Institute of Control and Computation Engineering

1999 Annual Report

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 are recognized not only in Poland. 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 education possibilities in a broad area of information technology for control and decision support, at three levels of education. At the first level (equivalent to B.Sc.) the degree programs are offered in Computer Control Systems and Information Systems for Decision Support, which combine courses from areas of control and computer science. Two M.Sc. degree programs are offered, namely in Computer Sciences and in Control Engineering. 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 would like to stress, among others, creation of the University Center for Control and Information-Decision Technology with Professor Krzysztof Malinowski as the Director.

I express my sincere appreciation to all of the staff of the Institute for their efforts and contributions to our achievements in teaching and research. I would like also to express my gratitude to all our partners from abroad, in particular to those 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

1 General Information

1.1 Board of Directors

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

1.2 Organization of the Institute

Control and Systems Division

Division Head:	Professor Krzysztof Malinowski.
Faculty and staff:	
Professors:	Władysław Findeisen (until June 30, 1999), Krzysztof Malinowski, Piotr Tatjewski, Jacek Szymanowski;
Assistant Professors:	Agnieszka Bogobowicz, Andrzej Karbowski, Tomasz Kruk (since September 30, 1999), Ewa Niewiadomska-Szynkiewicz, Krzysztof Nowosad, Andrzej Pacut, Stefan Romicki, Krzysztof Sacha, Adam Woźniak, Paweł Domański (until September 30, 1999);
Senior Lecturers:	Jerzy Gustowski, Zygmunt Komor, Andrzej Rydzewski;
Assistant:	Michał Warchoł;
Senior R&D Engineers:	Urszula Kręglewska, Piotr Misiurewicz (part-time), Jerzy Pułaczewski (part-time).
Software Engineers:	Włodzimierz Macewicz (senior grade), Piotr Bolek.

Research of the division is conducted in 2 research groups:

Control and Optimization of Complex Systems (***K. Malinowski***, *A. Bogobowicz, W. Findeisen, A. Karbowski, T. Kruk, E. Niewiadomska-Szynkiewicz, A. Pacut, K. Sacha, M. Warchoł, A. Woźniak, P. Bolek, and W. Macewicz*)

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.

Process Control (***P. Tatjewski***, *P. Domański, J. Gustowski, Z. Komor, K. Nowosad, J. Pułaczewski, S. Romicki, J. Szymanowski, A. Rydzewski, P. Misiurewicz and U. Kręglewska*)

The research is concerned with 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 base on fuzzy neural nets, 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.

Robotics and Operations Research Division

Faculty and staff:

Professors:	Anatol Gosiewski, Eugeniusz Toczyłowski, Cezary Zieliński;
Assistant Professors:	Włodzimierz Kasprzak, Krzysztof Pieńkosz, Grzegorz Płoszajski, Wojciech Szynkiewicz, Tomasz Traczyk;
Assistants:	Krzysztof Kierzenkowski, Tomasz Sikorski, Cezary Szwed;

Research of the division is conducted in 2 research groups:

Robot Control and Programming (since October 1999 in Control and System Division) (***C. Zieliński***, ***W. Szynkiewicz***, *A. Gosiewski, K. Kierzenkowski, and W. Kasprzak*)

Research is concerned with robot motion planning and control systems, robot programming languages, and computer vision systems. In the robot control systems area the research is focused on new motion and force/position control algorithms for multirobot systems. Special emphasis is given to the recently implemented research-oriented controller for sensor-equipped robots.

Operations Research and Management Systems (***E.Toczyłowski***, *K.Pieńkosz, G.Płoszajski, T. Traczyk, T. Sikorski, and C. Szwed*)

The research 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 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 distributed multifunctional heterogeneous information systems.

Optimization and Decision Support Division

Division Head:	Professor Wiesław Traczyk.

Faculty and staff:

Professors:	Wiesław Traczyk, Andrzej Wierzbicki (part-time);
Assistant Professors:	Jerzy Granat, Jerzy Paczyński, Andrzej Stachurski;
Senior Lecturer:	Tadeusz Rogowski (part-time);
Lecturer:	Jerzy Sobczyk (part-time);
Software Engineer:	Grzegorz Wójcik (part-time).

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 learning, data mining and reasoning in expert systems.

1.3 Statistical Data

FACULTY and STAFF	1997		1998		1999	
	persons	FTE	persons	FTE	persons	FTE
Academic Staff	38 (+2)	35 (+2)	35 (+2)	32.05 (+2)	33 (+3)	30.90 (+3)
by titles/degrees						
Professors	6 (+1)	4.75 (+1)	5 (+2)	3.65 (+2)	4 (+2)	3 (+2)
D.Sc.-s	6	6	6	6	5 (+1)	5 (+1)
Ph.D.-s	19 (+1)	18.25 (+1)	18	17.4	18	17.9
M.Sc.-s	7	6	6	5	6	5
by positions						
Professors	9	7.75	8 (+1)	6.65 (+1)	7 (+2)	6 (+2)
Associate Professors	1 (+1)	1(+1)	1 (+1)	1 (+1)	(+1)	(+1)
Assistant Professors	19	18.25	19	17.4	17	16.9
Senior Lecturers	4	3.5	4	3.5	4	3.5
Lecturers	1	0.5	1	0.5	1	0.5
Assistants	4 (+1)	4 (+1)	2	2	4	4
Ph.D. Students	35	35	39	39	36	36
Technical Staff	10	8.75	11	8.5	12	9.3
Administrative Staff	6	6	6	6	6	6

FTE – Full Time Employment units,
$+$ – corrections due to persons on long-time leave of absence

ACTIVITIES	1998	1999
Teaching activities		
standard teaching potential, hours	7544	7064
# hours taught	15226	15361
Degrees awarded		
D.Sc.	0	0
Ph.D.	0	3
M.Sc.	30	33
B.Sc.	2	8
Research projects		
granted by WUT	21	22
granted by State institutions	8	5
granted by international instutions	1	1
other	2	4
Refereed publications		
monographs	1	0
textbooks	0	1
chapters in books	0	1
papers in journals	17	15
international	8	10
local	9	5
papers in conference proceedings	30	29
international	24	14
local	6	16
other publications	24	24
Reports	18	45
Conferences		
participated (# of conferences)	39	17
participated (# of part. from ICCE)	78	38

RESOURCES	1998	1999
Space (sq.m.)		
laboratories	473.6	585
library + seminar room	98	73.6
faculty offices	767.4	724
Computers		
workstations*	8	44
personal computers*	150	160
Library resources		
books	4127	4265
booklets	862	1085
journals subscribed	5	6

*Classification into workstations and personal computers changes due to technical standards modifications.

2 Staff

2.1 Senior Faculty

By Senior Faculty we understand Professors, Associate Professors, Assistant Professors, and Senior Lecturers. In project participation lists, the reader is referred to the project listing in Chapter 4. Project leaderships are listed in bold.

room 570
tel. 660 7648
A. Bogobowicz@ia.pw.edu.pl

Agnieszka Bogobowicz Assistant Professor, Control and Systems Division.

M.Sc. 1976 from WUT, Ph.D. 1987 from Polish Academy of Sciences. With WUT since 1998.

In 1976 she was appointed by the Institute of Meteorology and Water Management. In 1981 the team was moved to the Institute of Geophysics of the Polish Academy of Sciences. Between 1988 and 1992 she was a Visiting Assistant Professor in the Departments of Civil Engineering and Earth Sciences of the University of Waterloo, Canada. In 1992 she was offered a regular appointment of an Assistant Professor in the Department of Systems Design Engineering of the University of Waterloo. She held the post until 1996. In 1991 she worked at Ecole Polytechnique, France (CNRS grant was obtained). From 1996-1998 she held the posts of an Assistant Professor at the Polish-Japanese Institute of Computer Techniques and the Institute of Biocybernetics and Biomedical Engineering of Polish Academy of Sciences. She is a member of the Polish Mathematical Society, American Association for Advancement of Science, the Polish Society of Applied Electromagnetism. She is an Associate Editor of the Journal of Computing and Information.

Interests: dynamic systems, scientific computing and information modelling

Project participation: **[P19]**

Publications: [I1]

M.A.Brdys@bham.ac.uk

Mieczysław A. Brdyś Associate Professor, professor since 1992.

M.Sc. 1970, Ph.D. 1974, D.Sc. 1980 from WUT.

From 1974-1983, he held the posts of Assistant Professor and Associate Professor at the Warsaw University of Technology. In 1992 he became Full Professor of Control Systems in Poland.

Between 1978 and 1995, he held various visiting faculty positions at the University of Minnesota, City University, De Montfort University and University Polytecnic of

Catalonia. Since January 1989, he has held the post of Senior Lecturer in the School of Electronic and Electrical Engineering at The University of Birmingham, UK.

He has served as the Consultant for the Honeywell Systems and Research Center in Minneapolis, the GEC Marconi and the Water Authorities in UK, France, Germany, Spain and Poland. His research is supported by the UK Research Council and industry and the European Commission. He is the author or co-author of about 100 refereed papers and 5 books.

His current research interests include intelligent control of nonlinear and uncertain systems, robust monitoring and operational control with application to environmental systems.

He is a Charter Engineer, a Member of the IEE and the IEEE , a Fellow of IMA and a member of IFAC Technical Committee on Large Scale Systems.

Paweł Domański Assistant Professor, Control and Systems Division until September, 1999.

room 572a
tel. 660 7120
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

Publications: [I3]

Władysław Findeisen Professor Emeritus (part-time), Control and Systems Division.

room 524
tel. 660 7397 and 825 0995
W.Findeisen@ia.pw.edu.pl

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

Founder and Director of ICCE (1955–1981), elected and re-elected Rector of WUT (1981–1985). Member of Polish Academy of Sciences (PAN) since 1971. Doctor Honoris Causa of The City University in London (1984), Warsaw University of Technology (1996), Gdańsk University of Technology (1997), Technische Universität Ilmenau (1998). Chairman of the Social Council to the Primate of Poland (1986–90), Vice-President of the Polish Academy of Sciences (PAN)(1990–1992), Senator of the Republic of Poland (1989–93), President of "Kasa Mianowskiego" (a foundation which sponsors foreign scientists in Poland) (since 1991), Vice-President of the Polish Commitee for UNESCO (since 1999).

Publications: [Ro1]

Anatol Gosiewski Professor, Robotics and Operation Research Division.

room 565
tel. 660 7750 and 825 5280
A.Gosiewski@ia.pw.edu.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

Project participation: [P2], [P8]

room 25
tel. 6607640,
J.Granat@ia.pw.edu.pl

Janusz Granat Assistant Professor, Optimization and Decision Support Division.

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

With WUT since 1987

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

Project participation: [P1]

Publications: [I10], [LC14]

Reports: [R38]

room 525
tel. 660 7699
J.Gustowski@ia.pw.edu.pl

Jerzy Gustowski Senior Lecturer, Control and Systems Division.

M.Sc. 1979 from WUT.

With WUT since 1979

Interests: low level software for computer control, interfacing, single-chip microcomputers, PLC controllers

Project participation: **[P22]**

Reports: [R5]

room 572
tel. 660 7632
A.Karbowski@ia.pw.edu.pl

Andrzej Karbowski Assistant Professor, Control and Systems Division.

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

With WUT since 1983. Research visitor, Politecnica di Milano and Universita di Genova, 1992. Member of IFAC

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 integrated services digital telecommunication networks

Project participation: [P6], [P12], [P9], [P1], **[P21]**, [P21]

Publications: [I5], [IC4], [IC7], [LC2]

Reports: [R4], [R8], [R9], [R11]

room 554
tel. 660 7866
W.Kasprzak@ia.pw.edu.pl.

