

INSTITUTE OF CONTROL
AND COMPUTATION ENGINEERING

2003 ANNUAL REPORT



WARSAW UNIVERSITY OF TECHNOLOGY
FACULTY OF ELECTRONICS AND INFORMATION TECHNOLOGY
INSTITUTE OF CONTROL AND COMPUTATION ENGINEERING
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From the Director

The Institute of Control and Computation Engineering (ICCE, 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 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 staff and students towards computational and algorithmic aspects of control, decision support, man-machine interfacing, etc. This resulted in creation of new educational profiles offered by the Institute and a change of its name to the present one in 1994. Professor Władysław Findeisen has been the Director of the Institute until he was elected the Rector of the Warsaw University of Technology in 1981. His achievements were recognized worldwide. He is Doctor Honoris Causa of the City University London, Warsaw University of Technology, Technical University of Gdańsk, and Technical University of Ilmenau.

The Institute offers educational possibilities in a broad area of information technology for control and decision support systems, at three levels of education. At the first level (equivalent to B.Sc.) the degree program combining courses from areas of computer science and control is offered. Two M.Sc. degree programs are offered, namely in Computer Science and in Control Systems. We are also proud to be able to offer interesting possibilities to our postgraduates for continuation of their study and research towards Ph.D.

Certainly, research is a very important part of our staff activities, directly affecting both 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 faculty and staff of the Institute for their efforts and contributions to our achievements in teaching and research. In particular, I would like to compliment Dr. Włodzimierz Kasprzak, who was awarded a prize of Ministry of National Education and Sport for his habilitation (D.Sc. thesis), Dr. Paweł Domański and Dr. Michał Warchoł who were awarded the Second Award for Exceptional National Scientific – Technical Achievement. The author of this note has been awarded a prize of Ministry of National Education for the book “Advanced Control of Industrial Processes – Structures and Algorithms”.

I would like to express my gratitude to all our partners, and in particular to our partners from abroad actively participating in international research programs. We will appreciate a feedback from our partners concerning our activities and this report itself. We will 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

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1 General Information

1.1 Board of Directors

Professor Piotr Tatjewski, Director
 Professor Andrzej Pacut, Deputy Director for Research
 Dr. Jerzy Paczyński, Deputy Director for Academic Affairs

1.2 Organization of the Institute

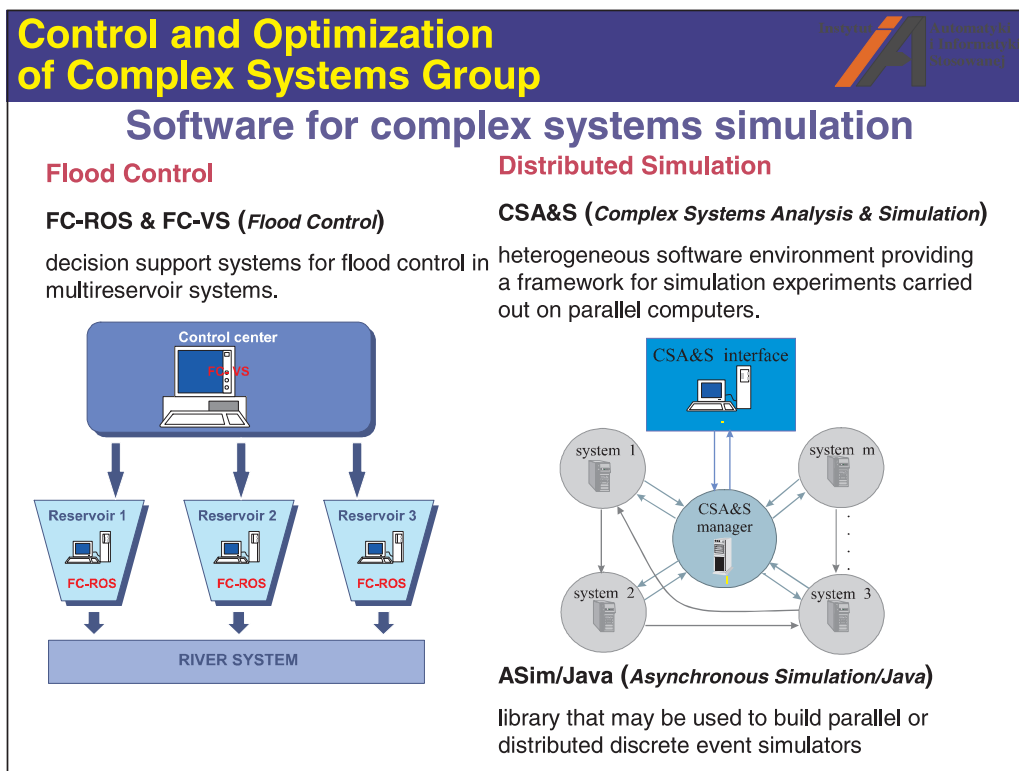
CONTROL AND SYSTEMS DIVISION

<i>Division Head:</i>	Professor Krzysztof Malinowski
<i>Professors:</i>	Krzysztof Malinowski, Andrzej Pacut, Krzysztof Sacha, Piotr Tatjewski, Cezary Zieliński
<i>Professors, retired:</i>	Władysław Findeisen, Anatol Gosiewski, Radosław Ładziński, Jacek Szymanowski
<i>Assistant Professors:</i>	Rafał Cegieła, Paweł Domański (part time), Andrzej Karbowski, Włodzimierz Kasprzak, Tomasz J. Kruk, Piotr Marusak (since October 2003), Ewa Niewiadomska-Szynkiewicz, Stefan Romicki, Wojciech Szynkiewicz, Michał Warchoń, Adam Woźniak, Andrzej Zalewski (since April 2003)
<i>Senior Lecturers:</i>	Jerzy Gustowski, Urszula Kręglewska, Zygmunt Komor, Andrzej Rydzewski
<i>Assistants:</i>	Piotr Arabas (part-time), Adam Czajka (since October 2003, part time), Mariusz Kamola (part-time), Maciej Ławryńczuk (since March 2003), Piotr Marusak (until September 2003)
<i>Senior Engineers:</i>	Włodzimierz Macewicz, Piotr Misiurewicz (until June 2003), Jerzy Pułaczewski (until September 2003)
<i>Ph.D. Students:</i>	Jacek Błaszczyk, Jarosław Chrobak, Adam Czajka, Marcin Jankowski (until October 2003), Przemysław Jaskóła, Radosław Kacperczyk, Adam Kozakiewicz, Bartłomiej Kubica, Rafał Lewczuk, Maciej Ławryńczuk, Przemysław Magiera (until November 2003), Michał Andrzej Malarski, Marek Małowidzki, Fumio Adam Okazaki, Sebastian Plamowski, Marek Publicewicz, Robert Seta, Andrzej Sikora, Ewa Snitkowska, Jarosław Sobieszek, Marek Strzelczyk, Maciej Staniak, Marcin Szlenk, Krzysztof Szyber, Karol Wawrzyniak, Paweł Wawrzyński, Tomasz Winiarski


Research of the division is conducted in 4 research groups:

Control and Optimization of Complex Systems Group (K. Malinowski, A. Karbowski, E. Niewiadomska-Szynkiewicz, A. Pacut, M. Warchoł, A. Woźniak, P. Arabas, A. Czajka, M. Kamola, J. Błaszczak, J. Chrobak, P. Jaskóła, A. Kozakiewicz, B. Kubica, P. Magiera, M. Małowidzki, M. Publicewicz, A. Sikora, J. Sobieszek, K. Wawrzyniak, P. Wawrzyński)

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 biometric identification.



Control and Optimization of 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

Control and Optimization of Complex Systems Group

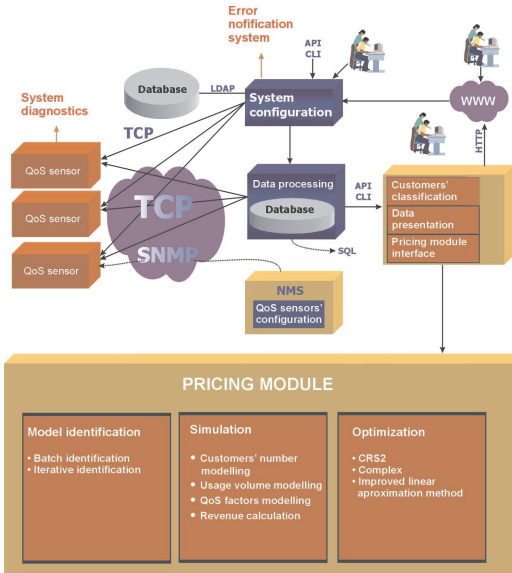


QOSIPS System

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

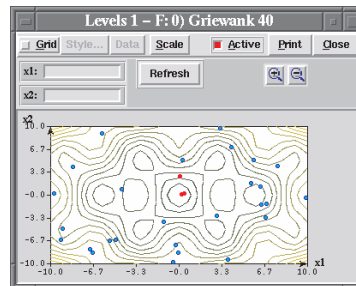
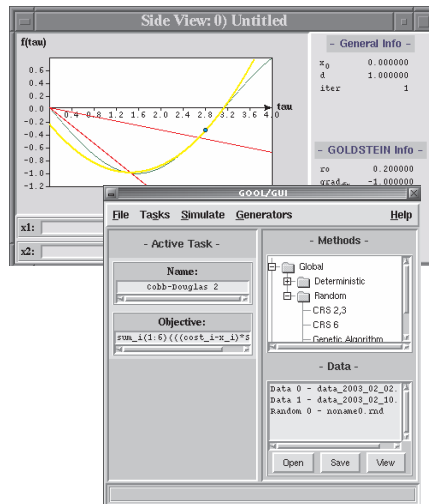


Control and Optimization of Complex Systems Group



Global optimization

GOOL - Global Optimization Object-Oriented Library



GOOL

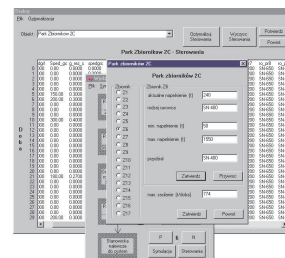
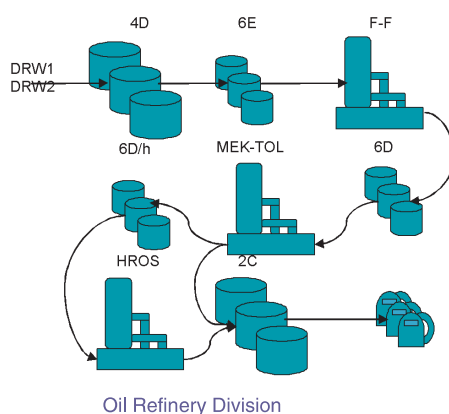
library of random search generators and optimization algorithms for convex and nonconvex, unconstrained and constrained problems

