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 Pacyński, 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 Szymański;  
Assistant Professors: Agnieszka Bogobowicz, Andrzej Karbowski, Tomasz Kruk (since September 30, 1999), Ewa NiewiadomskaSzynkiewicz, 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 Maciejewicz (senior grade), Piotr Bolek.

Research of the division is conducted in 2 research groups:


The main area of interest is the theory and methodology of model-based predictive repetitive control and hierarchical control structures for non-linear systems under uncertainty, methods for solving continuous and discrete time optimization problems, and software for computer aided analysis and design of complex systems. Particular attention is given to distributed and parallel, synchronous and asynchronous, computations.


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 Płoszański, 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.


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

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<th>FACULTY and STAFF</th>
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<th>1998</th>
<th>FTE</th>
<th>1999</th>
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<td>by titles/degrees</td>
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<td>35 (+2)</td>
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<td>1 (+1)</td>
<td>1 (+1)</td>
<td>(+1)</td>
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FTE – Full Time Employment units,
+ – corrections due to persons on long-time leave of absence

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### RESOURCES

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<td>personal computers*</td>
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*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.

**Agnieszka Bogobowicz**  Assistant Professor, Control and Systems Division.


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]

**Mieczysław A. Brdyś**  Associate Professor, professor since 1992.


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 Polytechnic 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 IEE, a Fellow of IMA and a member of IFAC Technical Committee on Large Scale Systems.

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

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

With WUT since 1991, half time since 1997

Interests: adaptive control, intelligent control, fuzzy logic

Publications: [13]

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

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


Publications: [Ro1]

**Anatol Gosiewski** Professor, Robotics and Operation Research Division.


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]

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]

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]

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]

Wlodzimierz Kasprzak  Assistant Professor, Robotics and Operation Research Division.
With WUT since 1997. Member of Polish Section of IAPR
Interests: computer vision, neural networks, knowledge-based systems,
Project participation: [P18], [P32]
Publications: [I2]

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.
M.Sc. 1994 from Technical University of Gda´nsk. 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).
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 Automation 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: [R01], [I9], [IC1], [IC2], [IC8], [IC9], [LC4]

Ewa Niewiadomska-Szynkiewicz  Assistant Professor, Control and Systems Division.
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.
With WUT since 1978
Interests: stability and performance analysis of predictive regulators, programmable logic controllers, industrial electronics
Project participation: [P6], [P10], [P13], [P28]
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] 

Jerzy Paczyński  Assistant Professor, Optimization and Decision Support Division.  
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] 

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] 

Grzegorz Płoszajski  Assistant Professor, Robotics and Operation Research Division.  
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 

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

rooms 530, 319GG  
tel. 660 7922, 660 5392  
T.Rogowski@ia.pw.edu.pl
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.
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.
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.
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.
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.
M.Sc. 1976, Ph.D. 1980 from WUT.
Senior Assistant (1979–80) and then Assistant Professor (1980–92) at the Institute of System Research (IBS PAN), with WUT since 1992. Visiting Professor at the Calabria University, Italy, 1984, Åbo Swedish Academy in Turku, 1987, Jyväskylä University, Finland, 1988, JSPS invitee at the Department of Control Engineering, Osaka

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]

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]

Jacek Szymanowski  Professor, Control and Systems Division.
M.Sc. 1962, Ph.D. 1966, D.Sc. 1983 from WUT.
Interests: simulation of control systems, linear and nonlinear programming, control applications of optimization techniques, operating systems
Project participation: [P1], [P14]
Reports: [R30]

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]

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


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], [R24], [R25], [R27], [R32], [R34], [R35], [R36], [R37], [R38], [R39], [R40], [R41]

Tomasz Traczyk  Assistant Professor, Robotics and Operation Research Division.

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.

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


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 Committee 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). Recipient 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]

Adam Woźniak  Assistant Professor, Control and Systems Division.

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


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

Project participation: [P6], [P8], [P11]
Publications: [LC1]

Cezary Zieliński  Professor, Robotics and Operation Research Division.

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.
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.
M.Sc. 1992 from WUT.

With WUT since 1993

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

Urszula Kreglewksa  Senior Engineer, Control and Systems Division.

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]

Wlodzimierz Macewicz  Software Engineer (senior grade), Control and Systems Division.
M.Sc. 1983 from WUT.