Włodzimierz Kasprzak Assistant Professor, Robotics and Operation Research Division.

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

With WUT since 1997. Member of Polish Section of IAPR

Interests: computer vision, neural networks, knowledge-based systems,

Project participation: **[P18]**, [P32]

Publications: [I2]

room 571
tel. 660 7861
Z.Komor@ia.pw.edu.pl

Zygmunt Komor Senior Lecturer, Control and Systems Division.

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

With WUT since 1964

Interests: automatic control, control instrumentation design and implementation,

Tomasz J. Kruk Assistant Professor, Control and Systems Division.

room 530
tel. 660 7922
T.Kruk@ia.pw.edu.pl

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

With WUT since 1999.

Interests: distributed operating systems, computer networks, parallel programming

Krzysztof Malinowski Professor and Head, Control and Systems Division. Director of the Center for Control and Information-Decision Technology (from 1 October 1999).

room 517
tel. 660 7397 and 825 0995
K.Malinowski@ia.pw.edu.pl

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 (since Sept. 1996 till Aug. 1999), Director of the Center for Control and Information Decision Technology (since Oct. 1999). Member of the Senate of Warsaw University of Technology (since 1993), Chairman of the Senate Committee on Academic Staff (1993–1996 and 1999–2002), Chairman of the 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 Polish Academy of Sciences (PAN) (since 1998), Member of the Scientific Society of Warsaw (TNW). Member of the 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), Member of the Scientific Council of the Industrial Institute for Automotion and Measurement(PIAP), Member of the Council on Informatics to the Prime Minister of Poland, Member of the IFAC Technical Committee on Control.

Interests: hierarchical control, model-based predictive control of nonlinear systems, applications of optimization

Project participation: [P6], [P1], [P26], [P27], **[P29]**

Publications: [Ro1], [I9], [IC1], [IC2], [IC8], [IC9], [LC4]

Ewa Niewiadomska-Szynkiewicz Assistant Professor, Control and Systems Division.

room 572
tel. 660 7632
E.Niewiadomska@ia.pw.edu.pl

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

Research Assistant at the Institute of Geophysics of Polish Academy of Sciences in (1987–88), with WUT since 1988

Interests: large scale systems, hierarchical control, computer simulation, computer aided control systems design, environmental systems management, decision support systems, distributed computations, global optimization

Project participation: **[P6]**, **[P12]**, **[P9]**, [P1], **[P25]**

Publications: [I8], [IC10], [IC14], [LC6], [LC7], [OC4]

Reports: [R16], [R17], [R18], [R21]

Krzysztof Nowosad Assistant Professor, Control and Systems Division.

rooms 567 and 036
tel. 660 7860 and 660 7757
K.Nowosad@ia.pw.edu.pl

M.Sc. 1973, Ph.D. 1979, D.Sc. 1997 from WUT.

With WUT since 1978

Interests: stability and performance analysis of predictive regulators, programmable logic controllers, industrial electronics

Project participation: [P6], [P10], [P13], [P28]

room 522
tel. 660 7733
A.Pacut@ia.pw.edu.pl

Andrzej Pacut Assistant Professor, Control and Systems Division

M.Sc 1969, Ph.D. 1975 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. Member of IEEE and INNS (Int. Neural Networks Society)

Interests: system identification, neural modeling, neural networks, learning systems, probabilistic modeling

Project participation: **[P3]**, [P8], **[P16]**, **[P17]**, **[P24]**, **[P26]**, **[P27]**, [P11], **[P30]**, **[P31]**

Publications: [IC3], [IC6]

Reports: [R4], [R19], [R20]

room 22/23
tel. 660 7750 and 8255280
J.Paczynski@ia.pw.edu.pl

Jerzy Paczyński Assistant Professor, Optimization and Decision Support Division.

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

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

Interests: transformations of formal languages - tools and applications, application of computer algebra and logic programming to systems theory and optimization

Project participation: **[P1]**

Reports: [R43]

room 560a
tel.660 7864
K.Pienkosz@ia.pw.edu.pl

Krzysztof Pieńkosz Assistant Professor, Robotics and Operation Research Division.

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.

Project participation: **[P5]**, [P4]

Publications: [I4], [L1], [IC11]

room 560a
tel. 660 7864
G.Ploszajski@ia.pw.edu.pl

Grzegorz Płoszajski Assistant Professor, Robotics and Operation Research Division.

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

With WUT since 1969. Deputy Director for Information of the Main Library of WUT since 1996

Interests: control and simulation of discrete production systems, e.g assembly lines, production management, quality management

rooms 530, 319GG
tel. 660 7922, 660 5392
T.Rogowski@ia.pw.edu.pl

Tadeusz Rogowski Senior Lecturer (part time), Optimization and Decision Support Division.

M.Sc. 1972.

Optimization and Decision Support Division. With WUT since 1972, Director of University Computer Center since 1989

Interests: computer network, programming languages, operating systems

Project participation: [P1]

Stefan Romicki Assistant Professor, Control and Systems Division.

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.

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

Project participation: [P8], [P23], [P11]

Krzysztof Sacha Assistant Professor, Control and Systems Division.

room 562
tel. 660 7756
K.Sacha@ia.pw.edu.pl

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), member of IEEE Computer Society

Interests: software technology for real-time applications with the emphasis on software specification and design methods, and distributed operating systems

Project participation: [P2], **[P7]**, **[P20]**, **[P15]**

Publications: [L2], [L3], [IC12], [LC8]

Reports: [R10]

Tomasz Sikorski Assistant, Robotics and Operation Research Division.

room 555
tel. 660 7997
T.Sikorski@ia.pw.edu.pl

M.Sc. 1994 from WUT. Ph.D. 1999 from WUT.

With WUT since 1999.

Interests: operation research, discrete optimization, real time control.

With WUT since 1999.

Interests: operation research, discrete optimization, real time control

Project participation: [P5]

Publications: [LC9], [LC10], [LC12], [LC16]

Reports: [R14], [R23], [R23], [R24], [R25], [R26], [R27], [R37], [R38], [R38], [R39]

Andrzej Stachurski Assistant Professor, Optimization and Decision Support Division.

room 25a
tel. 660 7640
A.Stachurski@ia.pw.edu.pl

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

Project participation: [P1]

Publications: [B1]

room 555
tel. 660 7997
C.Szwed@ia.pw.edu.pl

Cezary Szwed Assistant Professor, Robotics and Operation Research Division.

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

With WUT since 1999.

Interests: operation research, timetabling, discrete optimization, combinatorial algorithms

Reports: [R14], [R23], [R24], [R28], [R29], [R38]

room 530
tel. 660 7922
J.Szymanowski@ia.pw.edu.pl

Jacek Szymanowski Professor, Control and Systems Division.

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

Interests: simulation of control systems, linear and nonlinear programming, control applications of optimization techniques, operating systems

Project participation: [P1], **[P14]**

Reports: [R30]

room 554
tel. 660 7866
W.Szynkiewicz@ia.pw.edu.pl

Wojciech Szynkiewicz Assistant Professor, Robotics and Operation Research Division.

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

With WUT since 1985. Deputy Director of the Center for Control and Information Decision Technology (since November, 1999)

Interests: multiple robots coordination, robot motion space analysis and sensor based trajectory planning, real-time operating systems

Project participation: [P2], [P8], **[P23]**, [P27], **[P11]**, **[P32]**

Publications: [L5]

Reports: [R45], [R46], [R47], [R48], [R49], [R50]

room 521
tel. 660 7397 and 825 0995
P. Tatjewski@ia.pw.edu.pl

Piotr Tatjewski Professor, Control and Systems Division. Director of the Institute.

M.Sc. 1972, Ph.D. 1976, D.Sc. 1988 from WUT.

With Warsaw University of Technology since 1972. Ph.D. in automatic control in 1976, D.Sc. in 1988. Head of Process Control Group since 1991, Deputy Director of ICCE for Academic Affairs (1987–91), 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 (1992/93). Member of the FEIT Board for Graduate Studies, Member of the FEIT Committee on the Faculty Structure and Organization. Member of the IFAC Education Committee.

Interests: multilayer control systems, process control and optimization, decomposition methods in optimization and control, soft computing methods

Project participation: **[P10]**, [P26], [P27], **[P13]**, **[P28]**, [P28]

Publications: [I3], [IC13], [LC3], [LC5]

Reports: [R33]

Eugeniusz Toczyłowski Professor, Robotics and Operation Research Division.

room 516
tel. 660 7950
E.Toczylowski@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 Group, 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

Interests: structural approaches to discrete optimization, operations research and management, management information systems

Project participation: [P5], **[P4]**, [P26], [P27]

Publications: [LC9], [LC10], [LC11], [LC12], [LC13], [LC14], [LC16]

Reports: [R14], [R15], [R23], [R23], [R24], [R25], [R27], [R32], [R34], [R35], [R36], [R37], [R38], [R39], [R40], [R41]

Tomasz Traczyk Assistant Professor, Robotics and Operation Research Division.

room 561
tel. 660 7123
T.Traczyk@ia.pw.edu.pl

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

Publications: [L4], [OC6]

Reports: [R38], [R41]

Wiesław Traczyk Professor and Head, 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 Automation and Robotics Committee of Polish Academy of Sciences (PAN). Chairman of FEIT Committee for Ph.D. Degrees in Automatic Control and Computer Sciences, Member of FEIT Committee on Academic Staff Development and Commitee of Education. Head of ICCE Optimization and Decision Support Division since 1997.

Interests: knowledge engineering, expert systems, artificial intelligence

Project participation: [P1], [P26], [P27]

Publications: [OC7]

room 24
tel. 660 7750 825 5280
A.Wierzbicki@ia.pw.edu.pl

Andrzej P. Wierzbicki Professor, Optimization and Decision Support Division.

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 (1971–75), Deputy Dean and then Dean of FEIT(1972–1978) member of the Senate (1975–78), member or chairman of many university commissions. Since 1978 working with the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria and served (1979–84) as the chairman of the Systems and Decision Sciences Program. Visiting prof. at the University of Minnesota, Minneapolis, MN, Brown University, Providence, RI (1970–71), and Kyoto University, Japan (1989–90). Director of the National Institute of Telecommunications in Poland since 1996. Chairman of the Commission of Applied Research of the State Commitee for Scientific Research (KBN)(1991–1999) Chairman of the Consulting Panel for Promotion and Policy of Science of State Committee for Scientific Research (KBN) (since 1994), Member of the Consulting Panel for Computer Infrastructure of Science KBN (since 1994). 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), Chairman of its Section on Decision Support Systems (since 1992), Member of the presidium of the Committee of Future Research "Poland in XXI Century" of 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 (since 1995). Member of Polish Mathematical Society (PTM) (since 1975) and of Society of Polish Electrical Engineers (SEP) (since 1970). Recepient of George Cantor Award of the Int. Soc. of Multi-Criteria Decision Making for his results in multicriteria 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

Project participation: **[P1]**

Publications: [B1], [I10]

Reports: [R43]

room 560
tel. 660 7665
A.Wozniak@ia.pw.edu.pl

Adam Woźniak Assistant Professor, Control and Systems Division.

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 to present)

Interests: control of complex systems, servomechanisms, robot control, multicriteria optimization, game theory, decision support systems

Project participation: [P6], [P8], [P11]

Publications: [LC1]

room 565
tel. 660 7750, 8255280
C.Zielinski@ia.pw.edu.pl

Cezary Zieliński Professor, Robotics and Operation Research Division.

