

# **Institute of Control and Computation Engineering**

## **2021 Annual Report**



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Faculty of Electronics and Information Technology  
Institute of Control and Computation Engineering  
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## ***From the Director***

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

The Institute offers courses in Automatic Control and Robotics as well as in Computer Science, both at three levels of education (undergraduate, postgraduate, Ph.D.). We are proud to offer interesting opportunities to our postgraduates, so that they can continue their study and research towards a Ph.D. It is important that our postgraduate and Ph.D. courses are open for candidates with different educational background. Our courses attract more and more candidates who graduated from various universities and with degrees in different fields, not only in Automatic Control and Robotics or in Computer Science. During the last few years we have made an effort to organize and equip new laboratories located in a new part of our building. Currently, all our students benefit from new laboratories, without which it would be impossible to offer a few new courses. This standard educational offer has been supplemented by three postgraduate studies: Management of Information Technology Resources and Project Management organized by dr hab. Andrzej Zalewski as well as Designing Information Systems with Databases organized by prof. Tomasz Traczyk.

This year the Institute received a grant for a project entitled *Laboratory for Vulnerability Analysis (LaVA) of stationary and mobile IT devices and algorithms and software*, from The National Centre for Research and Development. The aim of the project is to develop methods and tools for vulnerability testing of complex cyber-physical systems (industrial automation systems and social/service robots). It is headed by dr hab. Wojciech Szynekiewicz.

Mr Grzegorz Zalewski was awarded a Ph.D. degree for his thesis entitled *Multi-criteria fair optimization models for network resource allocation*; it was supervised by dr hab. Andrzej Stachurski. Mr Wojciech Dudek was awarded a Ph.D. degree for his thesis entitled *Prudent management of interruptible tasks executed by a service robot*; it was supervised by dr hab. Wojciech Szynekiewicz.

Professor Włodzimierz Kasprzak was awarded the Medal of the National Education Commission. Mr Jerzy Sobczyk received the Rector's Award of the 1st Class for his didactic achievements. Dr. Andrzej Wojtulewicz received the Rector's Award of the 3rd Class for his scientific achievements. It is my pleasure to congratulate all the above for their achievements.

Since November 1st 2021, the structure of the Institute has been modified. Namely, the Institute's divisions, i.e. the Systems Control Division, the Control and Software Engineering Division and the Operations and Systems Research Division, are dissolved. Currently, the Institute is composed of eight Scientific Groups.

Cezary Zieliński

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## 1 General Information

The following information about organization of the Institute reflects the situation on December 31, 2021.

### 1.1 Directors

Professor Cezary Zieliński  
Professor Maciej Ławryńczuk, Deputy Director for Research  
Professor Tomasz Traczyk, Deputy Director for Academic Affairs

### 1.2 Organization of the Institute

#### **Complex Systems Group**

**Leader of the Group:** prof. dr hab. E. Niewiadomska-Szynkiewicz  
**Group members:** dr P. Arabas, dr M. Kamola, dr hab. A. Karbowski, dr hab. M. Karpowicz, dr A. Kozakiewicz, dr T.J. Kruk  
**Ph.D. Student:** mgr A. Nwachukwu

The main area of interest are problems of modeling, design, control, optimization and simulation of various types of complex real systems, including networks, ad hoc networks, social networks, economic systems and the environment. Research in the field of optimization and control are focused on developing the theory and methodology in applying model predictive control, hierarchical control structures in nonlinear systems with uncertainty, developing methods for solving continuous and discrete time optimization problems (including evolutionary optimization methods and using the arithmetic of intervals), game theory and design theory of complex systems of rules (so-called theory of mechanisms). Research in the field of computer simulation and parallel processing of information concerning such departments as: distributed operating systems, programming of parallel machines in computer networks, clusters, grids and GPUs, the creation of systems for computer-aided design and management. Particular attention is devoted to issues of modeling, management and security in computer networks, including sensor networks and mobile ad hoc networks.

#### **Biometrics and Machine Learning Group**

**Leader of the Group:** prof. dr hab. A. Pacut  
**Group member:** dr M. Trokielewicz  
**Ph.D. Student:** mgr E. Bartuzi, mgr K. Gabor-Siatkowska, mgr M. Hałoń

Research of the group is centered on biologically inspired information processing and control, including biometrics, machine learning, uncertainty modeling, and biological modeling. Biometrics consists in using personal characteristics for identity recognition. Our research is focused mainly on safety of biometrics software, systems, and applications. In particular, safety issues are investigated for iris, fingerprints, and finger veins. Safety of biometric data storage and exchange and data encryption using biometrics are investigated. Original recognition methodology is developed for iris hand-written signature, 3D face and EEG. Machine learning research is focused on reinforcement learning, applied to adaptive control and multi-agent systems including very large systems and adaptive network routing. Also, learning in neural networks and modeling granularity is investigated.