Control and Optimization of Complex Systems Group



Operations scheduling using Constraint Programming

Solution of a scheduling problem in an Oil Refinery Division



Simulation and optimization system

Goals:

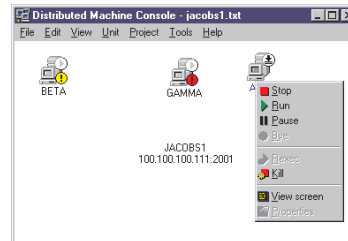
- Simulation of an Oil Refinery Division
- Finding all feasible solutions
- Meeting all technical requirements
- Constraint scheduling methods
- Very fast computations

Control and Optimization of 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:

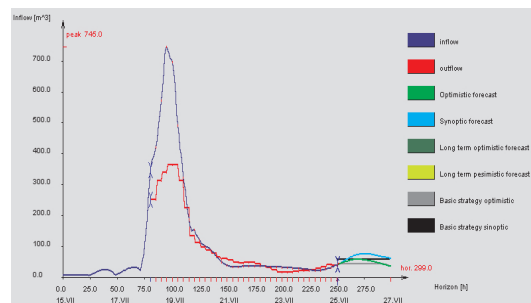
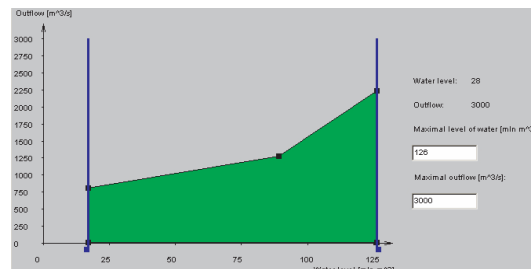
- **WDM** (windows distributed machine) – a software environment for performing distributed computations in a cluster of machines working under windows
- **GEPAS** (generic parallel suite) – an implementation of distributed shared memory in network
- **NONOS** (nonlinear optimization solver) – an ASP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

Control and Optimization of 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



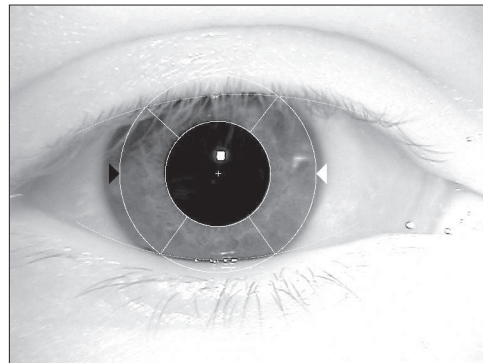
Control and Optimization of Complex Systems Group



Biometrics

Iris-based identity verification

- human iris automatic localization and artefacts exclusion (eyelids, eyelashes)
- the use of fast Zak-Gabor transform for iris code calculation
- iris object-oriented analysis (non repeatable biometrics for replay attacks prevention)
- research on iris texture statistics
- fusing iris biometrics with open operating system smart cards (e.g., JavaCards)
- eye aliveness detection (using, e.g., eye reactions to color changes, hippus detection, etc.)



Human eye imaged in infrared light, with the iris region not occluded by eyelids or eyelashes, as determined by the verification system. Below: the corresponding iris code,

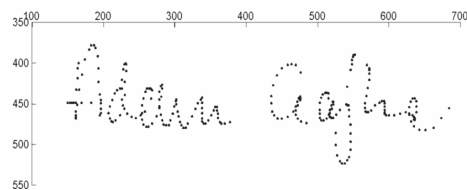
Control and Optimization of Complex Systems Group



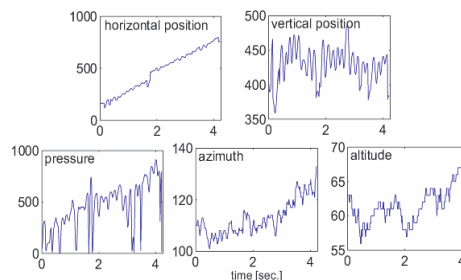
Biometrics

Handwritten signature-based identity verification

- signature as a multidimensional curve (five quantities vs. time are measured, namely the pen position, the pen tip pressure and the pen altitude and azimuth angles)
- the use of statistics and Hidden Markov Models for signature features extraction
- highly correlated features are removed from the feature set
- only dynamic features that are difficult to forge are employed in verification process
- the use of neural networks, dynamic programming and time warping for classification purposes



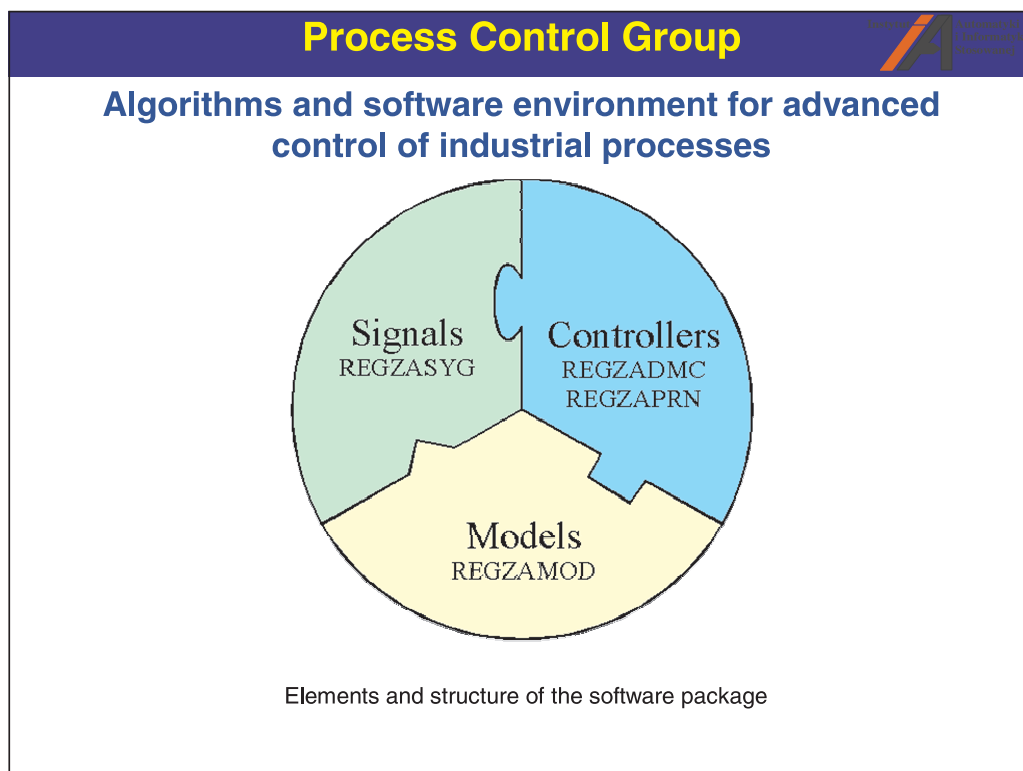
Example of human signature



A signature and the corresponding curves in time (pen position, pen tip pressure, pen angles)

Process Control Group (P. Tatjewski, P. Domański, J. Gustowski, U. Kręglewska, Z. Komor, S. Romicki, P. Marusak, J. Pułaczewski, M. Ławryńczuk, P. Marusak, S. Plamowski, M. Strzelczyk, K. Szyber)

Research of the group encompasses industrial process control. The focus is on predictive and fuzzy control algorithms, multilayer optimizing and supervisory control, and non-linear system control and analysis. Soft computing methods for design and tuning of control systems are developed, including those 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 professional SCADA and soft control systems.



Process Control Group

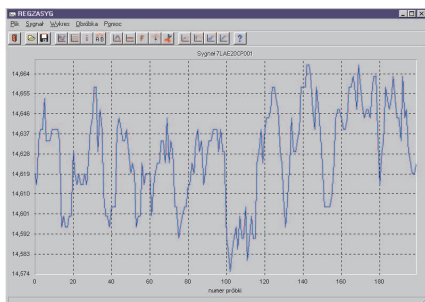


Algorithms and software environment for advanced control of industrial processes

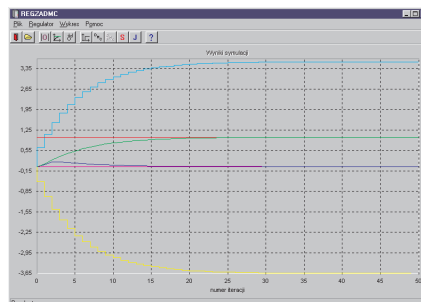
Nonlinear predictive control structures based on fuzzy and neural models

- 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

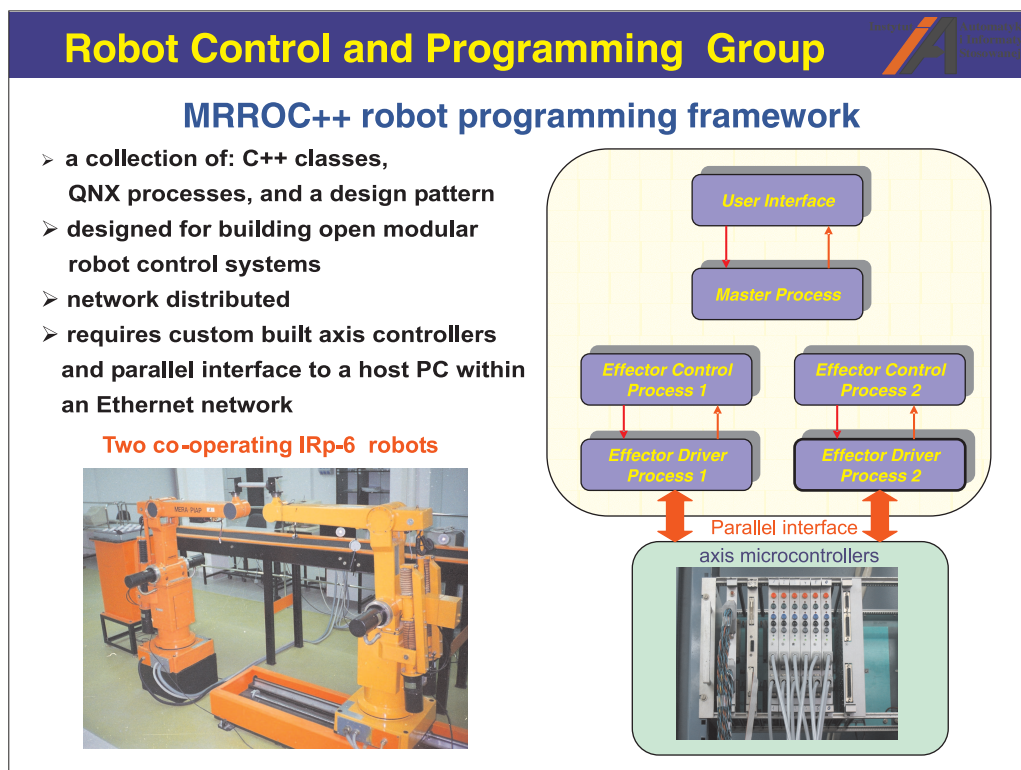



Main window of REGZADMC program



Robot Control and Programming Group (C. Zieliński, W. Kasprzak, A. Rydzewski, W. Szyrkiewicz, A. Gosiewski, F. Okazaki, M. Staniak, T. Winiarski, R. Seta, E. Snitkowska, M. Jankowski)