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

With WUT since 1985. Research visitor at Loughborough University of Technology, UK (1992), Visiting professor at Nanyang Technological University (since 1 September 1999), Secretary of Priority Research Program in Control, Information Technology, and Automation (PATIA). Member of the Editorial Board of International Journal of Intelligent Mechatronics: Design and Production. Member of the Rector's Committee for Research (since Oct. 1996), Member of FEIT Committee for Awards and Distinctions (since Oct. 1996)

Interests: robot programming languages, open-structure robot controllers, robot kinematics, digital and microprocessor systems

Project participation: [P2], **[P8]**, [P23], [P26]

Publications: [L5]

Reports: [R45], [R46], [R47], [R48], [R49], [R50]

2.2 Supporting Faculty and Staff

Here we list Lecturers, Assistants, and Research Associates, as well as Technical Staff

Piotr Bolek Software Engineer, Control and Systems Division.

room 560
tel. 660 7665
P.Bolek@ia.pw.edu.pl

M.Sc. 1991 from WUT.

With WUT since 1991

Interests: operating systems, UNIX, symbolic calculations, computer networks, parallel and distributed computing, game theory, text processing, electronic publications, TeX, perl, SGML, HTML, PDF, databases

Publications: [LC1], [LC7], [O1], [O2], [O3], [O4], [O5], [O6], [O7], [O8], [O9], [O10], [O11], [O12], [O13], [O14], [O15], [O16], [O17], [O18], [O19], [O20], [OC1], [OC2], [OC3], [OC5]

Krzysztof Kierzenkowski Assistant, Robotics and Operation Research Division.

room 561
tel. 660 7123
K.Kierzenkowski@ia.pw.edu.pl

M.Sc. 1992 from WUT.

With WUT since 1993

Interests: parallel and distributed computation, robot control systems, machine vision, image processing,

Urszula Kręglewska Senior Engineer, Control and Systems Division.

room 562
tel. 660 7756
U.Kreglewska@ia.pw.edu.pl

M.Sc. 1973.

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

Interests: computer interfaces designing, microprocessor systems design

Project participation: [P2]

Reports: [R10]

Włodzimierz Macewicz Software Engineer (senior grade), Control and Systems Division.

room 525
tel. 660 7699
W.Macewicz.@ia.pw.edu.pl

M.Sc. 1983 from WUT.

With WUT since 1983

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

room 566
tel. 660 7649
P.Misiurewicz@ia.pw.edu.pl

Piotr Misiurewicz Senior R&D Engineer, Control and Systems Division.

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

With WUT since 1965. Deputy Director of ICCE (1984-93)

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

room 567
tel. 660 7860
J.Pułaczewski@ia.pw.edu.pl

Jerzy Pułaczewski Retired Associate Professor, Senior R&D Engineer, Control and Systems Division.

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

Project participation: [P10], [P13], [P28]

Publications: [LC5]

Reports: [R22]

room 519
tel. 660 7863
J.Sobczyk@ia.pw.edu.pl

Jerzy Sobczyk Lecturer, Optimization and Decision Support Division.

M.Sc. 1985 from WUT.

With WUT since 1984. FEIT Network Administrator

Interests: computer networks, programming languages, parallel and distributed programming, multicriteria optimization,

Project participation: [P1]

room 572a
tel. 660 7120
M.Warchol@ia.pw.edu.pl

Michał Warchoł Assistant, Control and Systems Division.

M.Sc. 1991 from WUT.

With WUT since 1991

Interests: predictive control, synthesis of control systems, symbolic calculations, operating systems

Project participation: [P6], [P12], [P9], [P1]

Publications: [IC2]

Reports: [R3], [R18], [R42]

room 519
tel. 660 7863
G.Wojcik@ia.pw.edu.pl

Grzegorz Wójcik Software Engineer, Optimization and Decision Support Division.

M.Sc. 1994 from WUT.

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

2.3 Ph.D. Students

E-mail addresses of Ph.d. students have form: *i.name*@elka.pw.edu.pl where *i* = first name initial, *name* = surname.

Piotr Arabas	Project participation: [P6]; Publications: [IC2], [IC1]
Paweł Białoń	
Marek Brudka	Project participation: [P8]; Publications: [IC3]; Reports: [R2], [R1]
Rafał Cegieła	Project participation: [P7]
Jarosław Chrobak	
Ewa Figielska	
Marcin Galwas	
Cezary Głowiński	
Michał Gomuliński	
Artur Jaros	
Przemysław Jaskóła	
Michał Jaworski	Project participation: [P8]
Piotr Kaczmarczyk	
Mariusz Kamola	
Remigiusz Krupa	Project participation: [P5]
Sylwester Laskowski	
Tomasz Ładziński	
Maciej Ławryńczuk	Project participation: [P10], [P28], [P13]
Andrzej Machnacz	
Przemysław Magiera	Reports: [R11]
Michał Malarski	
Piotr Marusak	Project participation: [P10], [P28], [P13]; Publications: [LC5]; Reports: [R14], [R12], [R13]
Szczepan Pacut	
Jarosław Protasiewicz	
Dariusz Radomski	Project participation: [P8], [P11]; Publications: [IC5]; Reports: [R20]
Mariusz Siomak	Project participation: [P6]; Publications: [I9]
Adam Szmigielski	
Mirosław Szpilewski	
Wojciech Tadej	
Artur Walczak	Project participation: [P5]; Publications: [LC14], [LC11], [LC12]; Reports: [R14], [R39], [R36], [R38], [R38], [R6], [R7], [R23], [R23], [R24]
Jakub Witkowski	Publications: [LC15]
Gebre Wolde Mariam	
Karol Zadora-Przyłęcki	Publications: [LC16]; Reports: [R39], [R41], [R44]
Andrzej Zalewski	Project participation: [P7]
Tomasz Żabierek	
Maciej Żmuda	Project participation: [P6], [P9], [P12]; Publications: [IC14]; Reports: [R42], [R21]

2.4 Administrative and support staff

Jolanta Cieślewicz	Librarian and Office Support.
Elżbieta Głowacka	Secretary, Student Affairs.
Maria Graszka	Office support.
Elżbieta Matyjasiak	Secretary, Main Office.
Bogdan Murzynowski	Technical Support
Jolanta Niedbało	Office support.
Irena Olszewska	Manager, Finances. M.Sc. 1979 from Warsaw University.
Jadwiga Osowska	Deputy Manager, Finances. M.Sc. 1975 from WUT.
Ryszard Tchórz	Technical support.
Daniel Wieczorek	Technical support.
Andrzej Wiśniewski	Technical support.
Beata Woźniak	Manager, Administration. M.Sc. 1993 from Warsaw University.

3 Teaching Activities 1998/99

Course Title,	Dept. Course Code	Total credits	Lecturer
Administration of UNIX and TCP/IP	ASU	4	J. Sobczyk
Arts of Negotiations	SNE	3	A. Wierzbicki
Commercial Data Bases 2	KBD2	4	T. Traczyk
Computer Networks	SKP2	3	T. Rogowski
Control	A-19	4	R. Ładziński
Control Theory	TST	4	A. Woźniak
Data Bases and Information Systems	BSSI	4	T. Traczyk
Decision Support and Design	WDIP	4	J. Granat
Digital Control Algorithms	CAR	3	J. Pułaczewski
Digital Curcuits	A-13	4	C. Zieliński
Digital Servomechanisms	SCYF	3	S. Romicki
Discrete Process Scheduling	HPD	4	E. Toczyłowski
Evolutionary Algorithms	AE1	3	F. Seredyński
Feedback Control Design	PURE	4	A. Woźniak
Foundations of Feedback Control	PRE	3	K. Nowosad
Fundamentals of Operations Research	POBO	3	E. Toczyłowski
Fundamentals of Optimization	POPTY	4+1	A. Stachurski, M. Warchoł
Fuzzy methods and evolutional strategies	MSR	4	P. Domański
Global Optimization Methods	MOG	4	E. Niewiadomska--Szynkiewicz
Identification and Control	SII	4	A. Pacut
Introduction to Control Systems	PSS	4	P. Tatjewski
Introduction to Control, Informatics, Telecommunication	WAIT	3	J. Pułaczewski
Knowledge Engineering	IW	3	W. Traczyk
Logic Circuits	UKLO	4	C. Zieliński
Measurements and Automatics	PA	2	Z. Komor
Methods of Artificial Intelligence	MSI	3	W. Traczyk
Microprocessor Techniques	TM	5	A. Rydzewski
Modeling and Control of Robots	MPSR	4	C. Zieliński
Neural Networks	SNUP	3	A. Pacut
Numerical Methods and Computer Simulation	MNSK	4	P. Tatjewski
Operation Systems	SOP2A	4+2	J. Szymanowski
Optimization and Decision Support	OWD	3	A. Wierzbicki
Optimization in Operations Research	OBO	3	E. Toczyłowski
Process Automation Techniques	TAP	3	P. Tatjewski
Programmable Controllers	SP	4	J. Gustowski
Programming 1	A-4	3	J. Paczyński
Programming 2	A-4.2	3	A. Stachurski
Programming in C	PROC	4	A. Stachurski
Real-time Systems	SCZR	4	K. Sacha
Robot Control and Programming	SPRR	3	C. Zieliński
Selected Topics in Industrial Management	WZMP	2	G. Płoszajski
Simulation and Control of Systems	SSS	3	K. Malinowski
Software Project Management	ZPI	3	K. Pieńkosz
Sofware Specification and Design	SPOP	3	K. Sacha
Statistical Models and Inference Techniques	MWS	3	A. Pacut
Structural Programming	PROS	4	J. Paczyński
Synthesis of Decision Rules	ZSRD	4	K. Malinowski
Theory of Optimization	TOP	3	A. Wierzbicki
WWW - Internet Programming	WWW	3	J. Sobczyk

4 Projects

[P1] TEMPUS grant S-JEP-11253-96: **Information Technology for Decision Support and Computer Networks – Curriculum Development**, granting period 01.09.1996–31.08.1999. Coordinator: ICCE. Principal investigators: Jerzy Paczyński, Andrzej Wierzbicki. Investigators: Janusz Granat, Andrzej Karbowski, Krzysztof Malinowski, Ewa Niewiadomska-Szynkiewicz, Tadeusz Rogowski, Jerzy Sobczyk, Andrzej Stachurski, Jacek Szymanowski, Wiesław Traczyk, Michał Warchoł, Grzegorz Wójcik.

A three-year project was succesfully completed. In the framework of this project a group of courses was restructured and some new ones were introduced — with a clear separation of subjects taught at the Bachelor of Engineering, Master of Engineering and Doctoral levels. Teaching laboratories relevant for these courses were modernized or created. A set of course materials was prepared. sets of teaching materials.

The courses include:

Distributed Computer Operating Systems (M.S. level), taught for the first time in the Summer semester 1999/2000;

Parallel and Distributed Computations (M.S. level), taught for the first time in the Winter semester 1999/2000;

Foundations of Optimization (B.S. level) and Theory of Optimization (M.S. level);

Foundations of Decision Support (B.S. level) and Optimization and Decision Support (M.S. level);

Knowledge Engineering (B.S. level) and Methods of Artificial Intelligence (M.S. level);

Advanced Modeling Languages — taught for the first time in the Summer semester 1998/1999 for Ph.D. students;

Computer Networks (B.S. level).

