with an intelligent supervisory unit. Related practically important case is when reconfiguration is triggered by occurrence of faults, leading to the design of fault-tolerant control systems. Versatility in formulation of predictive control algorithms makes on-line changes in their structure and parameters possible, adopting to the current process situation.

Andrzej Rydzewski, Tomasz Winiarski, Maciej Staniak, Fumio Adam Okazaki, Krzysztof Mianowski (IAEAM), Marek Wojtyra (IAEAM), Witold Czajewski (ISEP).

The general objective of the grant was to create a service robot. Unlike industrial robots that operate in factories, hence in very structured environments and with very little interaction with human beings, service robots will have to operate in unstructured and to a certain extent unpredictable human ambient, moreover frequently interacting with people. To operate efficiently in such conditions service robots will have to possess similar capabilities that human beings have. Their sensing capabilities will have to include: vision, touch, feeling of exerted force and hearing. They must have that ability of two-handed dexterous manipulation. Last but not least, they must be highly reactive to sudden changes in the environment and be capable of reasoning, i.e. creation of action plans leading to the execution of the task at hand. Integration of all of the above components into a single complex system requires both adequate programming tools (e.g. a robot programming framework) and theoretical investigations showing what should be the proper structure of such a system. The operation of the constructed system was validated on the task of solving a Rubik's cube handed over by an operator.


The goal of the research is to develop theory and techniques concerned with quantitative analysis and decision support at the strategic, tactical and operational level of fair resource (or cost) allocation in various systems. Techniques for inequality measurement and equitable optimization algorithms as well as their use in decision support process represent the main algorithmic focus while the fairness of costs or profits allocation procedures within complex systems is major modeling issue of the research within ICCE. Fairness problems related to the telecommunication network design are analyzed by researchers from IT.


The research provides optimization models that support thermal units scheduling and generation planning for energy producers operating in an electricity spot market. The models take into consideration possibility of submitting hourly block bids in a sequence of auctions that constitute the spot market, the uncertain energy prices and the thermal units production costs and technical constrains, as well as the financial and physical contracted obligations. Several multicriteria stochastic optimization models that consider producer’s risk aversion degree were formulated: thermal units scheduling model, generation bidding model, aggregated scheduling model. Also a new model for determining the social welfare distribution for the multiperiod auction in the context of solving the unit commitment problems is formulated.

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 analyses 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 modelling, simulation, prediction and decision support concerned with flood management in the agglomeration of Warsaw.


The purpose of the project is to consider a security constrained balancing problem for joint balancing of the electric power and regulation reserves under presence of the security constraints, where the detailed requirements for transmission reserves in the distributed power network are directly taken into account. There are developed approximate optimization methods that provide efficient and fast solutions for this security constrained balancing problem.

5 Degrees Awarded

5.1 D.Sc. Degrees

EWAA NIEWIADOMSKA-SZYNKIEWICZ
_Symulacja komputerowa w analizie i projektowaniu złożonych systemów sterowania_
Degree awarded on June 26, 2006

5.2 Ph.D. Degrees

Advisor: Eugeniusz Toczyłowski

IZABELA ŹÓŁTOWSKA
_Modele optymalizacyjne wspomagania decyzji wytwórców na rynku energii elektrycznej_
Degree awarded on December 19, 2006 (with honors)

Advisor: Andrzej P. Wierzbicki

SYLWESTER ŁASKOWSKI
_Wspomaganie procesu ustalania cen detalicznych i negocjacji stawek rozliczeniowych na konkurencyjnym rynku usług telekomunikacyjnych_
Degree awarded on June 27, 2006

Advisor: Piotr Tatjewski

SEBASTIAN PŁAMOWSKI
_Wdrażanie zaawansowanych układów regulacji w strukturze przełączanej_
Degree awarded on June 27, 2006

Advisor: Krzysztof Malinowski

BARTŁOMIEJ KUBICA
_Optimization of Admission Control for Systems with Uncertain Parameters_
Degree awarded on April 25, 2006

Advisor: Krzysztof Sacha

MARCIN SZLENK
_Formalna semantyka i wnioskowanie o pojęciowym diagramie klas w UML_
Degree awarded on March 28, 2006
6 Publications

6.1 Monographs


6.2 Chapters in Scientific or Technical Books


### 6.3 Scientific and Technical Papers in Journals


6.4 Scientific and Technical Papers in Conference Proceedings


6.4 Scientific and Technical Papers in Conference Proceedings


6.5 Abstracts


6.6 Reports and Other Papers