Research of the group is concerned with robot motion planning and control systems, autonomous mobile robot localization and navigation, robot programming languages, and computer vision 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 Control and Programming 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





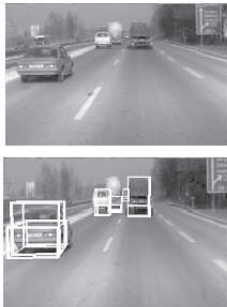
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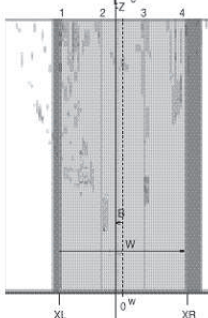
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Robot Control and Programming Group 

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.**

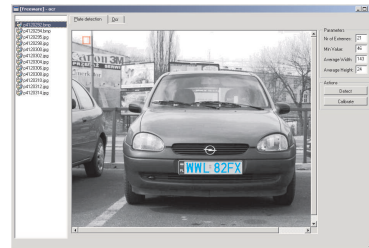
Robot Control and Programming Group



2-D object recognition in digital images

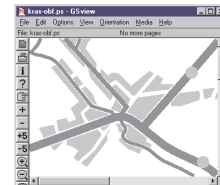
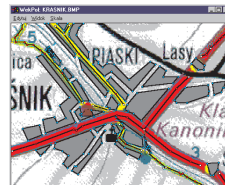
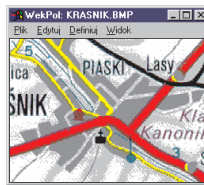
Car's license plate recognition :

- Automatic image region detection;
- Single symbol detection.
- Symbol classification.



Various 2-D object recognition:

i.e. fingerprint images, cartographic objects.



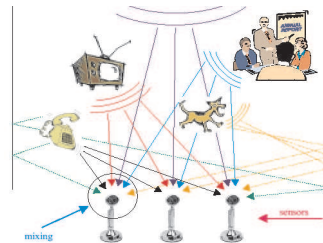
Robot Control and Programming Group



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.

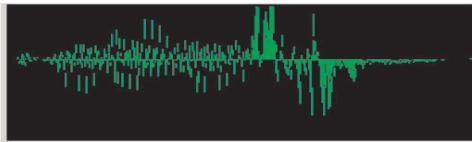


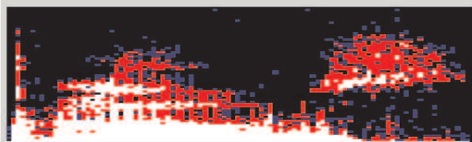
Robot Control and Programming Group


The recognition of Polish speech

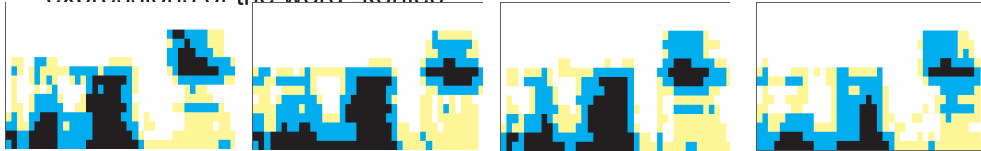
The automatic recognition of **Polish spoken words**:

- 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.”



Software Engineering Group (K. Sacha, R. Cegięła, T.J. Kruk, P. Misiurewicz, W. Macewicz, A. Zalewski, R. Kacperczyk, R. Lewczuk, M.A. Malarski, M. Szlenk)


The group deals with software development technology, with the emphasis on software specification and design methods for real time applications and distributed operating systems. The research interests also comprise the cluster processing problems and the design of distributed internet-based applications. The examples of research projects include the application of Petri nets to the modeling and verification of software, the design of dependable distributed systems with resource redundancy and task migration, and electronic transfer of documents through the internet. The group is also engaged in auditing of huge projects like IACS system development lead by one of the governmental agencies.

OPERATIONS RESEARCH AND MANAGEMENT SYSTEMS DIVISION

<i>Division Head:</i>	Professor Eugeniusz Toczyłowski
<i>Professors:</i>	Eugeniusz Toczyłowski
<i>Assistant Professors:</i>	Krzysztof Pieńkosz, Grzegorz Płoszajski, Cezary Szwed, Tomasz Traczyk
<i>Assistants:</i>	Krzysztof Fleszar (since November 2003, part time), Mariusz Kaleta (since November 2003, part time)
<i>Ph.D. Students:</i>	Krzysztof Fleszar, Mariusz Kaleta, Mariusz Rogulski, Tomasz Śliwiński, Kamil Smolira, Izabela Żółtowska

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 applied to design of the distributed multi-functional heterogeneous information systems.

Operations Research and Management Systems Division



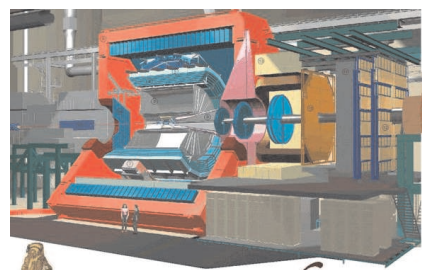
ALICE Detector Construction Database Group

Detector Construction Database for A Large Ion Collider Experiment (ALICE)*

➤ **The goal of the project:**
To create a database and an application environment for use in the initial construction of sub detectors for ALICE and to facilitate the operation of the completed ALICE detector

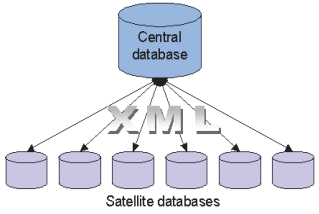
➤ **Solution:**

- Distributed heterogeneous database
 - satellite databases at participating laboratories
- central repository at CERN
- Flexible generic data structures
XML based data interchange




Alice

ALICE is one of the four detectors at the Large Hadron Collider (LHC) of the European Laboratory for Particle Physics (CERN), Geneva.



* In co-operation with Faculty of Physics



OPTIMIZATION AND DECISION SUPPORT DIVISION

<i>Division Head:</i>	Professor Włodzimierz Ogryczak
<i>Professors:</i>	Włodzimierz Ogryczak, Wiesław Traczyk, Andrzej P. Wierzbicki
<i>Assistant Professors:</i>	Janusz Granat, Jerzy Paczyński, Andrzej Stachurski
<i>Senior Lecturers:</i>	Tadeusz Rogowski (part time)
<i>Lecturers:</i>	Jerzy Sobczyk (part time), Grzegorz Wójcik (part time)
<i>Ph.D. Students:</i>	Cezary Chudzian, Piotr Górczyński, Tomasz Kozak (until October 2003), Adam Krzemienowski, Sylwester Laskowski, Tomasz Nitychoruk


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.

Optimization and Decision Support Division

Risk Measures and Optimization under Risk

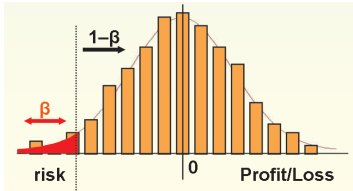
- **focus on risk measures consistent with axiomatic models of preferences for choice under risk**
- **risk preference modeling from strongest risk aversion to complete risk neutrality**
- **optimization with linear programming: very large dimensions, fast and stable numerical implementations**

Returns

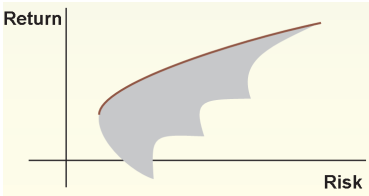


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Distribution approach



Mean-risk analysis



←

Optimization and Decision Support Division

Reference Point Method

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

● - reference point
○ - solution

Optimization and Decision Support Division

Application of the reference point method to land resource assessment

1.3 Statistical Data

FACULTY and STAFF	2001		2002		2003	
	persons	FTE	persons	FTE	persons	FTE
Academic Staff	32(+1)	29.23(+1)	38(+1)	34.03(+1)	40(+2)	34.90(+1.5)
by titles/degrees						
Professors	3(+1)	2.5(+1)	3	2.5(+1)	4(+1)	3.5(+1)
D.Sc.-s	7	7	7	7	6	6
Ph.D.-s	16	15.5	17	16.5	20	18.9
M.Sc.-s	6	4.23	12	8.03	10(+1)	6.5(+0.5)
by positions						
Professors	9(+1)	8.5(+1)	9	8.5 (+1)	9(+1)	8.5 (+1)
Assistant Professors	15	14.5	17	16.5	19	18
Senior Lecturers	4	3.5	5	4.5	4(+1)	4(+0.5)
Lecturers	3	1.73	3	1.33	2	1
Assistants	1	1	4	3.2	6	3.4
Ph.D. Students	30		32		35	
Technical Staff	12	9.05	10	7.30	6	4.5
Administrative Staff	6	5.65	6	5.4	7	6

FTE – Full Time Employment units,

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

ACTIVITIES	2001	2002	2003
Teaching activities			
standard teaching potential, hours	6981	6695	7780
# hours taught	14316	15886	14490
Degrees awarded			
D.Sc.	1	0	0
Ph.D.	2	3	3
M.Sc.	39	47	42
B.Sc.	32	25	47
Research projects			
granted by WUT	13	9	16
granted by State institutions	3	5	4
granted by international institutions	1	1	1
other	1	0	4
Referred publications			
monographs (authored or edited)	2	2	2
textbooks	1	0	2
chapters in books	20	10	7
papers in journals	20	25	28
<i>international</i>	13	15	21
<i>local</i>	7	10	7
papers in conference proceedings	38	41	35
<i>international</i>	17	24	18
<i>local</i>	21	18	17
other referred publications	7	8	6
Reports and unreferred publications	30	14	30
Conferences			

ACTIVITIES	2001	2002	2003
participated (# of conferences)	36	29	26
participated (# of part. from ICCE)	56	46	39

RESOURCES	2000	2001	2002	2003
Space (sq.m.)				
laboratories	585	585	585	585
library + seminar room	74	74	74	74
faculty offices	724	724	724	724
Computers				
workstations*	20	21	23	14
personal computers*	222	231	244	245
Library resources				
books	4385	4459	4547	4601
booklets	1276	1390	1442	1570
journals subscribed	6	7	7	7

* 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 following publication citation codes are used:

BK	books	Sec. 6.1
CH	chapters in books	Sec. 6.1
PH	Philadelphia list journal articles	Sec. 6.2
IJ	other international journal articles	Sec. 6.2
LJ	local journal articles	Sec. 6.2
IC	international conference proceedings	Sec. 6.3
LC	local conference proceedings	Sec. 6.3
AB	abstracts	Sec. 6.4
UN	unreferred publications	Sec. 6.4
RP	reports	Sec. 6.4

In project participation lists, the reader is referred to the project listing in Sec. 4.