[P2] KBN grant 1005/T11/95/09: **A fast robot without configuration constraints and a dynamically decoupled arm**, granting period 01.09.1995–28.02.1999. Coordinator: Institute of Aeronautics and Applied Mechanics (ITLIMS). Principal investigator: Kazimierz Nazarczuk. Investigators: Anatol Gosiewski, Andrzej Grodecki, Urszula Kręglewska, Krzysztof Sacha, Wojciech Szynkiewicz, Cezary Zieliński.

The goal of the research was to design and construct an arm and a control hardware and software for the fast robot. The arm has no configuration constranints and was designed by the team from ITLiMS PW, and the control hardaware and software by the team from IAIS PW. The arm is actuated by three DD and three AC motors. The control hardware consists of a three processor computer in a VME standard. Two real time operating systems, namely QNX and OS-9, are used. The control software is based on MRROC++ system.

[P3] KBN grant 8T11A02311: **Function approximation, regularization and model reduction with application to system dynamic modeling via neural networks**, granting period 02.07.1996–31.05.1999. Coordinator: Institute of Control and Industrial Electronics (ISEP). Subcontractor: ICCE. Principal investigators: Bartłomiej Beliczyński, Andrzej Pacut.

The project scope has been framed into the fallowing research tasks: generalization of uniqueness parametrization results for the networks with different activation

function, determination of sufficient convergence conditions for one-hidden- layer networks, determination of existence of NARMA models for nonlinear dynamics systems, comparison of efficiency selected and new methods of regularization and model reduction, construction of incremental algorithms for one-hidden layer networks, application of model reduction and regularization methods to neural networks, investigation of convergence, rate of approximation and robustness for one-hidden-layer neural networks, application of the created methodology for modeling nonlinear dynamic systems. This project's results were published in 18 technical papers and presented at a number of conferences.

[P4] KBN grant PB 717/T11/96/11: **Development of structural optimization methods for production scheduling**, granting period 01.07.1996–01.07.1999. Coordinator: ICCE. Principal investigator: Eugeniusz Toczyłowski. Investigators: Krzysztof Pieńkosz, Franciszek Seredyński.

The basic aim of the project was to develop and analyze composite planning and scheduling algorithms for efficient solution of large-scale decision problems for discrete processes that appear mainly in production systems. A selection of various structural discrete optimization methods and techniques for scheduling of discrete processes was investigated

[P5] KBN grant PB 788/T11/97/13: **Robust methods for management and control of manufacturing systems in the case of disturbances**, granting period 01.09.1997–30.06.2000. Coordinator: ICCE. Principal investigator: Krzysztof Pieńkosz. Investigators: Remigiusz Krupa, Krzysztof Maik, Franciszek Seredyński, Tomasz Sikorski, Eugeniusz Toczyłowski, Artur Walczak.

The aim of the project is to develop planning and scheduling methods for manufacturing systems in the case when some disturbances occur due to uncertain demands, machine tools breakdowns, absence of employees, etc. Both predictive and reactive scheduling algorithms are investigated which allow to reduce the effects of disturbances. A multi-agent approach is also analysed, where the manufacturing system is modeled as a distributed system with relatively independent units.

[P6] KBN grant 8T11A01115: **Control structures and algorithms for complex systems, computational methods and applications**, granting period 01.09.1998–31.08.2000. Coordinator: ICCE. Principal investigator: Ewa Niewiadomska-Szynkiewicz. Investigators: Piotr Arabas, Andrzej Karbowski, Krzysztof Malinowski, Krzysztof Nowosad, Mariusz Siomak, Michał Warchoł, Adam Woźniak, Maciej Żmuda.

The goal of the project is to develop and implement control structures and algorithms for large scale systems. The focus is to apply the proposed control methods (hierarchical structures, predictive control algorithms, fuzzy sets, dynamic programming, neurodynamic programming) to selected real-life complex problems and test their effectiveness through simulation experiments. The considered case studies include: air defence, control of oil department in petrochemical works, flood control in multireservoir systems, optimal portfolio selection.

[P7] PATIA grant: **Safety and Reliability Analysis for the Software Domain**, granting period 05.08.1998–31.05.1999. Coordinator: ICCE. Participation: Institute of Computer Science (II). Principal investigator: Krzysztof Sacha. Investigators: Rafał Cegieła, Andrzej Zalewski.

Safety and reliability are among the most important issues which must be addressed in the development of any dependable software system. The methods which can be

applied to produce safe and reliable software remain still an open research problem. The subject of this project was an evaluation of the current practices and methods to be used within the software lifecycle in order to improve the software safety and reliability. An important part of the research was focused on application of Petri net-based models to safety analysis. The other part of the work is related to the analysis of various aspects of testing, which is an important factor of software reliability.

[P8] PATIA grant: **Control in complex robotic and adaptive systems**, granting period 01.08.1998–31.05.1999. Coordinator: ICCE. Participation: Institute of Automatic Control and Robotics (IAR), Institute of Aeronautics and Applied Mechanics (ITLIMS), Institute of Manufacturing Technology (ITM). Principal investigator: Cezary Zieliński. Investigators: Marek Brudka, Anatol Gosiewski, Michał Jaworski, Andrzej Pacut, Dariusz Radomski, Andrzej Rydzewski, Wojciech Szynkiewicz, Adam Woźniak.

The project consisted of the following tasks: - improvement and investigations of a laboratory stand containing the RNT robot equipped for machining soft materials - improvement and investigations of the RNT robot control system (electronic module controlling the rotational velocity of the machining tool, electronic module with digital inputs and outputs, improvement of robot axis control algorithms, new robot motion trajectory generators) - adaptive control utilising non-linear models (application of ultrasonic imaging to robot grasping, utilization of random fields and wavelet transforms in image reconstruction, inverse model adaptive control)

[P9] PATIA grant: **Optimization in complex systems - methods and applications**, granting period 01.08.1998–31.05.1999. Coordinator: ICCE. Participation: Institute of Agricultural Machinery and Facilities, Institute of Electronic Systems (ISE), Institute of Environmental Engineering Systems (ISIS), Institute of Aeronautics and Applied Mechanics (ITLIMS). Principal investigator: Ewa Niewiadomska-Szynkiewicz. Investigators: Andrzej Karbowski, Michał Warchoł, Maciej Żmuda.

The objective of the project was to implement selected methods of linear and nonlinear optimization and apply them to decision making process concerning planning and controlling of complex systems. The main research tasks included: software environment and library of methods for global optimization, linear programming in optimal synthesis, parallel algorithm for time-domain aeroelastic analysis, parallel version of Greengard-Rokhlin algorithm, and optimal strategy for water quality improvement.

[P10] PATIA grant: **Algorithms and software for advanced control and diagnostics of industrial processes**, granting period 01.08.1998–01.07.1999. Coordinator: Institute of Automatic Control and Robotics (IAR). Subcontractor: ICCE. Principal investigators: Piotr Tatjewski, Jan M. Koscielny. Investigators: Piotr Marusak, Krzysztof Nowosad, Jerzy Pułaczewski, Maciej Ławryńczuk.

The goal of the project was a further development of algorithms and software modules for upper-layer (supervisory) control of industrial processes, i.e., advanced control (multistep predictive control with constraints, nonlinear predictive control), set-point optimisation, identification and diagnostics. Pilot industrial implementation of the diagnostic system DIAG in the power plant Siekierki (Warsaw) has been started. Control systems for a new pilot production line in the Laboratory of Technological Processes (Faculty of Chemistry) has been designed and control equipment was purchased. The installation is planned to be used in the future as a testbed for new control algorithms, and for training purposes.

The tasks were performed by a team of researchers and PhD students of four collaborating institutes from different faculties of Warsaw University of Technology.

[P11] CATID grant: **Perception and Control robotic and adaptive systems**, granting period 01.10.1999–31.05.2000. Coordinator: ICCE. Participation: Institute of Aeronautics and Applied Mechanics (ITLIMS), Institute of Automatic Control and Robotic (IAR), Institute of Manufacturing Technology (ITM). Principal investigator: Wojciech Szynkiewicz. Investigators: Andrzej Pacut, Dariusz Radomski, Andrzej Rydzewski, Adam Woźniak.

The project consists of the following tasks: improvement and investigation of a laboratory stand containing the RNT robot equipped with a coupler enahling quick chawegover of tools for various tasks, improvement and investigations of a new very fast prototype robot POLYCRANK with DD motors, improvement of the POLYCRANK and RNT robot control systems (electronic module for measuring forces, new servo alrithms for POLYCRANK robot, new robot motion trajectory generators), motion planning methods for multi-robot systems, adaptive systems (adaptive detection methods in digital image sequence analysis, inverse model adaptive control of the infusion pump), application of neural networks to induction motor drive approximation.

[P12] CATID grant: **Optimization and parallel computation in complex systems - methods and application**, granting period 01.10.1999–31.05.2000. Coordinator: ICCE. Principal investigator: Ewa Niewiadomska-Szynkiewicz. Investigators: Andrzej Karbowski, Michał Warchoł, Maciej Żmuda.

The basic goal of the project wa to develop library of global optimization methods, comparative study of optimization techniques, implementation of these alghoritms in case studies ranging from water resources managment, through electronical circuit design, to mechanics Particular attention is given to parallel and distributed computations.

[P13] CATID grant: **Algorithms and software for advanced control and diagnostics of industrial processes**, granting period 01.10.1999–31.05.2000. Coordinator: Institute of Automatic Control and Robotic (IAR). Subcontractor: ICCE. Principal investigators: Piotr Tatjewski, Jan M. Kościelny. Investigators: Piotr Marusak, Krzysztof Nowosad, Jerzy Pułaczewski, Maciej Ławryńczuk.

The goal of the project is a further development of algorithms and software modules for upper-layer (supervisory) control of industrial processes, i.e., advanced control (multistep predictive control with constraints, nonlinear predictive control), set-point optimisation, identification and diagnostics. The first version of the software system REG2A for advanced control will be completed. Control system for a new pilot production line in the Laboratory of Technological Processes (Faculty of Chemistry) will be designed and control the installation completed. The installation is planned to be used in the future as a process for testing new control algorithms, and for training purposes.

The tasks were performed by a team of researchers and PhD students from four collaborating institutes from different faculties of Warsaw University of Technology.

[P14] Rector's grant 503/006/8: **An optimal differential model for antipersistent fractional motion**, granting period 30.05.1998–30.05.1999. Coordinator: ICCE. Principal investigator: Jacek Szymanowski.

Tis work deals with the study of fractional Brownian motion (fbm) and fractional Gaussian noise (fgn). It is quite impossible to obtain simulation algorithm which satisfies all the properties of (fbm). The model of BARNES and ALLAN has been used, which fits very well the (fbm) for fractal dimension less than 0.5. This model leads to an infinite dimension state model. It is shown that each state is the solution of a first order equation with a time-varying parameter. The simulation thus consists in solving this non-stationary model. The discretisation problem is not evident. The solution which has been proposed uses a non uniform sampling. This sampling function is a result of optimisation of a multi-criteria function. Optimisation includes a seach for the "optimal" finite dimensional model used in simulations. Performance of this algorithm has been established for several values of the fractal dimension.

[P15] Rector's grant: **The evaluation of Profibus DP standard**, granting period 21.05.1998–31.05.1999. Coordinator: ICCE. Principal investigator: Krzysztof Sacha.