### **Robot Programming Group**

**Leader of the Group:** prof. dr hab. C. Zieliński

**Group members:** dr W. Dudek, mgr M. Figat, dr T. Kornuta, mgr D. Seredyński,  
dr hab. W. Szyrkiewicz, dr T. Winiarski

**Ph.D. Students:** mgr J. Karwowski, mgr M. Węgierek

Research of the group is concerned with robot control system design and in particular robot programming methods. The group focuses on robot system architectures, their specification and implementation. Service robots are at the centre of interest. The research encompasses manipulation and grasping, especially two handed manipulation, utilizing force and impedance control. It also deals with mobile robot localization and navigation. Special emphasis is placed on sensor-based motion planning and control of single and multiple robots.

### **Machine Perception Group**

**Leader of the Group:** prof. dr hab. W. Kasprzak

**Group members:** dr A. Wilkowski, mgr M. Stefańczyk

**Ph.D. Students:** mgr P. Piwowarski, mgr Ł. Bala, mgr P. Szelągowski

The research interests are in pattern recognition and machine learning techniques and their applications to image and speech analysis. Lately, the focus in image analysis is on bridging the semantic gap between object recognition in images/video and ontology-based image and scene representation. For this purpose RGB-D images and 3-D point clouds are intensively being processed. Machine learning techniques are applied for object detection and recognition in images and video, as well as for speech- and speaker recognition. Besides robot perception systems, the eyed application fields are multi-modal human-machine interfaces, automatic surveillance data analysis and biometrics – suitable gesture recognition- and speech/speaker recognition methods are developed and implemented.

### **Control Engineering Group**

**Leader of the Group:** dr hab. M. Ławryńczuk

**Group members:** dr P. Chaber, dr hab. P. Domański, mgr J. Gustowski,  
mgr R. Nebeluk, dr hab. P. Marusak, dr S. Plamowski,  
prof. dr hab. P. Tatjewski, dr A. Wojtulewicz, mgr K. Zarzycki

**Ph.D. Students:** mgr M. Okulski, mgr J. Sawulski, mgr M. Falkowski, mgr D. Rocki

Research of the group concentrates on advanced control engineering techniques and their applications in control of industrial process and in embedded systems. The focus is on model predictive control algorithms, multilayer optimizing and supervisory control, fault detection and fault-tolerant control. Among others, soft computing methods are used in

the considered algorithms (neural networks, fuzzy systems and genetic algorithms). The Advanced Control Systems Laboratory offers the possibility to verify developed theoretical solutions. The laboratory is equipped with a set of test processes. For control of industrial process, a Distributed Control System (DCS) cooperating with a Supervisory Control and Data Acquisition (SCADA) software platform and Programmable Logic Controllers (PLC) are used. For control of embedded systems, microcontrollers equipped with numerous sensors and actuators are used.

### **Software Engineering Group**

**Leader of the Group:** dr hab. A. Zalewski

**Group members:** mgr K. Borowa, dr S. Kijas, mgr W. Macewicz, dr M. Szlenk,  
dr A. Ratkowski

**Ph.D. Student:** mgr G. Mąkosa

The main area of interest is the development and maintenance of software. Topics include software processes, software analysis and design methods, and the methods for software quality evaluation. New approaches to the assessment of high-level system architecture in the earliest phases of software development are investigated. Methods for architectural decision modeling during the evolution of service-oriented (SOA) systems are developed. Part of the research is aimed at security and trust management issues in distributed open applications.

### **Operations Research and Management Systems Group**

**Leader of the Group:** dr hab.K. Pieńkosz

**Group members:** dr M. Kaleta, mgr A. Manujło, dr P. Pałka, dr T. Traczyk, dr I. Żółtowska

**Ph.D. Students:** mgr M. Drabecki, mgr R. Karpuk

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

### **Optimization and Decision Support Group**

**Leader of the Group:** dr hab. A. Stachurski

**Group members.:** dr J. Granat, dr B. Kozłowski, dr A. Krzemienowski, mgr J. Sobczyk, dr T. Śliwiński

**Ph.D. Students:** mgr K. Matela, mgr G. Zalewski

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



### 1.3 Statistical Data

FACULTY and STAFF	2019 persons	2020 persons	2021 persons
<b>Academic Staff</b>	47(+2)	44(+2)	44(+1)
by titles/degrees			
Professors	7	5	5
D.Sc.-s	7	9	9
Ph.D.-s	21(+2)	20(+2)	22(+1)
M.Sc.-s	10	10	9
Others	2	0	0
by positions			
Professors	8	7	8
Readers	1	1	0
Assistant Professors	21(+2)	21(+2)	22(+1)
Senior Lecturers	6	5	5
Assistants	11	10	9
<b>Ph.D. Students</b>	28	24	17
<b>Technical Staff</b>	2	1	1
<b>Administrative Staff</b>	7	8	8