2.1 Professors Emeriti

Władysław Findeisen Professor (retired July 1999)

Control and Systems Division, Control and Optimization of Complex Systems Group
room 524, tel. 6607397 and 8250995
 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), Vice-President of the Polish Committee for UNESCO (since 1999).

Anatol Gosiewski Professor (retired October 2001)

Control and Systems Division, Robot Control and Programming Group
room 565, tel. 6607750, 8255280
 A.Gosiewski3@wp.pl

Ph.D. 1959, D.Sc. 1964 from WUT; the titles of Professor of Technical Sciences awarded in 1972 and 1992.

With WUT since 1951. Post-Doctoral Fellow at Case Institute of Technology, Cleveland, Ohio (1961), Visiting Prof. at the Dept. of Electrical Eng. of University of Minnesota, Minneapolis, Minnesota (1975), Visiting Prof. at the Dept. of Mechanical and Aerospace Eng., of University of Delaware, Newark, Delaware (1979). Member of the State Committee for the Scientific Title and Scientific Degrees (1993–1996), member of the Committee on Automation and Robotics of Polish Academy of Sciences (PAN). Member of Scientific

Council of Institute of System Research (IBS PAN) (since 1985), and of the Industrial Institute for Automation and Measurements (PIAP) (since 1983). Chairman of the Section of Automation and Robotics T11A of the State Committee for Scientific Research (KBN) (1991–1996), Member of Scientific Society of Warsaw (TNW) (since 1983). Head of ICCE Robotics Group (1986–1996) and then Robotics and Operation Research Division, Director of the Ph.D. Program in Automatic Control and Computer Science at EIT.

Interests: Control theory, optimal control, robot dynamics and robot control.

Radosław Ładziński Professor (retired January 1998)

**Control and Systems Division, Control and Optimization of Complex Systems Group
room 570, tel. 6607648
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. Retiring by the end of 1997

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). 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). 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.

Jacek Szymanowski Professor (retired January 2000)

**Control and Systems Division, Control and Optimization of Complex Systems Group
room 530, tel. 6607922
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.

2.2 Senior Faculty

Rafał Cegiela Assistant Professor

**Control and Systems Division, Software Engineering Group
room 555, tel. 6607997
R.Cegiela@ia.pw.edu.pl, <http://www.ia.pw.edu.pl/~rcegiela>**

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

With WUT since 2001.

Interests: Software engineering, formal methods, IT project management and system audit.

Books, chapters: [CH5, CH6]

Conference proceedings: [LC2]

Coordinator or principal investigator in: [PR7]

Project participation: [PR6]

Paweł Domański Assistant Professor (part time)

Control and Systems Division, Process Control Group
room 572a, tel. 6607120
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.

Conference proceedings: [IC4, LC1]

Janusz Granat Assistant Professor

Optimization and Decision Support Division
room 25, tel. 6607640

J.Granat@ia.pw.edu.pl, <http://www.ia.pw.edu.pl/~janusz>

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

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

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

Journal articles: [PH3, IJ2]

Jerzy Gustowski Senior Lecturer

Control and Systems Division, Process Control Group
room 525, tel. 6607699
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.

Books, chapters: [BK2]

Unreferred publications: [RP6]

Coordinator or principal investigator in: [PR25]

Andrzej Karbowski Assistant Professor

Control and Systems Division, Control and Optimization of Complex Systems Group
room 572, tel. 6607632

A.Karbowski@ia.pw.edu.pl, <http://www.ia.pw.edu.pl/~karbowski>

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.

Conference proceedings: [LC5, IC1]

Coordinator or principal investigator in: [PR14]

Project participation: [PR2]

Włodzimierz Kasprzak Assistant Professor

**Robot Control and Programming Group
room 554, tel. 6607866**

W.Kasprzak@ia.pw.edu.pl, <http://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, neural networks, autonomous navigation.

Conference proceedings: [IC7, IC8]

Unreferred publications: [RP8, RP9]

Coordinator or principal investigator in: [PR20]

Project participation: [PR5, PR11, PR23]

Urszula Kręglewska Senior Lecturer

**Control and Systems Division, Process Control Group
room 553, tel. 6607121**

U.Kreglewska@ia.pw.edu.pl, <http://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.

Books, chapters: [BK2]

Zygmunt Komor Senior Lecturer

**Control and Systems Division, Process Control Group
room 571, tel. 6607861**

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.

Books, chapters: [BK1]

Tomasz J. Kruk Assistant Professor

**Control and Systems Division, Software Engineering Group
room 530, tel. 6607922**

T.Kruk@ia.pw.edu.pl, <http://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.

Journal articles: [LJ1, LJ2]

Krzysztof Malinowski Professor (Division Head)

**Control and Systems Division, Control and Optimization of Complex Systems Group
room 517, tel. 660 7397 and 8250995**

K.Malinowski@ia.pw.edu.pl, <http://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), Director of the Center for Control and Information-Decision Technology (1999–2003). Member of the Senate of the Warsaw University of Technology (since 1993), Chairman of the Senate Committee on Academic Staff (1993–1996 and 1999–2002), Chairman of Senate 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 Scientific Society of Warsaw (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-Chairman of the Scientific Council of Research and Academic Computer Network (NASK), Leader of the Research Division of NASK, Member of the Scientific Council of the Industrial Institute for Automation and Measurements (PIAP), Member of the IFAC Technical Committees on 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.

Books, chapters: [CH1]

Journal articles: [PH1, IJ1, IJ4]

Conference proceedings: [IC5, IC6]

Unreferred publications: [IC1, AB3, UN1]

Coordinator or principal investigator in: [PR10, PR18, PR19]

Project participation: [PR2, PR14]

Piotr Marusak Assistant Professor (since Oct. 2003)

**Control and Systems Division, Process Control Group
room 567, tel. 660 7673**

P.Marusak@ia.pw.edu.pl

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.

Conference proceedings: [IC11, LC17]

Unreferred publications: [RP16]

Coordinator or principal investigator in: [PR22]

Project participation: [PR12, PR16, PR24]

Ewa Niewiadomska-Szynkiewicz Assistant Professor

Control and Systems Division, Control and Optimization of Complex Systems Group
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M.Sc. 1986, Ph.D. 1995 from WUT.

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

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.

Books, chapters: [CH2]

Journal articles: [PH8,IJ4]

Conference proceedings: [IC13,LC8]

Unreferred publications: [RP5]

Coordinator or principal investigator in: [PR2]

Włodzimierz Ogryczak Professor

Optimization and Decision Support Division
room 26, tel. 6607862

W.Ogryczak@ia.pw.edu.pl, <http://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.

Books, chapters: [CH3]

Journal articles: [PH6,PH7,PH9,IJ3,IJ5]

Unreferred publications: [RP15,RP18,AB4,AB5,AB6]

Coordinator or principal investigator in: [PR3,PR10,PR17]

Andrzej Pacut Professor (Deputy Director of the Institute)

Control and Systems Division, Control and Optimization of Complex Systems Group
room 522, tel. 6607733

A.Pacut@ia.pw.edu.pl, <http://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 to present. Senior Member of IEEE, member of INNS (Int. Neural Networks Society). V-President of the Polish Section of IEEE (since 2001). Member, Tech. Committee 182 of Polish Normalization Committee (PKN) (2003-), Head of the NASK Biometrics Laboratory (2003-)

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

Books, chapters: [CH4]

Journal articles: [PH4, PH11, PH10]

Conference proceedings: [IC2, IC3, LC3]

Unreferred publications: [RP23, RP24, AB1, UN2, UN3, UN4]

Coordinator or principal investigator in: [PR10]

Project participation: [PR2]

Jerzy Paczyński Assistant Professor (Deputy Director of the Institute)

Optimization and Decision Support Division
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J.Paczynski@elka.pw.edu.pl, <http://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 (since Sept. 1996).

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. 660 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 Research and Management Systems Division
room 560a, tel. 660 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 of the Main Library of WUT since 1996.

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

Journal articles: [LJ5]

Conference proceedings: [LC9]

Tadeusz Rogowski Senior Lecturer (part time, on leave since November 2003)

Optimization and Decision Support Division
room 530, tel. 660 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.

Stefan Romicki Assistant Professor

Control and Systems Division, Process Control Group
room 571, tel. 660 7861
 S.Romicki@ia.pw.edu.pl

M.Sc. 1962, Ph.D. 1970 from WUT.

With WUT since 1962.

Interests: Automatic control, design of microprocessor devices, digital servomechanisms.

Andrzej Rydzewski Senior Lecturer

Control and Systems Division, Robot Control and Programming Group
room 566, tel. 660 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.

Unreferred publications: [RP19]

Project participation: [PR5, PR11, PR13, PR23]

Krzysztof Sacha Professor (group leader)

Control and Systems Division, Software Engineering Group
room 562, tel. 660 7756
 K.Sacha@ia.pw.edu.pl, <http://www.ia.pw.edu.pl/~sacha>

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

With Minicomputer Research and Development Center ERA (1973), with WUT since 1976. Software Engineering Consultant for Industrial Automation Enterprise PNEFAL (1987–90), University of Groningen (1991–1992). Member of IEEE Computer Society and Section of Software Engineering of Polish Academy of Sciences (PAN).

Interests: Software engineering, real-time systems, software specification and design methods, distributed operating systems.

Books, chapters: [BK2, CH5, CH6]

Conference proceedings: [IC14, IC15, LC2]

Coordinator or principal investigator in: [PR6, PR7, PR10]

Andrzej Stachurski Assistant Professor

Optimization and Decision Support Division
room 25a, tel. 6607640

A.Stachurski@ia.pw.edu.pl, <http://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.

Coordinator or principal investigator in: [PR21]

Cezary Szwed Assistant Professor

Operations Research and Management Systems Division
room 561, tel. 6607123

C.Szwed@ia.pw.edu.pl

M.Sc. 1993 from WUT. Ph.D. 1999 from WUT.

With WUT since 1999.

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

Conference proceedings: [LC7]

Project participation: [PR3]

Wojciech Szykiewicz Assistant Professor

Control and Systems Division, Robot Control and Programming Group
room 554, tel. 6607866

W.Szykiewicz@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: Multiple robots coordination, mobile robotics and artificial intelligence, robot motion space analysis and sensor based trajectory planning, real-time operating systems.