Fieldbus systems greatly influence the overall dependability of modern computer control systems. The architecture of fieldbuses differ significantly from the architecture of popular LANs. One of the most broadly used fieldbus system is Profibus, which was standardized in 1991. A few years ago the standard has been updated and much faster Profibus DP has been introduced to the market. The goal of this project is to instal Profibus DP in the laboratory of real-time systems, integrate the fieldbus within the programming environment of the laboratory and to evaluate the real speed of the network communication.

[P16] Rector's grant: **Reinforcement learning**, granting period 21.05.1998–31.05.1999. Coordinator: ICCE. Principal investigator: Andrzej Pacut.

The project is directed into modeling of learning systems with special attention paid to reinforcement learning. The following topics are discussed in final report: Averaging in Poisson models of learning neuron, diffusion models of neuron and their simplifications, first passage time calculations for neural models, autor - critic reinforcement, reinforcement with multiple critics, behavioral reinforcement.

[P17] Rector's grant: **Identification of quantizer's input signal for use in IEEE and EUPAS norms**, granting period 01.06.1999–31.05.2000. Coordinator: ICCE. Principal investigators: Konrad Hejn, Andrzej Pacut.

The goal of the project is to develop a theory aimed into modification of IEEE and EUPAS norms in the area of diagnostics of analog-to-digital converters.The main effort is directed into estimation of the effective resolution through estimation of input (analog) signal parameters.

[P18] Rector's grant 503G/0080/009: **Adaptive method of space transformation-based**, granting period 01.07.1999–31.05.2000. Coordinator: ICCE. Principal investigator: Włodzimierz Kasprzak.

In this research work an adaptive (ANN-learning based) approach to the classification of well-defined digital image windows is developed. The applied classification method is based entirely on image space transformation. In practice, a three-step image analysis system can be designed, which consists of following steps: 1. image window extraction - providing a solution of the image framing problem and the window-to-vector signal transformation; 2. vector signal compression - a Karhunen-Loeve transformation of the vector representation space, resulting in a

strong representation reduction; 3. reduced vector classification - a linear or non-linear space transformation for the differentiation between image classes.

The first step is performed by mostly conventional, computation techniques and it is out of scope of this research. The project deals with adaptive realizations of the next two space transformation steps. Two adaptive methods - learning algorithms in artificial neural networks (ANN) - are developed, which solve the compression and classification tasks: A. principal component analysis (PCA) or principal subspace analysis (PSA) based compression of the vector signal; B. a supervised learning vector quantifier (LVQ) method, which performs a discriminant analysis (DA) in the reduced space, i.e. the class border detection in this space.

[P19] Rector's grant 503G/0070/009: **Entropy production in nonlinear hiperbolic systems**, granting period 01.07.1999–31.05.2000. Coordinator: ICCE. Principal investigator: Agnieszka Bogobowicz.

An approximation of singularities occuring in the phase space of hyperbolic systems was contructed. Such approximation enables for a process recognition in open systems. The assumption of research is that not all conceivable interactions in equations must be taken into consideration. The simulating system generates some emerging properties.

[P20] Rector's grant 503G/0090/009: **Internet viewier for Profibus network**, granting period 27.05.1999–31.05.2000. Coordinator: ICCE. Principal investigator: Krzysztof Sacha.

Fieldbus systems influence greatly the overall dependability of modern computer control systems. The architecture of fieldbus differ significantly from the architecture of popular LANs. One of the most broadly used fieldbus system in Profibus, which was standarized in 1991. The goal of this project is to develop an internet viewier for Profibus systems.

[P21] Dean's grant 503/010/8: **Theory and computational methods of the optimal synthesis in multicriteria case**, granting period 01.07.1998–31.05.1999. Coordinator: ICCE. Principal investigator: Andrzej Karbowski. Investigators: Andrzej Karbowski.

The aim of the project is elaboration of a unified theory and effective numerical methods of optimal control of dynamic systems in the case of multiple performance criteria. They may have the form of optimized indices or constraints of functional type.

[P22] Dean's grant 503/013/8: **Adaptive control algorithms of strongly nonlinear objects with bounds**, granting period 01.07.1998–31.05.1999. Coordinator: ICCE. Principal investigator: Jerzy Gustowski.

Project is a continuartion of a previous Dean's grant. The main goal is to prepare neural network control algorithms combining the analitycal knowledge of the object and the data derived from real experiments.

[P23] Dean's grant 503/011/8: **MRROC++ controller for the IRp-6 robot mounted on a track**, granting period 01.07.1998–31.05.1999. Coordinator: ICCE. Principal investigator: Wojciech Szynkiewicz. Investigators: Andrzej Rydzewski, Cezary Zieliński.

In the design process of the controller for the IRp-6 robot mounted on a track it was assumed that it will be only one of the effectors working within the controlled

system, so a formalized approach to structuring the controller of a multi-robot system has been adopted. The resulting structure renders programming multi-robot systems, on the one hand, relatively simple and, on the other hand, does not limit the hardware configuration that can be controlled and programmed. An open system has been produced. The adopted strategy is especially well suited to research-oriented robot controllers which have to facilitate the execution of often changing complex tasks requiring different hardware configurations (e.g. diverse sensors, varying number of robots and cooperating devices). An object-oriented approach to the implementation of a software library (MRROC++), which contains building blocks for the construction of multi-robot system controllers tailored to meet specific demands of a task at hand, has been used.

The overall structure of the MRROC++ system is dictated by theoretical considerations which resulted in the division of the system into independent processes running concurrently either on separate computers connected into a network or on a single computer in a time-sharing fashion or both. The choice is made by the programmer implementing a specific task. With each of the effectors an Effector Control Process (ECP) is associated. The coordinating process is called the Master Process (MP). Each virtual sensor is implemented as a Virtual Sensor Processes (VSP) running concurrently to the other VSPs and ECPs. Each ECP creates or kills Virtual Sensor Processes according to the needs of control of motion. The ECP-s in each step obtain data from the VSPs. Both kinds of processes can be treated as device dependent drivers. In this way, if only one component of the system is changed the remaining components remain unaltered. A more elegant structure of the software component of the system can be obtained, if each ECP is partitioned into ECP proper and the Effector Driver Process (EDP).

[P24] Dean's grant 503G/0150/009: **Identification of quantizer's input signal for me in IEEE and EUPAS norms**, granting period 01.07.1999–31.05.2000. Coordinator: ICCE. Participation: Institute of Electronic Systems (ISE). Principal investigator: Andrzej Pacut.

The goal of the project is to develop theory aimed into a modification of IEEE and EUPAS norms in the area of diagnostics of analog-to-digital converters. The main effort is directed into estimation of the effective resolution through estimation of input (analog) signal parameters.

[P25] Dean's grant 503G/0140/009: **Computer aided control systems analysis and synthesis**, granting period 01.07.1999–31.05.2000. Coordinator: ICCE. Principal investigator: Ewa Niewiadomska-Szynkiewicz.

The goal of the project was to develop the methodology for computer aided analysis and synthesis of complex systems control. The work was focused on hierarchical and global optimization, multilevel control structures and predictive control. Particular attention was given to distributed and parallel computer simulation.

[P26] Statutory grant 504G/0368: **Developement of control, decision support and production management**, granting period 01.06.1998–15.04.1999. Coordinator: ICCE. Principal investigator: Andrzej Pacut. Investigators: Krzysztof Malinowski, Piotr Tatjewski, Eugeniusz Toczyłowski, Wiesław Traczyk, Cezary Zieliński.

[P27] Statutory grant 504G/036/9: **Development of methodology of control, decision support and production management**, granting period 01.06.1999–15.04.2000. Coordinator: ICCE. Principal investigator: Andrzej Pacut. Investigators: Krzysztof

Malinowski, Wojciech Szynkiewicz, Piotr Tatjewski, Eugeniusz Toczyłowski, Wiesław Traczyk.

[P28] Grant 2453/NB-11/98: **Optimisation of the ethylene distillation column E-DA-303, part II**, granting period 17.12.1998–15.06.1999. Coordinator: Industrial Chemistry Research Institute. Subcontractor: ICCE. Principal investigator: Piotr Tatjewski. Investigators: Piotr Marusak, Krzysztof Nowosad, Jerzy Pułaczewski, Piotr Tatjewski, Maciej Ławryńczuk.

The goal of the project was to design and implement an advanced control system for the ethylene distillation unit in Petrochemical Works in Płock, in order to improve the efficiency of the plant.

[P29] Grant 501E/0040/000: **Development of software tools for production and investry management at the Oil Division of PETROCHEMIA PŁOCK SA - Stage I**, granting period 14.04.1999–30.09.1999. Coordinator: ICCE. Principal investigator: Krzysztof Malinowski.

The objective of this work - at stage 1 - was to define both models and tasks concerned with the management of the Oil Division of the rafinery. The top-down approach was proposed, whereby scheduling of the three main production plants within the OD would be per formal first. This master schedule is then used by a system of rules for management of several parks of tanks. The second stage of the project will be devoted to building of plant simulator and to verification of the proposed management rules.

[P30] Grant WZ/171/030/98: **Cooperation with Departament of Electrical&Computer Engineering at Oregon State University in Covallis, Oregon, USA**, granting period 01.07.1999–31.05.2000. Coordinator: ICCE. Principal investigator: Andrzej Pacut.

Research in the area of feedback central with the use of classical and neural techniques

[P31] Grant WZ/159/030/98: **Cooperation with Institute of Natural and Environmental Sciences of Lancaster University, United Kingdom**, granting period 01.07.1999–31.05.2000. Coordinator: ICCE. Principal investigator: Andrzej Pacut.

Research in the area of adaptive control in living organisms

[P32] Grant WZ179/030/98: **Cooperation with Institute for Robotics and Computer Control of Technical University of Braunschweig**, granting period 01.07.1999–31.05.2000. Coordinator: ICCE. Principal investigator: Wojciech Szynkiewicz. Investigators: Włodzimierz Kasprzak.

The robotics teams from the Institute of Control and Computing Engineering and the Institute for Robotics and Computer Control of Technical University of Braunschweig deal with structures and architectures of new robot controllers and the methods of their programming. Truly intelligent robotics systems, dealing appropriately with unexpected behaviour of the environment, can be obtaied only, if the system is equipped with sensors of different types and is capable of processing high volumes of information from them and executing efficient data fusion from diverse sources. The experience of both teams in dealing with above-mentioned problems fruitfully exchenged. The best forum for the discussion of problems of common interest are lectures for Ph.D. students and seminar presentations followed by discussions. This can lead to future joint research and publications.