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

ACTIVITIES	2019	2020	2021
<b>Teaching activities</b>			
standard teaching potential, hours	9 980,0	10 755,8	10 220,6
# hours taught	14 043,70	14 449,30	16 328,00
<b>Degrees awarded</b>			
Professor	0	0	0
D.Sc	0	2	0
Ph.D.	2	2	2
M.Sc.	59	64	69
B.Sc.	59	68	74
<b>Research projects</b>			
granted by WUT	5	6	7
granted by State institutions	5	4	3
granted by international institutions	4	3	2
other	3	5	4
<b>Sci.-Tech. publications</b>			
monographs (authored or edited)	1	3	1
chapters in books and proceedings	18	37	14
papers in journals	34	41	38
<b>Reports, abstracts and other papers</b>	0	0	3
<b>Conferences</b>			
participation (# of conferences)	27	7	12
participation (# of part. from ICCE)	38	28	14

RESOURCES	2019	2020	2021
<b>Space (sq.m.)</b>			
laboratories	644	644	644
library + seminar room	182	182	182
faculty offices	821	821	821
<b>Computers</b>			
personal computers	234	235	236
<b>Library resources</b>			
books	3 188	3 194	2 743
booklets	3 176	3 176	3 176
journals subscribed	9	9	9

## 2 Faculty and Staff

Presentation of our faculty starts with Professors Emeriti and continues with Senior Faculty, Supporting Faculty, Ph.D. Students, and Administrative Staff. Senior Faculty includes Professors, Readers, Assistant Professors, and Senior Lecturers. By Supporting Faculty we understand Lecturers, Assistants, Research Associates, and Software Engineers, as well as Technical Staff. The personal information below regards the period of January 1 – December 31, 2018.

### 2.1 Professors Emeriti

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

**Complex Systems Group**  
**room 524, tel. 22 234 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) (1991–2009). Honored with the Order of the White Eagle (2012).

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

**Complex Systems Group**  
R.Ladzinski@ia.pw.edu.pl

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

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

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

**Krzysztof Malinowski** Professor (Head of Division, retired Feb. 2019)

**Complex Systems Group**

**room 517, tel. 22 234 7397 and 22 825 0995**

K.Malinowski@ia.pw.edu.pl, www.ia.pw.edu.pl/~malinows

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

With WUT since 1971. Director of ICCE (1984–1996), Dean of the FEIT (1996–1999). Member of the Senate of the Warsaw University of Technology (1993–2002), Chairman of the Senate Committee on Academic Staff (1993–1996 and 1999–2002), Chairman of Senate Committee on Research (1996–1999). Member of the Polish Academy of Sciences (PAN) (Corresponding Member 1998–2016, Full Member 2016–), Member of the Warsaw Scientific Society (TNW), Chairman of the Committee of Automation and Robotics of Polish Academy of Sciences (PAN) (2007–2014, Professor in the Research and Academic Computer Network Institute (NASK), Vice-Chairman of the Scientific Council of NASK (2011–2015), Chairman of Task Group of Ministry of Science and Higher Education for assessment of applications for funding large scale research equipment and constructions (2011–2015), Chairman of the Scientific Council of the Industrial Institute for Automation and Measurements (PIAP), Member of the IFAC Technical Committees on Optimal Control and on Large Scale Systems, Chair of the Council of Provost, Division IV: Engineering Science, Polish Academy of Sciences (2015–2018).

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

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

**Robot Programming Group**

J.Pulaczewski@ia.pw.edu.pl

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

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

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

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

**Complex Systems Group**

J.Szymanowski@ia.pw.edu.pl

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

With WUT since 1968. Visiting Professor, Laboratoire d'Automatique de Nantes, Ecole Centrale de Nantes, France, 1992, 1994, 1995, 1996, 1997. Retired since January 2000.

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

**Wiesław Traczyk** Professor (retired January 2010)

**Optimization and Decision Support Group**

W.Traczyk@ia.pw.edu.pl

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

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

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

**Eugeniusz Toczyłowski** Professor (retired Oct. 2020)

**Operations Research and Management Systems Group**

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

E.Toczyłowski@ia.pw.edu.pl

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

With WUT since 1973. Head of Operations Research and Management Systems Division, Vice-Dean of the Faculty of Electronics at WUT (1990–1993), chairman of the Rector's Committee for University Computerization (1993–1999), Advisor to the Dean on Strategic Planning (1993–1996). Head of the Undergraduate Program in Information Systems for Decision Support (1992–2004). Member of the Section on Decision Support (since 1992) and the Section on Knowledge Engineering and Operations Research (2003–) of the Committee of Automation and Robotics of Polish Academy of Sciences, Member of the Scientific Council of the Systems Research Institute (IBS PAN) (since 2002), Member of Consulting Council EnergoProject S.A. (2003–2004), Member of Steering Committee of the Energy Market (2003–2004). Member of the Polish National Council for CO<sub>2</sub> Reduction Emission Program, and Head of the Energy Market Group (2009–), Member of the European Commission DG Advisory Group for Energy Roadmap 2050 (2011–).