Journal articles: [PH13, IJ7]

Conference proceedings: [IC8, IC17]

Unreferred publications: [RP17, RP21, RP22]

Coordinator or principal investigator in: [PR15]

Project participation: [PR5, PR11, PR13, PR20, PR23]

Piotr Tatjewski Professor (Director of the Institute, group leader)

**Control and Systems Division, Process Control Group
room 521, tel. 6607397 and 825 0995**

P.Tatjewski@ia.pw.edu.pl, <http://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

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 since 1996. 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, Member of the Control and Robotics Section of the Scientific Research Council (KBN). Member of Programme Committee of the Journal PAK, Member of the IFAC Technical Committee on Education.

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

Journal articles: [IJ8, LJ7]

Conference proceedings: [IC11, IC10, LC17]

Unreferred publications: [AB2]

Coordinator or principal investigator in: [PR4, PR10, PR12, PR16, PR24]

Project participation: [PR22]

Eugeniusz Toczyłowski Professor (Division Head)

**Operations Research and Management Systems Division
room 516, tel. 6607950**

E.Toczyłowski@ia.pw.edu.pl

M.Sc. 1973, Ph.D. 1976, D.Sc. 1989 from WUT.

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, market design.

Books, chapters: [BK3]

Journal articles: [PH6]

Conference proceedings: [LC4, LC11, LC13]

Coordinator or principal investigator in: [PR8, PR9, PR10]

Project participation: [PR17]

Tomasz Traczyk Assistant Professor

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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.

Journal articles: [LJ6]

Conference proceedings: [IC12, LC14]

Project participation: [PR7]

Wiesław Traczyk Professor

Optimization and Decision Support Division
room 523, tel. 6607791
 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 since 1997. Chairman of FEIT Committee for Ph.D. Degrees in Automatic Control and Computer Sciences. Head of ICCE Optimization and Decision Support Division (1997-2002).

Interests: Knowledge engineering, expert systems, artificial intelligence.

Journal articles: [IJ6]

Coordinator or principal investigator in: [PR10]

Michał Warchoń Assistant Professor

Control and Systems Division, Control and Optimization of Complex Systems Group
room 572a, tel. 6607120
 M.Warchol@ia.pw.edu.pl, <http://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.

Project participation: [PR2]

Andrzej P. Wierzbicki Professor

Optimization and Decision Support Division
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 of Optimization and Decision Theory 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), and Kyoto University, Japan (1989–1990). Director of the National Institute of Telecommunications in Poland since 1996. 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 Scientific Council of the Industrial Institute for Automation and Measurements (PIAP) (since 1991), Scientific and Academic Computer Network (since 1994), and member of 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), vice Chairman since 2002, Chairman of its Section on Decision Support Systems (since 1992). Member of the presidium of the Committee for Future Studies “Poland XX+” PAN (since 1996), Member of the Panel for Cooperation with IIASA of PAN. Member of the presidium of the Polish Association for the Club of Rome (1995–2002). Member of Polish Mathematical Society (PTM) (since 1975) and of Society of Polish Electrical Engineers (SEP) (since 1970). 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).

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

Adam Woźniak Assistant Professor

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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).

Interests: Control of complex systems, servomechanisms, robot control, multi-criteria optimization, game theory, multiagent systems, decision support systems.

Journal articles: [PH12, IJ7]

Conference proceedings: [LC15]

Project participation: [PR2, PR5, PR11]

Andrzej Zalewski Assistant Professor (since April 2003)

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

With WUT since 2002.

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

Books, chapters: [CH5, CH6]

Conference proceedings: [LC16]

Coordinator or principal investigator in: [PR7]

Project participation: [PR6]

Cezary Zieliński Professor (group leader)

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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). Member of the Editorial Board of International Journal of Intelligent Mechatronics: Design and Production, Program Committee Member of PAK (Pomiary, Automatyka, Kontrola). Member of the Forecast Committee of the Polish Academy of Sciences: Poland 2000 Plus(2003-). Senior Member of IEEE (2002-). Vice Dean for Research and International Cooperation FEIT, Head of the Auditing Team of the Technological University Accreditation Committee (2003-), Head of ICCE Robotics Group since 1996.

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

Books, chapters: [BK4]

Journal articles: [PH13, IJ7]

Conference proceedings: [IC18]

Unreferred publications: [RP17, RP26]

Coordinator or principal investigator in: [PR1, PR5, PR10, PR11, PR13, PR23]

2.3 Supporting Faculty and Staff

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M.Sc 1996 from WUT

With WUT since 2002.

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

Journal articles: [PH1, IJ1]

Conference proceedings: [IC6]

Coordinator or principal investigator in: [PR18]

Project participation: [PR2]

Adam Czajka Assistant (since Oct. 2003)

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M.Sc. 2000 from WUT

With WUT since 2003. Research Assistant at NASK Biometrics Laboratory, Ph.D. student in ICCE, student member of IEEE.

Interests: Biometrics, image processing, neural networks.

Conference proceedings: [LC3]

Unreferred publications: [AB1, UN2, UN3, UN4]

Krzysztof Fleszar Assistant (since Nov. 2003)

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M.Sc. 2000 from WUT.

With WUT since 2003.

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

Journal articles: [PH2, PH5]

Mariusz Kamola Assistant

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room 573, tel. 6607126
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M.Sc. 1997 from WUT.

With WUT since 2002.

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

Journal articles: [PH1, IJ1]

Conference proceedings: [IC6]

Unreferred publications: [RP7]

Coordinator or principal investigator in: [PR19]

Project participation: [PR2]

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M.Sc. 2000 from WUT.

With WUT since 2003.

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

Journal articles: [PH6]

Conference proceedings: [LC4]

Maciej Ławryńczuk Assistant (since March 2003)

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

With WUT since 2003.

Interests: Process control and optimization.

Books, chapters: [BK2]

Journal articles: [IJ8, LJ7]

Conference proceedings: [IC10, LC17]

Unreferred publications: [RP16, AB2]

Coordinator or principal investigator in: [PR4]

Project participation: [PR12, PR17, PR22, PR24]

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M.Sc. 1983 from WUT.

With WUT since 1983.

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

Journal articles: [LJ4]

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M.Sc. 1961, Ph.D. 1969 from WUT.

With WUT since 1965. Deputy Director of ICCE (1984–1993).

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

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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.

Jerzy Sobczyk Lecturer (part time)

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M.Sc. 1985 from WUT.

With WUT since 1984. FEIT Network Administrator.

Interests: Computer networks, programming languages, parallel and distributed programming, multi-criteria optimization.

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M.Sc. 1994 from WUT.

With WUT since 1994, half time since Feb. 1998.

2.4 Ph.D. Students

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Supervisor: Krzysztof Malinowski

Conference proceedings: [IC1]

Unreferred publications: [RP1, RP2, RP3]

Project participation: [PR14]

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Conference proceedings: [IC2]

Project participation: [PR2]

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for activity see p. 34

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Conference proceedings: [IC5]

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Conference proceedings: [IC9, LC5]

Unreferred publications: [RP10, RP11, RP12]

Project participation: [PR14]

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Supervisor: Włodzimierz Ogryczak

Books, chapters: [CH7]

Journal articles: [LJ3]

Unreferred publications: [RP18, AB6]

Project participation: [PR3, PR17]

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Conference proceedings: [LC6]

Unreferred publications: [RP12, RP13, RP14]

Project participation: [PR14]

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Supervisor: Piotr Tatjewski
for activity see p. 35

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Project participation: [PR2]

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Supervisor: Krzysztof Malinowski
Journal articles: [IJ1]

Tomasz Nitychoruk Ph.D. Student

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T.Nitychoruk@ia.pw.edu.pl

Supervisor: Włodzimierz Ogryczak
Conference proceedings: [LC7]

Fumio Adam Okazaki Ph.D. Student

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Supervisor: Włodzimierz Kasprzak
Conference proceedings: [IC7]
Project participation: [PR5, PR20]

Sebastian Plamowski Ph.D. Student

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Supervisor: Piotr Tatjewski

Marek Publicewicz Ph.D. Student

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Supervisor: Krzysztof Malinowski

Conference proceedings: [LC8]

Mariusz Rogulski Ph.D. Student

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Supervisor: Eugeniusz Toczyłowski

Conference proceedings: [LC10, LC11]

Robert Seta Ph.D. Student

Control and Systems Division, Robot Control and Programming Group
room 556, tel. 6607124

Supervisor: Włodzimierz Kasprzak

Andrzej Sikora Ph.D. Student

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Supervisor: Krzysztof Malinowski

Conference proceedings: [IC13]

Kamil Smolira Ph.D. Student

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Supervisor: Eugeniusz Toczyłowski

Ewa Snitkowska Ph.D. Student

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Supervisor: Włodzimierz Kasprzak

Jarosław Sobieszek Ph.D. Student

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Supervisor: Andrzej Pacut

Maciej Staniak Ph.D. Student

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M.Staniak@ia.pw.edu.pl

Supervisor: Cezary Zieliński

Unreferred publications: [RP4]

Project participation: [PR5, PR11]

Marek Strzelczyk Ph.D. Student

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room 567, tel. 6607673
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Supervisor: Piotr Tatjewski

Conference proceedings: [IC16]

Adam Szmigielski Ph.D. Student

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Supervisor: Krzysztof Malinowski

Marcin Szlenk Ph.D. Student

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Supervisor: Krzysztof Sacha

Conference proceedings: [LC12]

Project participation: [PR7]

Krzysztof Sztyber Ph.D. Student

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room 567, tel. 6607673
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Supervisor: Piotr Tatjewski

Unreferred publications: [RP20]

Tomasz Śliwiński Ph.D. Student

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room 526, tel. 6607125
T.Sliwinski@ia.pw.edu.pl

Supervisor: Eugeniusz Toczyłowski

Journal articles: [PH9, IJ5]

Project participation: [PR17]

Karol Wawrzyniak Ph.D. Student

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Supervisor: Andrzej Pacut

Paweł Wawrzyński Ph.D. Student

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room 573a, tel. 6607860
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Supervisor: Andrzej Pacut

Unreferred publications: [RP23, RP24]

Tomasz Winiarski Ph.D. Student

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Supervisor: Cezary Zieliński

Unreferred publications: [RP22, RP25]

Project participation: [PR5, PR11, PR15, PR20]

Izabela Żółtowska Ph.D. Student

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Supervisor: Eugeniusz Toczyłowski

Journal articles: [PH6]

2.5 Administrative and Technical Staff

Jolanta Cieśliewicz Librarian and office support (part time).

room 564, 527, tel. 6607276, 7865
J.Cieslewicz@ia.pw.edu.pl

Elżbieta Głowacka Secretary, Student affairs.

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Maria Graszka Office support.

room 23, tel. 6607750, 8255280
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Małgorzata Jaworska Finances support (half time).

room 563, tel. 6607122
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M.Sc. 2001 from Łódź University.

Elżbieta Matyjasiak Secretary, Main office.

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

Bohdan Murzynowski Technical support (part time).

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B.Sc. from WUT.

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M.Sc. 1975 from WUT.

Ryszard Tchórz Technical support.

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Daniel Wieczorek Technical support (half-time).