5 Degrees Awarded

5.1 Ph.D. Degrees

[D1] Tomasz J. Kruk: *Komunikacja międzyprocesowa w rozproszonych systemach operacyjnych* (Interprocess communication in distributed operating systems), advisor Jacek Szymanowski, 23 November 1999

[D2] Tomasz Sikorski: *Analiza wybranych oriblemów optymalizacji obrotu energią elektryczną w warunkach rynkowych*, advisor Eugeniusz Toczyłowski, 14 December 1999

[D3] Cezary Szwed: *Metody dezintegracji zasobów w harmonogramowaniu zajęć elastycznego systemu studiowania*, advisor Eugeniusz Toczyłowski, 14 December 1999

5.2 M.Sc. Degrees

Advisor: E.Niewiadomska-Szynkiewicz

[D4] R.Śliwiński: *Środowiska graficzne do badania algorytmów optymalizacji*

[D5] A.Pondarzewski: *Interfejs graficzny heterogenicznego środowiska do symulacji asynchronicznej*

[D6] P.Cabak: *Biblioteka klas służąca do budowania graficznego interfejsu użytkownika w jednostkach obliczeniowych systemu CSAS&S-ANV*

Advisor: A. Karbowski

[D7] J.Chrobak: *Porównanie algorytmów neuronowych i tradycyjnych w zastosowaniu do rozwiązywania zadań syntezy optymalnej bez znanego modelu obiektu sterowania*

[D8] R.Kobyliński: *Środowisko WDM do tworzenia aplikacji rónoległych i rozproszonych na platformie MS Windows*

Advisor: K.Malinowski

[D9] M.Gomuliński: *Rozdział jednakowych zadań w rozproszonym środowisku obliczeniowym*

[D10] P.Jaskóła: *Optymalizacja procesu komponowania benzyn silnikowych*

Advisor: J.Paczyński

[D11] A.Nowakowski: *Transformacje tekstów programów w wybranych językach modelowania*

Advisor: K.Sacha

[D12] J.Mrozek: *Projekt i implementacja protokołu komunikacyjnego 7 warstwy modelu OSI przemysłowej sieci PROFIBUS*

Advisor: J.Pułaczewski

[D13] R.Charzewski: *Nieizotermiczny, przepływowy reaktor chemiczny - sterowanie i optymalizacja*

[D14] M.Chleikh: *Regulacja optymalizacyjna kolumny destylacyjnej*

Advisor: P.Tatjewski

[D15] A.Majzel: *Symulator obiektów dynamicznych, rozbudowa oprogramowania, testowanie na złożonym procesie technologicznym*

[D16] D.Mularczyk: *Symulator obiektów dynamicznych, rozbudowa oprogramowania, testowanie na złożonym procesie technologicznym*

Advisor: A.Rydzewski

[D17] W.Stępniak: *Emulator/Symulator programowo-sprzętowy mikrokomputerów firmy Microchip Technology INC z serii PIC 16C5x*

Advisor: C.Zieliński

[D18] F.Alshamkany: *Implementacja algorytmu hybrydowego sterowania robota z wykorzystaniem systemu operacyjnego czasu rzeczywistego QNX*

[D19] J.Sawoniewicz: *Specjalizowany język wysokiego poziomu przeznaczony do reaktywnego sterowania robotami*

Advisor: J.Gustowski

[D20] G.Zarzycki: *System programowania i wizualizacji pracy sterowników Allen-Bradley*

Advisor: K.Pieńkosz

[D21] W.Barański: *Środowisko sterowania wieloagentowego w warunkach zakłóceń w elastycznych systemach montażowych*

Advisor: W.Kasprzak

[D22] W.Lis: *Komputerowy system detekcji wybranych obiektów kartograficznych w obrazach cyfrowych*

Advisor: G.Płoszajski

[D23] M.Sasinowsk-Zielińska: *Rozpoznawanie elementów strukturalnych artykułów naukowych w oparciu o narzędzia OCR, w zastosowaniu do tworzenia baz danych*

[D24] A.Kowalczyk: *Porównywanie opisów bibliograficznych w oparciu o algorytmy tekstowe odporne na błędy*

Advisor: W.Szynkiewicz

[D25] M.Izdebski: *Generowanie trajektorii ruchu robota w czasie rzeczywistym*

[D26] M.Wełpa: *Graficzny interfejs użytkownika dla sterownika wielorobotowego*

Advisor: J.Sobczyk

[D27] W.Pietroń: *Kolokwium sieciowe jako element oprogramowania nowoczesnej pracowni dydaktycznej*

Advisor: G.Wójcik

[D28] M.Tutak: *Bezpieczna wymiana danych w sieci Internet*

Advisor: E.Toczyłowski

[D29] T.Śliwiński: *Wykorzystanie metody generacji kolumn do rozwiązywania wybranych zadań harmonogramowania produkcji*

[D30] J.Piotrowski: *System informatyczny wspomagający konstrukcję portfeli inwestycyjnych*

Advisor: J.Granat

[D31] P.Kędzierski: *Modelowanie matematyczne a organizacja przedsiębiorstwa*

[D32] J.Pietrzykowski: *Metoda punktu odniesienia w analizie danych*

Advisor: J. Szymanowski

[D33] M.Malarski: *Komunikacja rozproszonego systemu operacyjnego „Amoeba" w sieciach rozległych*

Advisor: T.Rogowski

[D34] B.Motoszko: *Nowoczesne techniki multimedialne w sieciach komputerowych*

[D35] R.Szombara : *Nowoczesne techniki multimedialne w sieciach komputerowych*

Advisor: A.Wierzbicki

[D36] N.Abragimowicz: *Modele symulacyjne i optymalizacyjne wspomagające ustalanie taryf telekomunikacyjnych w połączeniach międzyoperatorskich*

5.3 B.Sc. Degrees

Advisor: J.Szymanowski

[D37] A.Pogorzelski: *Opracowanie laboratoryjnej wersji systemu Minix 2.0*

Advisor: J.Mulawka

[D38] G.Tomczuk: *Optymalizacja sekwencji odcinków DNA przeznaczonych do konstrukcji bramek logicznych*

Advisor: W.Szynkiewicz

[D39] M.Burakowski: *Wizualizacja i animacja robotów w systemie AVS/Express*

Advisor: A.Woźniak

[D40] D.Marchel: *Projektowanie serwomechanizmu położenia*

[D41] D.Domaniuk: *Projektowanie układów regulacji położenia*

Advisor: J.Gustowski

[D42] K.Popończyk: *Symulacja wybranych obiektów sterowania w środowisku systemu ISAGRAF*

Advisor: E.Toczyłowski

[D43] M.Kaleta: *Wybrane rozszerzenia i modyfikacje algorytmu dobowego planowania pracy jednostek wytwórczych na rynku energii elektrycznej SOREE*

Advisor: K.Wydro

[D44] Abdallah Ally: *Systemy kontroli dostępu do pomieszczeń*

Advisor: A.Rydzewski

[D45] M.Gałach: *Wzmacniacz audio ze sterownikiem mikroprocesorowym*

[D46] K.Dziekanowski: *System symulatora dydaktycznego dla laboratorium Techniki Mikroprocesorowej*

Advisor: J.Szymanowski

[D47] R.Lewczuk: *Biblioteka IPC w systemie Minix 2.0*

6 Publications

6.1 Monographies

6.1.1 Scientific or Technical Books

[B1] Andrzej Wierzbicki, Andrzej Stachurski: „Podstawy optymalizacji", Oficyna Wydawnicza Politechniki Warszawskiej, 1999

6.1.2 Chapters

[Ro1] Krzysztof Malinowski, Władysław Findeisen: „75 haseł z zakresu sterowania i optymalizacji procesów złożonych" w „Comprehensive Dictionary of Electrical Engineering", CRC Press, 1999

6.2 Scientific and Technical Papers in Journals

6.2.1 International Journals

[I1] Agnieszka Bogobowicz: „Missing Boundary Conditions Estimation in the High-Flux Dialyser", *Medical and Biological Engineering and Computing*, **37** (1999), Part II, pp. 1224–1225

[I2] Andrzej Cichocki, Juha Karhunen, Włodzimierz Kasprzak, Ricardo Vigário: „Neural networks for blind separation with unknown number of sources", *Neurocomputing*, **24** (1999), pp. 55–93

[I3] Paweł Domański, Mieczysław Brdyś, Piotr Tatjewski: „Design and Stability of Fuzzy Logic Multi-Regional Output Controllers", *International Journal of Applied Mathematics and Comp. Sci.*, **9** (1999), No. 4, pp. 883–897

[I4] K.S. Hindi, Krzysztof Pieńkosz: „Efficient solution of large scale, single-source, capacitated plant location problems", *Journal of the Operational Research Society*, **50** (1999), pp. 268–274

[I5] Andrzej Karbowski: „Optimal Infinite-Horizon Multicriteria Feedback Control of Stationary Systems with Minimax Objectives and Bounded Disturbances", *Journal of Optimization Theory and Applications*, **101** (1999), No. 1, pp. 59–71

[I6] Radosław Ładziński: „An outline of the linear control system synthesis by a proper, stable rational functions approach", *Archives of Control Sciences*, **7**, No. 3/4 (1998), pp. 241–265, (printed in 1999)

[I7] Radosław Ładziński: „On reducing the order of the stabilizing compensator for a linear multivariable plant", *Archives of Control Sciences*, **7**, No. 1/2 (1998), pp. 69–98, (printed in 1999)

[I8] Ewa Niewiadomska-Szynkiewicz: „Parallel Global Optimization for Optimal Flood Control", *Acta Geophysica Polonica*, **XLVII** (1999), No. 1, pp. 93–109

[I9] Mariusz Siomak, Krzysztof Malinowski: „Optimal design of control law under uncertainty by dynamic programming", *Archives of Control Sciences*, **7**, No. 3/4 (1998), pp. 203–226, (printed in 1999)

[I10] Andrzej Wierzbicki, Janusz Granat: „Multi-objective modeling for engineering applications: DIDASN++ system", *European Journal of Operational Research*, **113** (1999), pp. 374–389

6.2.2 Local Journals

[L1] Krzysztof Pieńkosz: „Porównanie metod optymalizacji procesów dyskretnych na przykładzie uogólnionego zadania przydziału”, *Automatyka*, **3** (1999), No. 1, pp. 281–287

[L2] Krzysztof Sacha: „Charakterystyka sieci przemysłowych”, *Informatyka*, **XXXVII (37)** (1999), No. 3, pp. 34–42

[L3] Krzysztof Sacha: „Sieć PROFIBUS”, *Informatyka*, **39** (1999), No. 5, pp. 37–45

[L4] Tomasz Traczyk: „Wprowadzenie do języka XML”, *Informatyka*, **46** (1999), No. 12, pp. 8–13

[L5] Cezary Zieliński, Wojciech Szynkiewicz: „Sterownik robota POLYCRANK”, *Pomiary Automatyka Kontrola*, **8** (1999), pp. 10–16

6.3 Scientific and Technical Papers in Conference Proceedings

6.3.1 International Conference Proceedings

[IC1] Piotr Arabas, Krzysztof Malinowski: „Hierarchical System for Anti-missile Defense”, *Proceedings of XXI-st International Colloquium Advanced Simulation of Systems*, (1999), Ostrava, Czechy, pp. 289–294

[IC2] Piotr Arabas, Michał Warchoł, Krzysztof Malinowski: „Model of Sectored Air Defense System”, *Modelling and Simulation: a Tool for the Next Millennium, 13-th European Simulation Multiconference*, Vol. **1** (1999), Warsaw, pp. 599–604

[IC3] Marek Brudka, Andrzej Pacut: „Intelligent Robot Control Using Ultrasonic Measurements”, *Proc. of the 16th IEEE Instrumentation and Measurement Technology Conference*, Vol. **2** (1999), Venice, Italy, pp. 727–732

[IC4] Jarosław Chrobak, Andrzej Karbowski: „Application of Simulation to Optimal Control Generation Process”, *Proceedings of XXI-st International Colloquium Advanced Simulation of Systems*, (1999), Ostrava, Czechy, pp. 345–351

[IC5] M. Czarkowski, L. Hilgertner, T. Powałowski, Dariusz Radomski, P. Bagiński: „Carotid artery wall properties in hypertyroid patients with Grave’s disease”, *13th Congress of the European Chapter of the International Union of Angiology*, (1999), Rhodes, Greece, pp. 147–151