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

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

**Optimization and Decision Support Group**

A.Wierzbicki@ia.pw.edu.pl

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

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

Since 1978 working with the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria and served (1979–1984) as the chairman of the Systems and Decision Sciences Program. Visiting prof. at the University of Minnesota, Minneapolis,

MN, Brown University, Providence, RI (1970–1971), Kyoto University, Japan (1989–1990), Fernuniversitaet Hagen (1985) and Japan Advanced Institute of Science and Technology (2004–2007).

Director of the National Institute of Telecommunications in Poland (1996–2004). Chairman of the Commission of Applied Research of the State Committee for Scientific Research (KBN) (1991–1994). Chairman of the Consulting Panel for Promotion and Policy of Science of State Committee for Scientific Research (KBN) (1994–2000), Member of the Consulting Panel for Computer Infrastructure of Science KBN (1994–2000), Chairman of the Consulting Panel for International Scientific Cooperation of State Committee for Scientific Research (KBN) (2000–2004). Chairman of the Scientific Council of the Industrial Institute for Automation and Measurements (PIAP) (1991–2004), chairman of the Scientific Council of Scientific and Academic Computer Network NASK (1994–2004), and member of the Scientific Council of Institute of System Research (IBS PAN) (1992–2004). Member of the Committee of Automation and Robotics of Polish Academy of Sciences (PAN) (1970–2004). Member of the Committee for Future Studies “Poland 2000+” PAN (since 1986, deputy chairman since 2000). Member and deputy chairman of the Panel for Cooperation with IIASA of PAN.

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

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

## 2.2 Senior Faculty

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

**Complex Systems Group**  
**room 573, tel. 22 234 7126**  
Przemyslaw.Arabas@pw.edu.pl

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

With WUT since 2002.

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

**Klara Borowa** Assistant

**Software Engineering Group**  
**room 562, tel. 22 234 7756**  
klara.borowa@pw.edu.pl

*M.Sc. 2019 from WUT*

With WUT since 2019.

*Interests:* Software engineering, software architecture, architecture decision making, requirements engineering

**Patryk Józef Chaber** Assistant Professor

**Control and Software Engineering Division, Control Engineering Group**  
**room 571, tel. 22 234 7861**  
patryk.chaber@pw.edu.pl

*M.Sc. 2014, Ph.D 2018 from WUT.*

*Interests:* Neural networks, microcontrollers, control algorithms, modelling.

**Paweł Domański** Professor (since Feb. 2020)

**Control Engineering Group**  
**room 570, tel. 22 234 7665**  
Pawel.Domanski@pw.edu.pl

*D.Sc. 2018, Ph.D. 1996, D.Sc 2018 from WUT.*

With WUT since 1991.

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

**Wojciech Dudek** Assistant

**Robot Programming Group**  
**room P109, 566, tel. 22 234 7649**  
wojciech.dudek@pw.edu.pl, <https://www.robotyka.ia.pw.edu.pl/team/wdudek>

*M.Sc 2015 from WUT*

With WUT since 2017

*Interests:* Mobile robots, navigation, distributed architectures, cloud computing.

**Maksym Figat** Assistant**Robot Programming Group****room 566**

maksym.figat@pw.edu.pl

*M.Sc. 2013 from WUT.*

With WUT since 2008.

*Interests:* methodology of designing robotic control systems, Petri nets, formal language theory, CAD/CAM systems.**Janusz Granat** Assistant Professor**Optimization and Decision Support Group****room 560A, tel. 22 234 7864**

Janusz.Granat@pw.edu.pl, www.ia.pw.edu.pl/~janusz

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

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

*Interests:* Decision support systems, multicriteria decision analysis, data warehouses, decision support in telecommunication industry.**Jerzy Gustowski** Senior Lecturer**Control Engineering Group****room 525, tel. 22 234 7699**

Jerzy.Gustowski@pw.edu.pl

*M.Sc. 1979 from WUT.*

With WUT since 1979.

*Interests:* Low level software for computer control, interfacing, single-chip microcomputers, PLC controllers.**Mariusz Kaleta** Assistant Professor**Operations Research and Management Systems Group****room 561, tel. 22 234 7123**

Mariusz.Kaleta@pw.edu.pl

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

With WUT since 2003.

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



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

**Complex Systems Group**

**room 573, tel. 22 234 7126**

Mariusz.Kamola@pw.edu.pl, www.ia.pw.edu.pl/~mkamola

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

With WUT since 2002.