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Wiśniewski Wiśniewski Technical support.

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Beata Woźniak Manager, Administration.

room 521, tel. 6607397
B.Wozniak@ia.pw.edu.pl

M.Sc. 1993 from Warsaw University.

3 Teaching Activities – Academic Year 2002/2003

Course Title	Course code	Hours per week	Semester code	Lecturer
Administration of UNIX and TCP/IP	ASU	2 - 2 -	6 SIWD	J. Sobczyk
Algorithms and Data Structures	AISD1	2 - 1 -	sem. 3	A. Zalewski (spring)
Artificial Intelligence Methods	MSI		PZ-P, OT	W. Traczyk (spring)
Commercial Data Bases 2	KBD2		OT	T. Traczyk (spring)
Computer Networks	ECONE	2 1 1 -		J. Sobczyk (spring)
Control	ECONT	2 1 1 -	sem. 6	R. Ładziński (spring)
Controls Fundamentals	PRE	2 - 1 -	5KSS	A. Woźniak
Computer Networks	SKP2	2 - 1 -	5KSS, SIWD	T. Rogowski (spring) J. Sobczyk (fall)
Control Design	PURE	2 - - 2	5KSS	A. Woźniak
Control Theory	TST	2 1 - 1	PZ-P., OT	A. Woźniak (spring)
Data Bases and Information Systems	BSSI	2 - 2 -	5 SIWD, OT	T. Traczyk
Decision Support and Design	WDIP	2 - 2 -	6 SIWD, OT	J. Granat
Decision Support Under Risk Conditions	WDWR	2 - - 1	PZ-I	W. Ogryczak
Discrete Process Scheduling	HPD	2 - 2 -	6 SIWD, OT	E. Toczyłowski
Digital Circuits	EDC1	2 - 2 -		C. Zieliński
Digital Control Algorithms	CAR	2 - - 1	OT	J. Pułaczewski (fall)
Digital Servomechanisms	SCYF	2 - - 1	OT	S. Romicki (fall)
Distributed Operating Systems	RSO	2 - 1 -	PZ-I, OT	T. Kruk
Dynamic Systems	EDYSY	2 - 2 -	sem. 5	R. Ładziński (fall)
Elements of Robotics	ERO	2 - 2 -	7 KSS, OT	W. Szykiewicz
Evolutionary strategies	MSR	2 - 2 -	OT	P. Domański (spring)
Fundamentals of Control Systems	PSS	2 1 1 -	sem. 4	K. Malinowski (fall)
Fundamentals of Control Systems	PSTE	2 - 1 -	sem. 4	P. Tatjewski (spring)
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 -	5 SIWD, OT	A. Stachurski
Fundamentals of Parallel Computation	PORR	2 - - 2	PZ-A, PZ-I	A. Karbowski
Fundamentals of Programming	PRI	2 1 2 -	sem. 1	J. Paczyński (spring)
Image and Speech Recognition	ROSM	2 - - 1		W. Kasprzak (fall)
Information Project Management	ZPI	2 - - 1	8 SIWD, OT	K. Pieńkosz
Knowledge Engineering	IW	2 - - 1	7 SIWD, OT	W. Traczyk
Neural Networks	SNUP	2 - - 1	OT	A. Pacut (spring)
Numerical Methods and Simulation	MNSK	2 - 2 -	5 KSS, SIWD, OT	P. Tatjewski
Microprocessor Techniques	TM	2 1 2 -	5 KSS, OT	A. Rydzewski
Modelling and Forecasting	MPRO	3 - - 1	6 KSS, OT	A. Pacut
Numerical Methods	ENUME	2 - 2 -		P. Tatjewski (spring)
Object Oriented Programming	PROBE	2 - 2 -	sem. 3	W. Kasprzak (fall)
Operating Systems	EOPSY	2 1 1 -		T. Kruk (fall)
Operating Systems	SOP2A	2 - 2 -	5 KSS, SIWD, OT	T. Kruk
Optimization and Decision Support	OWD	2 - - 1	PZ-A, PZ-I, OT	A. Wierzbicki (spring)
Optimalization in Operation Research	OBO	2 - - 1	PZ-A, PZ-I	E. Toczyłowski
Process Automatization Techniques	TAP	2 - 1 -	OT, PZ-A	P. Tatjewski (fall)
Programmable Controllers	SP	2 - 2 -	6 KSS, OT	J. Gustowski
Programming 1	EPRO1	2 1 1 -		J. Paczyński (fall)
Programming 2	EPRO2	2 - 2 -		A. Stachurski (spring)

Course Title	Course code	Hours per week	Semester code	Lecturer
Real-time Systems	SCZR	2 - 2 -	6 KSS, OT	K. Sacha
Robot Control and Programming	SPRR	2 - - 1	PZ-A, OT	C. Zieliński (spring)
Software Specification and Design	SPOP	2 - 1 -	7 SIWD, OT, PZ-A, PZ-I	K. Sacha
Synthesis of Decision Rules	ZSRD	2 - 2 -	6 SIWD, OT	K. Malinowski
Theory of Optimization	TOP	2 - - 1	OT, PZ-P	W. Ogryczak (fall)
System Simulation and Control	SSS	2 - -1	PZ-A, PZ-I, OT	K. Malinowski (spring)

Table explanations

Hours per week

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

Semester

symbol	level	description
P1,P2	B.Sc.	pre-specialization courses
SIWD	B.Sc.	specialization in Information Systems for Decision Support
KSS	B.Sc.	specialization in Computerized Control Systems
En	B.Sc.	taught in English
I	M.Sc.	Informatics
PZ-P	M. Sc., Ph.D.	advanced classes, fundamental
PZ-A	M. Sc., Ph.D.	advanced classes, controls
PZ-I	M. Sc., Ph.D.	advanced classes, informatics
OT	all levels	free electives

4 Projects

- [PR1] Network of Excellence within EU FP5 IST-200-26048 **European Robotics Research Network, EURON**, granting period: 8.04.2001–30.04.2004. Principal investigator: Cezary Zieliński.

The objective of EURON (European Robotics Network) is the implementation and maintenance of a network of excellence within the 5th 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.

- [PR2] KBN grant 7 T11A 022 20: **Specialized optimization and simulation methods for decision making in complex systems control**, granting period 01.03.2001 – 28.02.2003. Coordination: ICCE. Principal investigator: Ewa Niewiadomska-Szynkiewicz. Investigators: Piotr Arabas, Jarosław Chrobak, Mariusz Kamola, Andrzej Karbowski, Przemysław Magiera, Krzysztof Malinowski, Andrzej Pacut, Michał Warchoł, Adam Woźniak, Maciej Żmuda.

The basic goal of the project was to develop, implement and test optimization methods, control structures and algorithms for complex systems. The focus was to apply the proposed optimization techniques and control methods (global and parallel optimization, hierarchical optimization, predictive control algorithms, hierarchical control structures, reinforcement networks) to selected real-life problems. The case studies include: air defense, optimal portfolio selection, control of oil department in petrochemical works, flood control in multi-reservoir systems. The effectiveness of proposed control systems have been tested through computer simulation.

- [PR3] KBN grant PBZ 016/P03/99: **Mathematical methods for analysis of the financial markets and instruments in Poland**, granting period 01.06.2001–30.05.2004. Coordinator: Institute of Mathematics of the Polish Academy of Sciences (IMPAN). Principal investigator: Włodzimierz Ogryczak. Investigators: Cezary Szwed, Adam Krzemienowski.

The goal of the research is to develop mathematical theory and techniques concerned with quantitative analysis and decision support at the strategic, tactical and operational level of risk management in financial markets in Poland. Techniques for risk measurement and portfolio optimization represent the main focus of the research within ICCE. New LP computable risk measures and the corresponding LP solvable portfolio optimization models have been introduced and analyzed.

- [PR4] KBN grant 4 T11A 008 22 **Multiregional neural models, nonlinear predictive control algorithms based on neural models**, granting period 1.03.2002 – 31.03.2003. Coordination: Piotr Tatjewski. Principal investigator: Maciej Ławryńczuk.

The objective of the project was to develop nonlinear model predictive control algorithms (MPC) based on feed forward neural networks. Two general classes were researched: MPC structures with nonlinear optimization and suboptimal ones, based on different linearization approaches. The latter class was thoroughly investigated because of its computational efficiency. The structure and identification algorithms for multi-regional neural models were also investigated.

- [PR5] MNIł grant no 4 T11A 003 25: **Control of Multirobot Systems Performing Service Tasks**, granting period: 15.11.2003 – 14.11.2006. Principal investigator: Cezary Zieliński. Investigators: Włodzimierz Kasprzak, Wojciech Szynkiewicz, Adam Woźniak, Andrzej Rydzewski, Tomasz Winiarski, Maciej Staniak, Fumio Adam Okazaki, Krzysztof Mianowski (IAEAM), Marek Wojtyra (IAEAM), Witold Czajewski (ISEP).

The general objective of the grant is 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, feel 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 will be validated on the task of solving a Rubik's cube on the operator's vocal prompt.

- [PR6] Project granted by The Polish Post 501H/0005/00: **Auditing the tests of the mail distribution support system**, granting period: 01.01.2003 – 15.08.2004. Principal investigator: Krzysztof Sacha. Investigators: Rafał Cegieła, Andrzej Zalewski.

The aim of the project was to assess the process and results of the testing of a system being developed for The Polish Post to support operation of its mail distribution centers.

- [PR7] Agency for Restructuring and Modernisation of Agriculture 501H000300 **Advisory and consulting services in the project of the development of Integrated Administration and Control System (IACS)**, granting period: 03.03.2003 - 30.06.2004. Coordinator: Krzysztof Sacha, principal investigators: Rafał Cegieła, Andrzej Zalewski, participants: Tomasz Traczyk, Marcin Szlenk.

The subject of the project was the assessment of the IT products developed by Hewlett-Packard as parts of IACS system as well as non-IT elements prepared by the Agency. The main criteria of the assessment were quality, embedded risks, conformance with European Union regulations, standards and best practices. During the project an integrated methodology for auditing different kinds of IT deliverables have been developed.

- [PR8] EnergoProject-Consulting S.A. 501H0004 **Study of market development rules to be implemented after July 2004**, granting period: 15.07.2003–27.10.2003. Principal investigator: Eugeniusz Toczyłowski.

- [PR9] EnergoProject-Consulting S.A. 501H0002 **Consulting for EnergoProject-Consulting S.A.**, granting period: 15.07.2003–15.01.2005. Principal investigator: Eugeniusz Toczyłowski.

- [PR10] Statutory grant 504G/036/300: **Development of methodology of control, decision support and production management**, granting period 01.5.2002 – 15.4.2003 and 16.4.2003 – 15.04.2004. Principal investigators: Andrzej Pacut, Krzysztof Malinowski, Włodzimierz Ogryczak, Krzysztof Sacha, Piotr Tatjewski, Eugeniusz Toczyłowski, Wiesław Traczyk, Cezary Zieliński.