[IC6] Konrad Hejn, Andrzej Pacut: „Error Correction in Effective Resolution Measurement”, *Third International Conference on Advanced A/D and D/A Conversion Techniques and Their Applications*, (1999), Glasgow, UK, pp. 70–73

[IC7] Andrzej Karbowski: „Optimal feedback Control in Multicriteria Case”, *Modelling and Simulation: a Tool for the Next Millennium, 13-th European Simulation Multiconference*, (1999), Warsaw, pp. 640–645

[IC8] Andrzej Kraśniewski, Krzysztof Malinowski: „Making Ph.D. Studies More Attractive”, *Proceedings SEFI Annual Conference*, (1999), Winterthur and Zurich, Switzerland, pp. 141–146

[IC9] Krzysztof Malinowski: „Issues of Hierarchical Computations”, *Proceedings of the III International Conference on Parallel Processing and Applied Mathematics*, (1999), Kazimierz Dolny, pp. 110–120

[IC10] Ewa Niewiadomska-Szynkiewicz: „Flood Control Simulation”, *Modelling and Simulation: a Tool for the Next Millennium, 13-th European Simulation Multiconference*, Vol. **1** (1999), Warsaw, pp. 623–628

[IC11] Krzysztof Pieńkosz, Karol Zadora-Przyłęcki: „On Efficiency of ILOG Software in Application to Combinatorial Problems”, *Proceedings of the CPDC'99 Workshop*, (1999), Gliwice, pp. 35–40

[IC12] Krzysztof Sacha: „Real Time Systems Education at Warsaw University of Technology”, *Proceedings Real-Time Systems Education III*, (1999), Poznań, pp. 1–5

[IC13] Piotr Tatjewski: „Two-Phase Dual-Type Optimising Control Algorithm for Uncertain Plants with Active Output Constraints”, *European Control Conference - Conference Proceedings*, (1999), Karsruhe, Germany, CD (F0437)

[IC14] Maciej Żmuda, Ewa Niewiadomska-Szynkiewicz: „Parallel Simulation of Complex Systems Software Environment and Applications”, *Modelling and Simulation: a Tool for the Next Millennium, 13-th European Simulation Multiconference*, Vol. **1** (1999), Warsaw, pp. 52–57

6.3.2 Local Conference Proceedings

[LC1] Piotr Bolek, Adam Woźniak: „Optymalizacja globalna metodą brutalnej siły”, *Materiały III Krajowej Konferencji Algorytmy Ewolucyjne i Optymalizacja Globalna*, (1999), Potok Złoty, pp. 17–26

[LC2] Andrzej Karbowski: „Metody uwzględniania ryzyka w zadaniach optymalizacji reguł decyzyjnych”, *Materiały III Krajowej Konferencji Algorytmy Ewolucyjne i Optymalizacja Globalna*, (1999), Potok Złoty, pp. 373–395

[LC3] Jan Maciej Kościelny, Piotr Tatjewski: „Zaawansowane sterowanie i diagnostyka w nowoczesnych systemach automatyki - szansa polskich ośrodków naukowych”, *XIII Krajowa Konferencja Automatyki*, (1999), Opole, pp. 27–34

[LC4] Krzysztof Malinowski: „Sterowanie i zarządzanie; nowa rzeczywistoć”, *XIII Krajowa Konferencja Automatyki*, (1999), Opole, pp. 11–18

[LC5] Piotr Marusak, Jerzy Pułaczewski, Piotr Tatjewski: „Algorytmy regulacji DMC z uwzględnieniem ograniczeń sterowania”, *XIII Krajowa Konferencja Automatyki*, (1999), Opole, pp. 113–118

[LC6] Ewa Niewiadomska-Szynkiewicz: „Przegląd metod optymalizacji globalnej”, *Materiały III Krajowej Konferencji Algorytmy Ewolucyjne i Optymalizacja Globalna*, (1999), Potok Złoty, pp. 363–372

[LC7] Ewa Niewiadomska-Szynkiewicz, Piotr Bolek, Robert Śliwiński: „Środowisko graficzne do badania metod optymalizacji globalnej”, *Materiały III Krajowej Konferencji Algorytmy Ewolucyjne i Optymalizacja Globalna*, Vol. **1** (1999), Potok Złoty, pp. 235–243

[LC8] Krzysztof Sacha: „Zastosowanie sieci Petriego do analizy bezpieczeństwa oprogramowania”, *Diagnostyka Procesów Przemysłowych*, (1999), Kazimierz Dolny, pp. 341–346

[LC9] Tomasz Sikorski, Eugeniusz Toczyłowski, Krzysztof Tomczyk: „Usuwanie ograniczeń sieciowych metodą interwencyjnych zakupów i sprzedaży”, *Konferencja Naukowo-Techniczna "Optymalizacja w elektroenergetyce"*, (1999), Jachranka, pp. 103–112

[LC10] Tomasz Sikorski, Piotr Surma, Eugeniusz Toczyłowski: „Mechanizmy zawierania transakcji handlowych na rynku energii elektrycznej”, *Materiały VI Konferencji Naukowo-Technicznej "Rynek Energii Elektrycznej"*, Vol. **2** (1999), Kazimierz Dolny, pp. 99–108

[LC11] Eugeniusz Toczyłowski, Artur Walczak: „Algorytm harmonogramowania pracy jednostek wytwórczych na ofertowym rynku energii elektrycznej”, *XIII Krajowa Konferencja Automatyki*, Vol. **2** (1999), Opole, pp. 139–144

[LC12] Eugeniusz Toczyłowski, Tomasz Sikorski, Artur Walczak, Izabela Mileńko, Krzysztof Tomczyk: „Analiza porównawcza zdecentralizowanych i scentralizowanych struktur rynków energii elektrycznej”, *Materiały VI Konferencji Naukowo-Technicznej "Rynek Energii Elektrycznej"*, Vol. **2** (1999), Kazimierz Dolny, pp. 127–134

[LC13] Eugeniusz Toczyłowski, Tomasz Śliwiński: „Dwufazowa metoda znajdowania harmonogramu produkcji wieloasortymentowej na elastycznej linii produkcyjnej”, *XIII Krajowa Konferencja Automatyki*, Vol. **2** (1999), Opole, pp. 145–152

[LC14] Artur Walczak, Eugeniusz Toczyłowski, Janusz Granat, Krzysztof Fleszar: „Wspomaganie decyzji dobowego planowania pracy jednostek wytwórczych na rynku energii elektrycznej”, *Konferencja Naukowo-Techniczna "Optymalizacja w elektroenergetyce"*, (1999), Jachranka, pp. 33–42

[LC15] Jakub Witkowski: „Znajdowanie zbioru rozwiązań efektywnych dla wielokryterialnych problemów decyzyjnych”, *Materiały III Krajowej Konferencji Algorytmy Ewolucyjne i Optymalizacja Globalna*, (1999), Potok Złoty, pp. 353–361

[LC16] Karol Zadora-Przyłęcki, Włodzimierz Ogryczak, Tomasz Sikorski, Eugeniusz Toczyłowski: „Metody usuwania ograniczeń systemowych na rynku energii elektrycznej”, *Materiały VI Konferencji Naukowo-Technicznej "Rynek Energii Elektrycznej"*, Vol. **2** (1999), Kazimierz Dolny, pp. 135–142

6.4 Other Publications and Reports

Here we list unrefereed publications and publications of popular character, and reports.

6.4.1 Unrefereed Journals

[O1] Piotr Bolek: „Archiwa CPAN”, *NET FORUM*, **4** (1999), pp. 18–20

[O2] Piotr Bolek: „Dostęp do baz danych”, *NET FORUM*, **1** (1999), pp. 16–19

[O3] Piotr Bolek: „Graficzna prezentacja raportów systemowych”, *NET FORUM*, **2** (1999), pp. 14–17

[O4] Piotr Bolek: „Języki skryptowe”, *NET FORUM*, **11** (1999), No. cz.1, pp. 60–61

[O5] Piotr Bolek: „Miniskrypty”, *NET FORUM*, **6** (1999), pp. 20–21

[O6] Piotr Bolek: „Nroff, troff - formatowanie dokumentacji w systemach uniksowych”, *Magazyn Linux & Unix*, **13** (1999), No. 9, pp. 14–17

[O7] Piotr Bolek: „PHP - dynamiczne generowanie stron WWW”, *Magazyn Linux & Unix*, **10** (1999), pp. 26–29

[O8] Piotr Bolek: „PHP, procesy i PDF”, *Magazyn Linux & Unix*, **11** (1999), pp. 23–25

[O9] Piotr Bolek: „Po co SGTML?”, *Magazyn Linux & Unix*, **6** (1999), No. 2, pp. 5–8

[O10] Piotr Bolek: „Program SWIG”, *NET FORUM*, **5** (1999), pp. 18–21

[O11] Piotr Bolek: „Tk - graficzne interfejsy”, *NET FORUM*, **2** (1999), pp. 64–65

[O12] Piotr Bolek: „Wieczny kalendarz”, *NET FORUM*, **3** (1999), pp. 22–24

[O13] Piotr Bolek: „Wprowadzenie do programowania obiektowego”, *NET FORUM*, **7/8** (1999), pp. 20–22

[O14] Piotr Bolek: „Wyrażenia regularne”, *NET FORUM*, **10** (1999), pp. 48–51

[O15] Piotr Bolek: „Zmienne wiązane”, *NET FORUM*, **9** (1999), pp. 18–19

[O16] Piotr Bolek, Adam Dawidziuk: „Grafika w LATEX-u”, *Magazyn Linux & Unix*, **8** (1999), pp. 6–9

[O17] Piotr Bolek, Adam Dawidziuk: „LATEX definiowanie makr i środowisk”, *Magazyn Linux & Unix*, **4** (1999), pp. 6–10

[O18] Piotr Bolek, Adam Dawidziuk: „Tabele w LATEX-u”, *Magazyn Linux & Unix*, **5** (1999), pp. 11–14

[O19] Piotr Bolek, Adam Dawidziuk: „Tworzenie dokumentów w LATEX-u”, *Magazyn Linux & Unix*, **6** (1999), pp. 9–11

[O20] Piotr Bolek, Adam Dawidziuk: „Wprowadzenie do matematyki w LATEX-u”, *Magazyn Linux & Unix*, **7** (1999), pp. 10–12

6.4.2 Unrefereed Conference Proceedings

[OC1] Piotr Bolek: „Języki skryptowe”, *Jesienne Warsztaty Linuksowe JWL'99*, (1999), Warszawa, pp. 127–133

[OC2] Piotr Bolek: „Kodowanie, przetwarzanie i formatowanie dokumentów SMGL-owych ”, *Biuletyn Polskiej Grupy Użytkowników Systemu TEX, BACHOTEK 1-3 maja 1999*, (1999), Bachotek, pp. 24–43

[OC3] Piotr Bolek: „Nie tylko Power Point”, *Biuletyn Polskiej Grupy Użytkowników Systemu TEX, BACHOTEK 1-3 maja 1999*, (1999), Bachotek, pp. 58–63

[OC4] Ewa Niewiadomska-Szynkiewicz: „Comparative Study of Global Optimization Methods”, *Proceedings of Internationnal Conference on Intelligent Techniques in Robotics, Control and Decision Making*, (1999), Warsaw, pp. 53–61

[OC5] Tomasz Przechlewski, Piotr Bolek: „Generowanie dokumentów PDF w systemie Linux”, *Jesienne Warsztaty Linuksowe JWL'99*, (1999), Warszawa, pp. 92–104