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

**Andrzej Karbowski** Assistant Professor

**Complex Systems Group**

**room 572, tel. 22 234 7632**

Andrzej.Karbowski@pw.edu.pl, www.ia.pw.edu.pl/~karbowski

*M.Sc. 1983, Ph.D. 1990. D.Sc. 2012 from WUT*

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

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

**Michał Karpowicz** Assistant Professor (part time)

**Complex Systems Group**

**room 573a, tel. 22 234 7860**

Michal.Karpowicz@pw.edu.pl, staff.elka.pw.edu.pl/~mkarpowi

*M.Sc. 2005, Ph.D. 2010, D.Sc 2020 from WUT*

With WUT since 2014

*Interests:* Control theory, game theory, computer networks, cybersecurity

**Włodzimierz Kasprzak** Professor

**Machine Perception Group**

**room 565, tel. 22 234 7866**

Wlodzimierz.Kasprzak@pw.edu.pl, www.ia.pw.edu.pl/~wkasprza

*M.Sc. 1981, Ph.D. 1987 from WUT, Dr-Ing. 1997 from Univ. of Erlangen-Nuremberg, D.Sc. 2001 from WUT, the title of Professor awarded in 2014.*

With WUT since 1997, Professor since 2005. Member of Polish Section of IAPR.

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

**Szymon Kijas** Assistant Professor (part time)

**Software Engineering Group**  
**room 555, tel. 22 234 7997**  
szymon.kijas@pw.edu.pl

*Ph.D. 2019 from WUT*

With WUT since 2019

**Tomasz Kornuta** Assistant Professor (on leave) (until Oct. 2021)

**Robot Programming Group**  
Tomasz.Kornuta@pw.edu.pl, <http://tkornuta.googlepages.com>

*M.Sc. 2005, Ph.D 2013 from WUT.*

With WUT since 2008.

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

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

**Complex Systems Group**  
**room 573a, tel. 22 234 7860**  
Adam.Kozakiewicz@pw.edu.pl

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

With WUT since 2006.

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

**Bartosz Kozłowski** Assistant Professor (on leave)

**Optimization and Decision Support Group**  
Bartosz.Kozlowski@pw.edu.pl

*M.Sc. 2004 from WUT.*

With WUT since 2010.

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

**Tomasz Jordan Kruk** Assistant Professor

**Complex Systems Group**  
**room 530, tel. 22 234 7922**  
Tomasz.Kruk@pw.edu.pl, [www.ia.pw.edu.pl/~tkruk](http://www.ia.pw.edu.pl/~tkruk)

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

With WUT since 1999. Since 2018 cybersecurity expert of PIIT (The Polish Chamber of Information Technology and Telecommunications)

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

**Adam Krzemienowski** Senior Lecturer

**Optimization and Decision Support Group**

**room 553, tel. 22 234 7640**

Adam.Krzemienowski@pw.edu.pl

*Ph.D. 2007 from WUT.*

With WUT since 2007. Visiting Lecturer at the University of Leeds, United Kingdom (2007–2008).

*Interests:* Optimization and decision support under risk, risk measures, stochastic programming.

**Maciej Ławryńczuk** Professor (Leader of the Group), (Deputy Director of the Institute)

**Control Engineering Group**

**room 563, tel. 22 234 7124**

Maciej.Lawrynczuk@pw.edu.pl

*M.Sc. 1998, Ph.D. 2003, D.Sc. 2013 from WUT.*

With WUT since 2003. Twice awarded of “Gold chalk” („Złota kreda”) award. The coordinator of B.Sc. and M.Sc. studies in automation and robotics since 2011.

*Interests:* advanced process control algorithms, in particular Model Predictive Control (MPC) algorithms, set-point optimisation algorithms, artificial intelligence and soft computing techniques, in particular neural networks, modelling and simulation.

**Andrzej Manujło** Assistant

**Operations Research and Management Systems Group**

**room 556**

Andrzej.Manujlo@pw.edu.pl

*M.Sc. 2015 from WUT.*

With WUT since 2009.

*Interests:* Machine Learning, Energy Clusters

**Piotr Marusak** Assistant Professor

**Control Engineering Group**

**room 567, tel. 22 234 7673**

Piotr.Marusak@pw.edu.pl, www.ia.pw.edu.pl/~pmarusak

*M.Sc. 1997, Ph.D. 2003, D.Sc 2020 from WUT.*

With WUT since 2002.

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

**Robert Ryszard Nebeluk** Assistant

**Control and Software Engineering Division, Control Engineering Group**

**room 571, tel. 22 234 7861**

Robert.Nebeluk@pw.edu.pl

*M.Sc. 2019 from WUT*

With WUT since 2019

*Interests:* Modelling, control algorithms, optimization.