- [PR11] CATID grant **Design of heterogeneous multi-robot service systems**, granting period: 20.03.2003–31.08.2003. Principal investigator: Cezary Zieliński. Investigators: Wojciech Szynekiewicz, Adam Woźniak, Włodzimierz Kasprzak, Andrzej Rydzewski, Tomasz Winiarski, Maciej Staniak.

Investigations were concentrated on some aspects of embodied agents, namely: force control, visual servoing, independent component analysis in the description of textures, design of a mobile robot propelled by six half-wheels.

- [PR12] CATID grant **Methods of modelling, control and fault detection of industrial processes**, granting period: 20.03.2003–31.08.2003. Principal investigators: Piotr Tadjewski, J. Kościelny. Investigators from ICCE: Piotr Marusak, Maciej Ławryńczuk.

The research of ICCE concerned nonlinear constrained predictive control algorithms, in particular practically effective algorithms with on-line nonlinear model linearizations and guaranteed stability. The resulting algorithms were implemented and inducted into the software package "REGZA".

- [PR13] Rector's grant 503G/0007/003 **Analysis and synthesis of complex systems composed of embodied agents**, granting period: 07.2003 – 31.12.2003. Principal investigator: Cezary Zieliński. Investigators: Wojciech Szynekiewicz, Andrzej Rydzewski, Henryk Dobrowolski (ICS), Wiktor B. Daszczuk (ICS), Jerzy Mieścicki (ICS), Teresa Zielińska (IAEAM), Krzysztof Mianowski (IAEAM), Andrzej Chmielniak (IAEAM), Janusz Frączek (IAEAM), Marek Wojtyra (IAEAM)

This research was conducted jointly by three institutes: Institute of Control and Computation Engineering (ICCE), Institute of Computer Science (ICS) and Institute of Aircraft Engineering and Applied Mechanics (IAEAM). The work done by ICS concentrated on the specification of agent behaviours based on Concurrent State Machines and the implementation of such agents. The team from the other two institutes focused on a device propelled by six half wheels. This device combines the advantages of both wheeled vehicles and walking machines. Wheeled vehicles attain fast motion over flat terrain, but are not suitable for motion over an uneven terrain. On the other hand, walking machines can cope with uneven terrain, but are relatively slow on flat surfaces. This research dealt with the initial design of the mechanical and control parts of the device.

- [PR14] Rector's grant 504G/0008/003 **Computational grids and peer-to-peer networks as a tool for solving big simulation and optimization problems and control in large scale systems** (the research enabling submitting a proposal of a project for the 2 Call of IST priority of 6FP of EU and preparing for its realization), granting period: 01.09.2003 – 31.12.2003. Principal investigator: Andrzej Karbowski. Investigators: Jacek Błaszczuk, Franciszek Dul, Adam Kozakiewicz, Bartłomiej Kubica, Krzysztof Malinowski.

The project was devoted to recognizing current issues concerning computational grids and P2P networks sufficient for submitting within an adequate European consortium a proposal of STREP in IST priority of 6 FP EU in October 2003 and possible participation in this project. The proposed project was entitled "Next Generation Grid Computing based on P2P Techniques" (EPSS number: 004307). The chosen grid software platforms were: MOSIX, Condor, Globus, NetSolve, Ninf, NEOS and metaNEOS. They were installed, configured and tested at a Beowulf type network on problems concerning local and global optimization (including genetic), aeroelastic stability of a plane and ranking of Web pages in a search engine. All experiments were described in appropriate reports. Finally, the possibilities of creating an effective grid at the university on the basis of students' laboratories "after hours" were analyzed and some suggestions presented.

- [PR15] Rector's grant 503G/0006/003: **Mobile robot Nomad-IA**, granting period: 16.06.2003 – 31.12.2003. Principal investigator: Wojciech Szynkiewicz. Investigators: Bartosz Rakowski, Marek Majchrowski, Piotr Trojanek, Tomasz Winiarski, Wojciech Romaniuk, Wojciech Młynarczyk, Marcin Tymiński, Radosław Rymkiewicz, Przemysław Maciąg (students).

The goal of the project was to design and develop a small mobile robot prototype. Both, mechanical and electronic part of the robot was designed. The robot platform is a tracked vehicle driven by two DC servo motors. The hardware of the control system consists of PC/104 onboard computer, dedicated motion-control processor, and I/O board.

- [PR16] Rector's grant **Diagnostic of actuators and its application in fault tolerant control systems**, granting period: 01.09.2003 – 31.12.2003. Principal investigators: Piotr Tatjewski, J. M. Kościelny. Investigators: Piotr Marusak, Maciej Ławryńczuk.

The research conducted at ICCE concerned application of predictive control algorithms in situations of actuator faults. Both analytic and numerical versions of predictive controllers were taken into consideration, in situation with different information patterns.

- [PR17] Rector's grant 503/R/1036/36300 (503G0014003): **Problems of telecommunication networks design with fair resource allocation**, granting period: 01.09.2003 – 31.12.2003. Coordination: Institute of Telecommunications. Principal investigator from ICCE: Włodzimierz Ogryczak, investigators from ICCE: Eugeniusz Toczyłowski, Adam Krzemienowski, Tomasz Śliwiński, Jacek Chodera.

The main objective of the project was to perform the analysis and classification of multiple criteria models and algorithms for fair resource allocation from the perspective of their possible application to telecommunication networks design.

- [PR18] Rector's grant 503G/0009/003: **Hierarchical decision structure in missile defense system; decision mechanisms and simulation experiments**, granting period: 16.06.2003 – 31.12.2003. Coordination: Krzysztof Malinowski, principal investigator: Piotr Arabas.

The project continues research on hierarchical modeling in missile defense supporting completion of advanced PhD thesis. Direct method of coordination and predictive control scheme using multiple scenarios are considered. The most important part of the project is constructing models and algorithms efficient enough for on-line control of the system, specifically heuristic algorithms of task allocation and meta-heuristics like taboo search together with simplified coordination strategies are investigated. The resulting solutions are verified by computer simulation showing area of applicability.

- [PR19] Rector's grant 503G/0010/003: **Algorithms for optimisation problems with implicit and feasibility constraints**, granting period: 16.06.2003 – 29.02.2004. Coordination: Krzysztof Malinowski, principal investigator: Mariusz Kamola.

The aim of the grant is to support research on optimisation problems with performance index based on simulation output. The works focus on peculiarities in so defined problems, which are: complicated constraints and performance index disturbed by simulation inaccuracy. In particular, simulation failures are investigated; they define an important class of feasibility constraints, especially difficult to handle since no simulation output is available whatsoever. Next, simulation inaccuracy causes a sort of simulation noise obscuring performance index real shape. Construction of hybrid global and distributed optimisation algorithms is the author's proposed approach in such circumstances. Three practical examples are analysed and solved using the postulated methodology. The grant

main deliverable is M. Kamola's Ph.D. dissertation (under the same title). Development of optimisation environment for automated classification and solving of problems from the considered class is envisaged as further research direction.

- [PR20] Dean's grant 503G/0011/003 **The analysis of speech sensor and force sensor signals applied to multi-modal human-robot communication**, granting period: 01.10.2003 – 31.12.2003. Principal investigator: Włodzimierz Kasprzak. Investigators: Wojciech Szykiewicz, Fumio Adam Okazaki, Tomasz Winiarski.

The main goal of this project was to support the preparation of two PhD thesis, dealing with the analysis of signals acquired from speech and force sensors. In particular, a laboratory workplace for the parallel acquisition of up to 8 mixed sound signals was prepared. A robust algorithm for the multi-channel blind deconvolution (MBD) of mixed sources, called constant diagonal MBD approach, was developed, formally described and it was implemented as a computer program. Similarly, a testbed for controlling the robot arm position and force was prepared. The development of an accompanying algorithm for robot arm position-force control was performed. As a result of this work the testing of two types of signal analysis algorithms will be done more realistically than before, while working on real data, measured in the robot laboratory environment.

- [PR21] Dean's grant 503G/0013/003 **Modelling and identification of voids nucleation and growth effects in voided media plastic flow**, granting period: 01.10.2003 – 31.12.2003. Principal investigator: Andrzej Stachurski. Investigator: Zdzisław Nowak (IPPT PAN, participation sponsored by IPPT PAN).

Within the project the effects of nucleation and growth of voids in the plastic porous media are investigated. Three different forms of the model are considered: a) the augmented Gurson model (total porosity model) with variable nucleation and growth material function, b) the same model with the constant growth material function, c) the separated porosity model with separated porosities following from the existing voids growth and nucleation of new voids. For investigation the Fischer's experimental data set for axisymmetric tension of steel specimens was used. The least squares method was applied. The resulting minimization problem was solved by means of the own implementation of the Boenedr *at al.* (1982) global optimization method. Numerical calculations and statistical analysis of the models (Akaike, FPE and Vuong's tests) have led to the conclusion that the growth material function in the presence of the axisymmetric tension may be constant. However, at least in the steel case, this constant is different from one, what was usually assumed in the subject literature. The results of the investigations are described in the paper submitted for publication in the journal *Control & Cybernetics*. The paper has been accepted for publication, it will appear in "Control and Cybernetics", Vol. 32, No. 4, 2003.

- [PR22] Dean's grant 503G/0012/003 **Predictive control algorithms with set-point optimization**, granting period: 24.09.2003 – 31.12.2003. Principal investigator: Piotr Marusak. Investigators: Maciej Ławryńczuk, Piotr Tatjewski.

The aim of the project was research on predictive control algorithms that integrate the tasks of predictive controller and set-point optimization in one algorithm, i.e. calculation of control variables values and set-point values is conducted together in appropriately formulated structures and predictive control problems. Such a formulation of the problem may lead to design control systems that for significant class of processes, in which dynamics of a control plant and of uncontrolled inputs are similar, are more effective economically than systems using classical approach.

- [PR23] Dean's grant 503G/1031/0003/002: **Multiagent robotic systems: control, trajectory planning and environment image analysis**, granting period: 20.09.2002 – 30.09.2003. Principal investigator: Cezary Zieliński. Investigators: Wojciech Szykiewicz, Włodzimierz Kasprzak, Andrzej Rydzewski.

The investigations concentrate on theoretical aspects of programming and controlling systems consisting of many embodied autonomous agents acting in partially structured environments. Such systems will perform diverse service, inspection or intervention tasks within or outside buildings.

- [PR24] Dean's grant 503G/1031/0004/002: **Nonlinear predictive control algorithms using successive linearisations**, granting period: 20.09.2002 – 31.05.2003. Principal investigator: Piotr Tatjewski. Investigators: Maciej Ławryńczuk, Piotr Marusak.