With WUT since 1983

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

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

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


Interests: digital control algorithms, process modeling and simulation, process control

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

Publications: [LC5]

Reports: [R22]

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]

Michał Warchol  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]

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 Białon

Marek Brudka  
Project participation: [P8]; Publications: [IC3]; Reports: [R2], [R1]

Rafał Cegiela  
Project participation: [P7]

Jarosław Chrobak
Ewa Figielska
Marcin Galwas
Cezary Głowiński
Michał Gomuliński
Artur Jaros
Przemysław Jaskóla
Michał Jaworski
Piotr Kaczmarsczyk
Mariusz Kamola
Remigiusz Krupa
Sylwester Laskowski
Tomasz Ładziński
Maciej Ławryńczuk
Andrzej Machnacz
Przemysław Magiera  
Reports: [R11]

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

Piotr Marusak  
Project participation: [P10], [P28], [P13]; Publications: [LC5]; Reports: [R14], [R12], [R13]

Szczepean Pacut
Jarosław Protasiewicz
Dariusz Radomski  
Project participation: [P8], [P11]; Publications: [IC5]; Reports: [R20]

Mariusz Siomak
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
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 Tchorz        Technical support.
Daniel Wieczorek      Technical support.
Andrzej Wiśniewski   Technical support.
Beata Wozniak         Manager, Administration. M.Sc. 1993 from Warsaw University.
### 3 Teaching Activities 1998/99

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Dept. Course Code</th>
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<td>Administration of UNIX and TCP/IP</td>
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<td>3</td>
<td>K. Nowosad</td>
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<td>Introduction to Control, Informatics, Telecommunciation</td>
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<td>K. Sacha</td>
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4 Projects


A three-year project was successfully 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.

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).


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 constraints and was designed by the team from ITLiMS PW, and the control hardware 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.


The project scope has been framed into the following research tasks: generalization of uniqueness parametrization results for the networks with different activation functions.
function, determination of sufficient convergence conditions for one-hidden-layer networks, determination of existence of NARMA models for nonlinear dynamic 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.


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.


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.


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.


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.


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)


The objective of the project was to implement selected methods of linear and non-linear 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.


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.


The project consists of the following tasks: improvement and investigation of a laboratory stand containing the RNT robot equipped with a coupler enabling quick changeover 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 algorithms 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.


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


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.

This 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 search for the “optimal” finite dimensional model used in simulations. Performance of this algorithm has been established for several values of the fractal dimension.


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 install 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.


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.


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.


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.


An approximation of singularities occurring in the phase space of hyperbolic systems was constructed. 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.


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 systems in Profibus, which was standardized in 1991. The goal of this project is to develop an internet viewer for Profibus systems.


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.


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


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 ECPs 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).


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.


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.


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


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.


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 refinery. The top-down approach was proposed, whereby scheduling of the three main production plants within the OD would be 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.


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

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


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 obtained 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 exchanged. 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


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 rozwiązania zadań syntezy optymalnej bez znanego modelu obiektu sterowania*

[D8] R. Kobyliński: *Środowisko WDM do tworzenia aplikacji równoległych 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.Stępnia: Emulator/Symulator programowo-sprzętowy mikрокomputerów 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

Advisor: J.Gustowski
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.Sasinowska-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 odpornie na błędy

Advisor: W.Szynkiewicz
[D25] M.Izdebski: Generowanie trajektorii ruchu robota w czasie rzeczywistym
[D26] M.Welpa: Graficzny interfejs użytkownika dla sterownika wielorobotowego
Advisor: J.Sobczyk
[D27] W.Pietroń: Kolokwium sieciowe jako element oprogramowania nowoczesnej pracomni 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
Advisor: J. Granat

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

Advisor: J. Szymanowski

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

Advisor: T. Rogowski

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

Advisor: A. Wierzbicki

[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 branek logicznych

Advisor: W. Szymkiewicz

[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: Wzmocniacz 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


6.1.2 Chapters


6.2 Scientific and Technical Papers in Journals

6.2.1 International Journals


6.2.2 Local Journals


6.3 Scientific and Technical Papers in Conference Proceedings

6.3.1 International Conference Proceedings


[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)


6.3.2 Local Conference Proceedings


6.4 Other Publications and Reports

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

6.4.1 Unrefereed Journals


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


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

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

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


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

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

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

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

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

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

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

6.4.2 Unrefereed Conference Proceedings


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


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

Piotr Tatjewski: Program Committee Member

Andrzej Pacut: Session Organizer and Chairman

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

Włodzimierz Macewicz: Program Committee Member

Piotr Bolek: Program Committee Member