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

**Complex Systems Group**

**room 572a, tel. 22 234 3650**

Ewa.Niewiadomska@pw.edu.pl, www.ia.pw.edu.pl/~ens

*M.Sc. 1986, Ph.D. 1995, D.Sc. 2005 from WUT, the title of Professor of Technical Science awarded in Feb. 2017. Member of the Foundation for the Promotion of Science Systems Polish Academy of Sciences (2017-)*

Research Assistant at the Institute of Geophysics of Polish Academy of Sciences in (1987–1988), with WUT since 1988, NASK since 2001, NASK Director for Research since 2009, IEEE Member. Member of of the Scientific Council of NASK since 2002 (Vice-Chairman 2008–2009).

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

Ekspert of the Polish Accreditation Committee, Member of the Committee of Automation and Robotics of Polish Academy of Sciences (PAN)., Member of the Foundation for the Promotion of Science system of PAN

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

**Biometrics and Machine Learning Group**

**room 522, tel. 22 234 7733**

Andrzej.Pacut@pw.edu.pl, www.ia.pw.edu.pl/~pacut

*M.Sc. 1969, Ph.D. 1975, D.Sc. 2000 from WUT, the title of Professor of Technical Sciences awarded in December 2010.*

With Warsaw University of Technology since 1969, first with the Institute of Mathematics (until 1978) then with ICCE. Visiting Assistant Prof. at Lefschetz Center for Dynamical Systems of Brown University, Providence, RI (1980–1981), Visiting Associate Prof. at Oregon State University, Corvallis, OR (1984 and 1986–1991). Deputy Director of ICCE 1985–1986 and 1993–2005. Senior Member of IEEE. Vice Chairman (2001–2005) and Chairman (2006–2009) of the IEEE Poland Section, Chair of Tech. Committee No. 309 on Biometrics (2010–) and expert of Tech. Committee No. 182 on Information Security in IT Systems (2003–) of Polish Normalization Committee (PKN). Head of the NASK Biometric Laboratories (2003–), member of NASK Research Council (2007–), vice-chair (2009–2011). Member of Scientific Council of Central Laboratory of Criminology (2011–).

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

**Piotr Pałka** Assistant Professor

**Operations Research and Management Systems Group**

**room 554, tel. 22 234 7648**

Piotr.Palka@pw.edu.pl, <http://www.ia.pw.edu.pl/~ppalka>

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

With WUT since 2009. Member of the Rector's Team for the Innovative Forms of Education (2014–). Expert of Ministry of Economic Development on Industry Transformation (2016–2017).

*Interests:* multi-agent systems, agent-based modeling, smart cities, distributed decision systems, auction theory, IoT, innovative forms of education, problem based learning, design thinking.

**Krzysztof Pieńkosz** Assistant Professor, Leader of the Group

**Operations Research and Management Systems Group**

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*M.Sc. 1984, Ph.D. 1992, D.Sc. 2011 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.

**Sebastian Plamowski** Assistant Professor

**Control Engineering Group**

**room 567, tel. 22 234 7673**

Sebastian.Plamowski@pw.edu.pl

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

With WUT since 2015.

*Interests:* Modeling and simulation, optimization, diagnostics, predictive control, SCADA and DCS systems.

**Andrzej Ratkowski** Senior Lecturer

**Software Engineering Group**

**room 555, tel. 22 234 7997**

Andrzej.Ratkowski@pw.edu.pl

*M.Sc. 2005, Ph.D. 2011 from WUT.*

With WUT since 2009.

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

**Dawid Seredyński** Assistant**Robot Programming Group****room 566**

Dawid.Seredynski@pw.edu.pl

*M.Sc. 2012 from WUT.*

With WUT since 2012.

*Interests:* grasp planning, manipulation planning**Jerzy Sobczyk** Senior Lecturer**Optimization and Decision Support Group****room 519A, tel. 22 234 7863**

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*M.Sc. 1985 from WUT.*

With WUT since 1984. FEIT Network Administrator.

*Interests:* Computer networks, system and network administration, programming languages, web applications, parallel and distributed programming, multi-criteria optimization.**Andrzej Stachurski** Assistant Professor (Leader of the Group)**Optimization and Decision Support Group****room 553, tel. 22 234 7640**

Andrzej.Stachurski@pw.edu.pl, www.ia.pw.edu.pl/~stachurs

*M.Sc. 1976, Ph.D. 1980, D.Sc 2013 from WUT.*

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

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

**Maciej Stefańczyk** Assistant**Machine Perception Group****room 564**

Maciej.Stefanczyk@pw.edu.pl

*M.Sc. 2011*

With WUT since 2011

*Interests:* Computer vision, computer graphics.**Marcin Szlenk** Senior Lecturer**Software Engineering Group****room 555, tel. 22 234 7997**

Marcin.Szlenk@pw.edu.pl

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

With WUT since 2005.