[OC6] Tomasz Traczyk: „Język XML w aplikacjach z bazami danych”, *Integracja danych i systemów informatycznych*, (1999), Zakopane, pp. 45–58

[OC7] Wiesław Traczyk: „Mining Telecommunications Data”, *Second International Conference on Research for Information Society*, Vol. **B** (1999), Warsaw, Poland, pp. 1–4

6.4.3 Reports

[R1] Marek Brudka: „Estymacja wieloznacznych reguł decyzyjnych”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-42, 1999

[R2] Marek Brudka: „Metodologia chwytania obiektów”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-41, 1999

[R3] Piotr Cabak, Michał Warchoł: „Bibioteka graficzna do tworzenia interfejsu jednostek obliczeniowych w systemie CSA&S”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-51, 1999

[R4] Jarosław Chrobak, Andrzej Karbowski, Andrzej Pacut: „Algorytmy neuronowe a algorytmy tradycyjne - porównanie na przykładzie optymalizacji strategii giełdowej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-1, 1999

[R5] Jerzy Gustowski: „Adaptacyjne algorytmy regulacji obiektów silnie nieliniowych, z ograniczeniami”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-37, 1999

[R6] Mariusz Kaleta, Artur Walczak: „Algorytm adaptacyjny planowania jednostek wytwórczych w trakcie wznoszenia krzywej zapotrzebowania dla modelu SOREE”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-52, 1999

[R7] Mariusz Kaleta, Artur Walczak: „Algorytm poprawy planów pracy jednostek wytwórczych na styku dni ofertowych”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-48, 1999

[R8] Andrzej Karbowski: „Optymalizacja polityk sterowania systemów zbiornikowych w warunkach niepewności, z parą kryteriów oceny typu: wartość oczekiwania-wariancja”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-28, 1999

[R9] Andrzej Karbowski: „Środowisko WDM (Windows Distributed Machine) do tworzenia aplikacji równoległych i rozproszonych na platformie MS Windows”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-57, 1999

[R10] Urszula Kręglewska, Krzysztof Sacha: „Sprzęt i oprogramowanie podstawowe sterownika robota POLYCRANK”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-17, 1999

[R11] Przemysław Magiera, Andrzej Karbowski: „Biblioteka programów do rozwiązywania podstawowych zadań optymalnej syntezy poprzez sprowadzenie do zadań programowania liniowego ”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-27, 1999

[R12] Piotr Marusak: „Algorytm regulacji DMC jako zadanie optymalizacji kwadratowej - opis i implementacja”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-32, 1999

[R13] Piotr Marusak: „Rozmyte algorytmy regulacji typu DMC dla obiektów nieliniowych”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-33, 1999

[R14] Piotr Marusak, Eugeniusz Toczyłowski, Artur Walczak, Tomasz Sikorski, Cezary Szwed: „Środowisko aplikacyjne Fix Dynamics z implementacją algorytmu DMC”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-4, 1999

[R15] Izabela Mileńko, Eugeniusz Toczyłowski: „Zadania koordynatorów i agregatorów w rozproszonej strukturze rynku energii”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-16, 1999

[R16] Ewa Niewiadomska-Szynkiewicz: „VSO - środowisko graficzne do badania algorytmów optymalizacji”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-29, 1999

[R17] Ewa Niewiadomska-Szynkiewicz: „Wybrane metody optymalizacji globalnej - implementacja i wyniki testów”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-7, 1999

[R18] Ewa Niewiadomska-Szynkiewicz, Piotr Cabak, Michał Warchoł: „Realizacja hierarchicznej struktury sterowania falą powodziową w środowisku CSA&S”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-56, 1999

[R19] Andrzej Pacut: „Neurony, sieci neuronowe i systemy neuronowe - uczenie i adaptacja”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-43, 1999

[R20] Andrzej Pacut, Dariusz Radomski: „Struktury sterowania adaptacyjnego pompy infuzyjnej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-40, 1999

[R21] Andrzej Pondarzewski, Ewa Niewiadomska-Szynkiewicz, Maciej Żmuda: „Środowisko do obliczeń symulacji równoległej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-55, 1999

[R22] Jerzy Pułaczewski: „Algorytm DMC z ograniczeniem na sterowania i wielkości regulowane”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-2, 1999

[R23] Tomasz Sikorski, Artur Walczak, Cezary Szwed, Tomasz Sikorski, Eugeniusz Toczyłowski, Eugeniusz Toczyłowski, Artur Walczak, Krzysztof Fleszar, Mariusz Kaleta, Andrzej Kiepiel, Izabela Mileńko, Piotr Surma, Krzysztof Tomczyk: „Projekt systemu planowania dobowego bez ograniczeń dla rynku SOBRE”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-49, 1999

[R24] Tomasz Sikorski, Eugeniusz Toczyłowski, Krzysztof Tomczyk, Cezary Szwed, Artur Walczak: „Analiza modeli usuwania ograniczeń sieciowych na rynku energii elektrycznej metodami cen strefowych oraz interwencyjnych zakupów”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-9, 1999

[R25] Tomasz Sikorski, Eugeniusz Toczyłowski: „Struktury systemów planowania na rynku energii elektrycznej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-8, 1999

[R26] Tomasz Sikorski, Izabela Mileńko: „Analiza ofertowych mechanizmów obrotu energią elektryczną w warunkach rynkowych”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-12b, 1999

[R27] Tomasz Sikorski, Piotr Surma, Eugeniusz Toczyłowski: „Algorytmy równoważenia popytu i podaży na giełdowym rynku energii elektrycznej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-12a, 1999

[R28] Cezary Szwed: „Analiza problemu przydziału sal zajęć z uwzględnienim przejść studentów między salami ”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-23, 1999

[R29] Cezary Szwed: „Przegląd metod planowania zajęć”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-6, 1999

[R30] Jacek Szymanowski: „Optymalny model różniczkowy sygnałów fraktalnych”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-30, 1999

[R31] Tomasz Śliwiński: „ColGen 2 Biblioteka wspomagająca rozwiązanie zadań optymalizacji z wykorzystaniem techniki generacji kolumn”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-45, 1999

[R32] Tomasz Śliwiński, Eugeniusz Toczyłowski: „Dwufazowa metoda znajdowania harmonogramu produkcji wieloasortymentowej na elastycznej linii produkcyjnej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-44, 1999

[R33] Piotr Tatjewski: „Algorytm dualny dwufazowy optymalizacji on-line punktów pracy procesów technologicznych z regulacyjnie ograniczonymi wyjściami”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-3, 1999

[R34] Eugeniusz Toczyłowski: „Analiza krytyczna modelu bilansowania i optymalizacji kontraktowego rynku energii elektrycznej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-53, 1999

[R35] Eugeniusz Toczyłowski: „Propozycja ramowych założeń nowego modelu bilansowania na rynku bilansującym energii elektrycznej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-54, 1999

[R36] Eugeniusz Toczyłowski, Artur Walczak: „Analiza zagadnień planowania generacji w scentralizowanych formach rynku”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-18, 1999

[R37] Eugeniusz Toczyłowski, Tomasz Sikorski, Izabela Mileńko, Włodzimierz Ogryczak, Piotr Surma, Krzysztof Tomczyk: „Analiza modeli decyzyjnych na rynku energii elektrycznej”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-13, 1999

[R38] Eugeniusz Toczyłowski, Tomasz Traczyk, Tomasz Sikorski, Artur Walczak, Cezary Szwed, Tomasz Sikorski, Artur Walczak, Mariusz Kaleta, Andrzej Kiepiel,

Krzysztof Fleszar, Janusz Granat, Izabela Mileńko: „Dokumentacja użytkowa wersji końcowej programu RO-KCO+”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-46, 1999

[R39] Eugeniusz Toczyłowski, Izabela Mileńko, Włodzimierz Ogryczak, Tomasz Sikorski, Piotr Surma, Krzysztof Tomczyk, Artur Walczak, Karol Zadora-Przyłęcki: „Modele planowania pracy systemu elektroenergetycznego”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-14, 1999

[R40] Eugeniusz Toczyłowski, Izabela Mileńko: „Modele i metody indywidualnego planowania pracy jednostek wytwórczych na zdecentralizowanym rynku energii”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-11, 1999

[R41] Eugeniusz Toczyłowski, Zdzisław Glik, Tomasz Traczyk, Piotr Dąbrowski, Andrzej Detkiewicz, Maria Januszewska, Justyna Piotrowska, Paweł Rodo, Robert Trębski, Karol Zadora-Przyłęcki: „Ocena i klasyfikacja ograniczeń systemowych oraz analiza możliwości i sposobu ich uwzględnienia w generatorze modeli ograniczeń systemowych (GMOS) i systemie planowania pracy JWRS z ograniczeniami systemowymi ROPLAN-OS”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-15, 1999

[R42] Sylwester Tyszewski, Michał Warchoł, Maciej Żmuda: „Zastosowanie programowania matematycznego do optymalizacji zlewniowego systemu oczyszczalni ściekłw”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-31, 1999

[R43] Andrzej Wierzbicki, Jerzy Paczyński: „Workshop of the Tempus S-JEP-11253-96”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-50, 1999

[R44] Karol Zadora-Przyłęcki: „Wyznaczanie cen energii elektrycznej metoda cen węzłowych”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-38, 1999

[R45] Cezary Zieliński, Wojciech Szynkiewicz: „Podręcznik programowania systemu MRROC++ dla robota IRp-6 na torze jezdnym”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-21, 1999

[R46] Cezary Zieliński, Wojciech Szynkiewicz: „Podręcznik programowania systemu MRROC++ dla robota POLYCRANK”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-22, 1999

[R47] Cezary Zieliński, Wojciech Szynkiewicz: „Podręcznik programowania systemu MRROC++ dla robota RNT”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-34, 1999

[R48] Cezary Zieliński, Wojciech Szynkiewicz: „System MRROC++ dla robota IRp-6”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-20, 1999

[R49] Cezary Zieliński, Wojciech Szynkiewicz: „System MRROC++ dla robota POLYCRANK”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-19, 1999

[R50] Cezary Zieliński, Wojciech Szynkiewicz: „System MRROC++ dla robota RNT”, *Raport Instytutu Automatyki i Informatyki Stosowanej Politechniki Warszawskiej*, No. 99-35, 1999

7 Conference Organization

Workshop on Constraint Programming for Decision and Control CPDC'99, Gliwice, Poland, 28 July 1999
Krzystof Malinowski: Scientific Committee Member

European Simulation Multiconference ESM'99, Warsaw, Poland, 1-4 July 1999
Krzystof Malinowski: Program Committee Member

III International Conference on Parallel Processing and Applied Mathematics – PPAM'99, Kazimierz Dolny, Poland, 14-17 September 1999
Krzystof Malinowski: Program Committee Member

12th Conference Process Controll'99, Pardubice, Slovakia, 31 May – 3 July 1999
Piotr Tatjewski: Program Committee Member

16th IEEE Instrumentation and Measurement Technology Conference – IMTC'99, Venice, Italy, 24–26 May 1999
Andrzej Pacut: Session Organizer and Chairman

XIII Krajowa Konferencja Automatyki, Opole, Poland,
Krzystof Malinowski: Program Committee Member

VII Ogólnopolska Konferencja Grupy Użytkowników Systemu TEX, BachoTEX'99 – BachoTEX'99, Bachotek, 1–3 May 1999
Włodzimierz Macewicz: Program Committee Member

Jesienne Warsztaty Linuksowe 1999 – JWL'99, Warszawa, 28–30 October 1999
Piotr Bolek: Program Committee Member