The aim of the project was to continue research on nonlinear predictive control algorithms supporting completion of two far advanced PhD thesis. In particular, FDMC (Fuzzy Dynamic Matrix Control) algorithms based on on-line successive linearization (and thus efficient for practical applications) were investigated. Further, application of the approach to predictive control algorithms using neural process models was under research. The design and analysis were focused on practical applicability and stability issues. The software package REGZA for design and analysis of advanced control algorithms has been also further developed.

- [PR25] Dean's grant 503G/1031/0005/002: **Analytical and soft-computing methods for nonlinear objects control**, granting period: 20.09.2002 – 31.05.2003. Principal investigator: Jerzy Gustowski.

The author's goal is a trial to propose some methods for controlling of nonlinear objects. These methods should combine advantages of two types of control algorithms: analytical and soft computing ones. The methods are especially designed for electromechanical objects and could be verified using the laboratory rig of an inverted pendulum driven by DC motor of a linear movement.

5 Degrees Awarded

5.1 Ph. D. Degrees

Advisor: **Krzysztof Sacha**

- A. Zalewski, *Specyfikacja oprogramowania systemów wbudowanych o ostrych wymaganiach czasowych metodą Transnet*, 01/2003

Advisor: **Jacek Szymanowski**

- A. Machnacz, *Systemy tolerujące uszkodzenia w technologii klastra*, 05/2003

Advisor: **Piotr Tatjewski**

- P. Marusak, *Regulacja predykcyjna obiektów nieliniowych z zastosowaniem techniki DMC i modelowania rozmytego*, 03/2003
- M. Ławryńczuk, *Nieliniowe algorytmy regulacji predykcyjnej z neuronowymi modelami procesów*, 12/2003

5.2 M.Sc. Degrees

Advisor: **Janusz Granat**

- M. Lewandowski, *Eksploatacja danych dotyczących użycia serwisów internetowych przy wykorzystaniu drzew decyzyjnych*, 03/2003
- M. Jezierski, *Zastosowanie modelowania agentowego do analizy rynku telefonii komórkowej*, 10/2003

Advisor: **Jerzy Gustowski**

- A. Przychodzeń, *Praktyczne zastosowanie informatyki w geologii i geotechnice*, 06/2003

Advisor: **Włodzimierz Kasprzak**

- M. Jankowski, *Programowa realizacja wizyjnego sensora ruchu drogowego*, 03/2003 (with honors)
- M. Kołota, *Rozproszona realizacja systemu do detekcji ruchomych obiektów w sekwencji obrazów cyfrowych*, 03/2003
- J. Zawisłak, *Automatyczna klasyfikacja i identyfikacja obrazów odcisków palców*, 05/2003
- J. Szymczak, *System rozpoznawania komend głosowych*, 06/2003

Advisor: **Tomasz Kruk**

- T. Bazewicz, *Zwiększanie bezpieczeństwa w systemach tolerujących uszkodzenia*, 10/2003
- D. Chojnacki, *System zarządzania inteligentnym domem*, 10/2003
- J. Wrzesień, *Wykrywanie nietypowych sposobów skanowania portów*, 10/2003

Advisor: **Ewa Niewiadomska-Szynkiewicz**

- M. Publicewicz, *GOOL - biblioteka metod optymalizacji globalnej*, 03/2003
- B. Szulecka, *Interfejs graficzny środowiska do symulacji rozproszonej ASIM/Java*, 06/2003
- J. Sitkiewicz, *Obiektowe wersje metod punktu wewnętrznego i płaszczyzn tnących*, 07/2003

Advisor: **Andrzej Pacut**

- P. Sobieralski, *Aproksymacja w algorytmach uczenia przez wzmacnianie*, 10/2003

Advisor: **Andrzej Paszkiewicz**

- M. Chwiećko, D. Stacewicz, *E-Voting*, 10/2003

Advisor: **Grzegorz Płoszajski**

- P. Pietrzak, *Algorytmy graficzne i OCR w zastosowaniu do tworzenia komputerowych baz danych na podstawie kartkowych katalogów bibliotecznych*, 03/2003

- D. Czerewacki, *Algorytmy graficzne wspomagające odczyt informacji z formularzy wypełnionych pismem maszynowym*, 10/2003
- K. Zieliński, *CMS-Systemy zarządzania zawartością z wykorzystaniem języka XML*, 11/2003

Advisor: **Andrzej Rydzewski**

- R. Zareba, *Wykorzystanie systemu CardOS do tworzenia aplikacji kart elektronicznych*, 03/2003

Advisor: **Stefan Romicki**

- M. Rudzik, *Model komputerowy obrotowego wahadła odwróconego*, 07/2003

Advisor: **Tadeusz Rogowski**

- M. Śliwiński, *Bezpieczeństwo transakcji elektronicznych opartych o XML z wykorzystaniem infrastruktury klucza publicznego*, 10/2003

Advisor: **Krzysztof Sacha**

- P. Pilarczyk, *Testowanie amatorskich kart graficznych dla komputerów typu PC*, 12/2003

Advisor: **Jerzy Sobczyk**

- P. Gołowski, *Monitorowanie obciążeń sieci lokalnej*, 03/2003

Advisor: **Piotr Tatjewski**

- D. Baryłka, *Środowisko programowo-graficzne do wyboru i testowania algorytmów rozwiązywania równań nieliniowych*, 03/2003
- M. Zaguła, *Wielowymiarowa regulacja predykcyjna typu DMC z ograniczeniami*, 10/2003

Advisor: **Eugeniusz Toczyłowski**

- W. Łapka, *Model obrotu wielotowarowego na giełdzie towarowej*, 03/2003
- M. Zarod, *System wspomagania decyzji dla odbiorcy hurtowego na rynku energii elektrycznej*, 03/2003
- T. Skiepmo, *Integracja jako mechanizm poprawy efektywności rynków zdecentralizowanych*, 06/2003
- J. Gajewski, *Analiza możliwości redukcji nadwyżek w parametrycznym modelu obrotu towarowego*, 06/2003
- M. Vaina, *Optymalizacja produkcji i dystrybucji w warunkach rynkowych*, 06/2003
- J. Chodera, *Zarządzanie usługami internetowymi w architekturze Differentiated Services*, 10/2003

Advisor: **Tomasz Traczyk**

- R. Hołubowicz, *Systemy komunikacji internetowej w projekcie ALICE*, 03/2003
- P. Szelenbaum, *Zastosowanie języka XML do wymiany danych w rozproszonej heterogenicznej bazie danych*, 03/2003
- D. Jarosz, *Wykorzystanie technologii EJB do tworzenia aplikacji dla potrzeb eksperymentu ALICE*, 03/2003
- M. Oleszczuk, *Zastosowanie XML we współczesnych bazach danych*, 03/2003

Advisor: **Wiesław Traczyk**

- E. Pilecki, *Wnioskowanie o zależnościach czasowych z uwzględnieniem niepewności w zastosowaniu do systemów eksperckich*, 09/2003 (with honors)
- A. Zając, *Wspomaganie orzekania w sądach przy wykorzystaniu wnioskowania na podstawie znanych przypadków*, 10/2003

Advisor: **Andrzej Wierzbicki**

- P. Stasieńko, *Komputerowy system wspomagania decyzji rankingowych*, 10/2003
- M. Popławska, *Tworzenie serwisów internetowych przy użyciu języka XML*, 10/2003

5.3 B.Sc. Degrees

Advisor: **Jarosław Arabas**

- A. Bieńkowski, *Wykorzystanie sieci neuronowych do odtworzenia rozkładu zmiennej losowej na podstawie zbioru jej realizacji*, 10/2003

Advisor: **Jarosław Domaszewicz**

- Ł. Geldner, P. Nowiński, *RFID Reader/Writer*, 10/2003

Advisor: **Janusz Granat**

- T. Helbing, *Modelowanie dynamiki i niepewności rynku*, 10/2003 (with honors)
- N. Kamiński, *Modelowanie i analiza danych w zastosowaniach marketingowych*, 12/2003

Advisor: **Krzysztof Gracki**

- S. Szczepankiewicz, *Wizualizacja danych architektonicznych z wykorzystaniem pakietu DirectX8*, 10/2003

Advisor: **Jerzy Gustowski**

- M. Zakrzewski, *Wizualizacja procesów automatyzacji za pomocą WINDOWS CONTROL CENTER*, 03/2003
- T. Matyśniak, *Stanowisko laboratoryjne manipulatora elektropneumatycznego*, 10/2003
- P. Stańdo, *Interpreter sterujący w środowisku OS-9*, 10/2003

Advisor: **Andrzej Karbowski**

- C. Dmowski, *Pakiet GEPAS - narzędzia elastycznego tworzenia programów równoległych dla środowisk SM-MIMD oraz DM-MIMD*, 02/2003
- P. Wiechowski, *Obiektowa biblioteka do rozwiązywania zadań optymalizacji globalnej oraz układów równań nieliniowych oparta na metodach interwałowych*, 10/2003
- P. Domański, *Zastosowanie markowskich procesów decyzyjnych do wyznaczania optymalnych cen i parametrów usług internetowych w warunkach umów SLA*, 10/2003
- G. Pogorzelski, *Implementacja wybranych algorytmów dekompozycji dużych zadań programowania liniowego*, 10/2003

Advisor: **Ryszard Kossowski**

- Z. Szczesniewski, *Authentication to Web applications using client's certificate*, 10/2003
- D. Mizerny, *The computer environment monitoring system*, 10/2003

Advisor: **Tomasz Kruk**

- M. Kszczot, *Język "Ala-Java" - rozszerzenie JavaSpaces o funkcjonalność języka Ala*, 03/2003
- R. Michalski, *Strategie i metody reagowania na łamanie zabezpieczeń komputerowych*, 03/2003
- T. Belina, *Obieg dokumentów w systemie informatycznym*, 03/2003

Advisor: **Andrzej Pacut**

- P. Biel, *Detekcja, lokalizacja i identyfikacja twarzy*, 03/2003
- M. Doliwa, *Wykrywanie i klasyfikacja punktów osobliwych odcisków palców przy użyciu sieci neuronowych*, 03/2003
- A. Gilewski, *Biometria dłoni*, 10/2003
- J. Sałacki, *Uczenie ze wzmacnianiem dla dwóch antagonistycznych obiektów*, 10/2003
- P. Mileuski, *Wykrywanie punktów osobliwych odcisków palców przy użyciu metody Poincare*, 10/2003

Advisor: **Jerzy Paczyński**

- R. Łebkowski, *Baza danych i aplikacja do planowania egzaminów dyplomowych*, 06/2003
- M. Zaręba, *Projekt bazy danych wspomagającej działalność dydaktyczną Instytutu Automatyki i Informatyki Stosowanej*, 06/2003

Advisor: **Krzysztof Pieńkosz**

- A. Gawkowski, *System wspomagania dydaktyki i badań operacyjnych w zakresie programowania dynamicznego*, 06/2003

Advisor: **Andrzej Rydzewski**

- G. Maciak, *System archiwizacji danych na karcie CompactFlash*, 10/2003

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