*Interests:* Software modeling, programming paradigms.**Wojciech Szykiewicz** Assistant Professor**Robot Programming Group****room 517, tel. 22 234 7119**

Wojciech.Szykiewicz@pw.edu.pl

*M.Sc. 1985, Ph.D. 1996 from WUT, D.Sc. 2016 from WUT.*

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

*Interests:* Robotics, multiple robots coordination, robot sensor-based manipulation and motion planning, autonomous navigation, real-time systems.**Tomasz Śliwiński** Assistant Professor**Optimization and Decision Support Group****room 561, tel. 22 234 7123**

Tomasz.Sliwinski@pw.edu.pl

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

With WUT since 2004.

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

**Piotr Tatjewski** Professor (part time)

**Control Engineering Group**

**room 524, tel. 22 234 7397 and 825 0995**

Piotr.Tatjewski@pw.edu.pl

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

With Warsaw University of Technology since 1972. Head of Control Engineering Group 1991–2015, Deputy Director of ICCE for Academic Affairs (1987–1991), Director of ICCE 1996–2008. Vice Dean for Research of the Faculty since (2012–2020). Head of Control and Software Engineering Division (2006–2021), Head of the Undergraduate Degree Program in Computer Control Systems (1994–1996). DAAD scholarship in 1978 (TU Hanover), SERC research fellow at the City University, London (1986), visiting professor at the University of Birmingham (1992/1993). Member of Committee of Control and Robotics of Polish Academy of Sciences since 2004, Chair of the Automatic Control Systems Section of this Committee (2007–2015), Member of the Control and Robotics Section of the Scientific Research Council (KBN) 1997–2004. Member of Programme Committee of Int. Journal of Applied Mathematics and Computer Science, Journal of Automation, Mobile Robots and Intelligent Systems, Member of Advisory Board of ISA Transactions (2011–), Expert of Ministry of Education and Science for Educational Standards (2005–2006). Member of EUCA (European Union Control Association) Administrative Council (2008–2011), member of IFAC Technical Committees TC 2.1 and TC 5.4, Member of the Scientific Council of Systems Research Institute of Polish Academy of Sciences (2007–), vice-chairman of the Scientific Council (2011–2018). Member of the Polish Central Commission for Degrees and Titles (2017–2020). Member of the Advisory Council of the Minister of Science for evaluation of proposals and reports within the programme “PhD with industrial implementation” (2021 –).

**Interests:** Advanced process control and optimization, model based predictive control, multi-layer control systems, decomposition methods in optimization and control, soft computing methods.

**Tomasz Traczyk** Professor (Deputy Director of the Institute)

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

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

With WUT since 1984.

**Interests:** Applications of databases in management and control, software for high-energy physics, long-term digital archives.

**Mateusz Trokielewicz** Assistant Professor (part-time)

**Biometric and Machine Learning Group**

**room 558, tel. 22 234 7805**

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**Interests:** biometrics, iris recognition, machine intelligence, pattern recognition



**Artur Wilkowski** Assistant Professor

**Systems Machine Perception Group**

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*M.Sc Eng 2004, Phd 2012 from WUT*

With WUT since 2006

*Interests:* Computer vision, Machine learning.

**Tomasz Winiarski** Assistant Professor

**Robot Programming Group**

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

With WUT since 2004.

*Interests:* Robot control systems, artificial intelligence, mobile robots, impedance control, manipulator force control, service robots, social robots

**Andrzej Marcin Wojtulewicz** Assistant Professor

**Control Engineering Group**

**room 571, tel. 22 234 7861**

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*M.Sc. 2014, Ph.D 2020 from WUT*

With WUT since 2016

*Interests:* Control theory, FPGA, microcontroller.

**Andrzej Zalewski** Assistant Professor (Leader of the Group)

**Software Engineering Group**

**room 555, tel. 22 234 7997**

Andrzej.Zalewski@pw.edu.pl

*M.Sc. 1997, Ph.D. 2003, D.Sc 2015 from WUT.*

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

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

**Krzysztof Zarzycki** Assistant

**Control Engineering Group**

**room 571, tel. 22 234 7861**

krzysztof.zarzycki@pw.edu.pl

*M.Sc. 2020 from WUT.*

With WUT since 2020.

*Interests:* Process modelling, model predictive control, neural networks.

**Cezary Zieliński** Professor (Leader of the Group)

**Robot Programming Group**

**room 518A, tel. 22 234 5102**

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*M.Sc. 1982, Ph.D. 1988, D.Sc. 1996 from WUT, the title of Professor of Technical Sciences awarded in 2012.*

With WUT since 1985. Research visitor at Loughborough University of Technology, UK (1990, 1992), Senior Fellow at Nanyang Technological University, Singapore (1999–2001), Secretary of Priority Research Program in Control, Information Technology, and Automation (PATIA) (1994–1999). Member of the Forecast Committee of the Polish Academy of Sciences: Poland 2000 Plus (2003–2007, 2015–). Senior Member of IEEE (2002–), Vice Chairman of the Scientific Committee of the Industrial Research Institute for Automation and Measurement PIAP (2016–2017). Vice Dean for Research and International Cooperation FEIT (2002–2005), Head of ICCE Robot Programming and Pattern Recognition Group since 1996 (currently Robot Programming Group). Member of the board of EURON (European Robotics Network of Excellence, 2004–2008). Deputy Director of ICCE for Research (2005–2008), Director of ICCE (2008–2016), Vice Dean for General Affairs (2016–). Member of the Control and Robotics Committee of the Polish Academy of Sciences (2007–). Editor in Chief of Measurements-Automation-Robotics Technical Sciences Quarterly (PAR) (2017–). Head of Warsaw University of Technology Centre for Priority Research Area Artificial Intelligence and Robotics, established within the Excellence Initiative: Research University (IDUB) programme (2020–)

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

**Izabela Żółtowska** Assistant Professor

**Operations Research and Management Systems Group**

**room 554, tel. 22 234 7648**

Izabela.Zoltowska@pw.edu.pl, home.elka.pw.edu.pl/~imilenko

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

With WUT since 2005.

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

## 2.3 Supporting Faculty and Staff

**Włodzimierz Macewicz** Senior Software Engineer

**Software Engineering Group**  
**room 525, tel. 22 234 7699**  
Wlodzimierz.Macewicz@pw.edu.pl

*M.Sc. from WUT.*

With WUT since 1983.

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

**Sylwia Piskorska** R&D Specialist (part time)

**room 530, tel. 22 234 6156**  
Sylwia.Piskorska@pw.edu.pl, sylwia.piskorska@pw.edu.pl

*M.Sc. 2002 from Technical University of Gdańsk.*

With WUT since 2010. Effective project coordinator, works to assist project managers teams with the coordination of resources, equipment, meetings, and information. Organize projects with the goal of getting them completed on time and within budget. Makes sure all aspects of the project run smoothly and efficiently. Works with various members of the project team and the client to develop a time line, create schedules, and oversee progress to make sure goals are met on time.

**Interests:** Program and projects – defence and security, Strategic R&D programs, Horizon 2020, Horizon Europe, European Funds, National Programs (creation of modern solutions and technologies increasing innovation).

Certified in: Prince 2 Practitioner, Management of Risk

## 2.4 Ph.D. Students

**Łukasz Bala** Ph.D. Student (until Oct. 2021)

**Machine Perception Group**  
lukasz.bala.dokt@pw.edu.pl

*Supervisor:* Włodzimierz Kasprzak

**Ewelina Bartuzi** Ph.D. Student

**Biometrics and Machine Learning Group**  
room 558/559, tel. 22 234 7805  
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*Supervisor:* Andrzej Pacut

**Mariusz Drabecki** Ph.D. Student

**Operations Research and Management Systems Group**  
room 556, tel. 22 234 7125  
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*Supervisor:* Eugeniusz Toczyłowski

**Wojciech Dudek** Ph.D. Student (until September 2021)

**Robot Programming Group**  
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*Supervisor:* Wojciech Szyrkiewicz

**Michał Falkowski** Ph.D. Student

**Control Engineering Group**  
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*Supervisor:*

Paweł Domański

**Karolina Gabor-Siatkowska** Ph.D. Student

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*Supervisor:* Andrzej Pacut

**Michał Hałoń** Ph.D. Student

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*Supervisor:* Andrzej Pacut

**Daniel Giełdowski** Ph.D. Student

**Robot Programming Group**  
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*Supervisor:* Wojciech Szyrkiewicz

**Radian Karpuk** Ph.D. Student

**Operations Research and Management Systems Group**  
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*Supervisor:* Eugeniusz Toczyłowski

**Jarosław Karwowski** Ph.D. Student

**Robot Programming Group**  
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*Supervisor:* Wojciech Szynekiewicz

**Kamila Matela** Ph.D. Student

**Optimization and Decision Support Group**  
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*Supervisor:* Eugeniusz Toczyłowski

**Andrzej Manujło** Ph.D. Student

**Operations Research and Management Systems Group**  
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*Supervisor:*  
Eugeniusz Toczyłowski

**Grzegorz Mąkosa** Ph.D. Student

**Software Engineering Group**  
room 556, tel. 22 234 7125

*Supervisor:* Andrzej Zalewski

**Anthony Nwachukwu** Ph.D. Student

**Complex Systems Group**  
Anthony.Nwachukwu.dokt@pw.edu.pl

*Supervisor:* Andrzej Karbowski

**Michał Okulski** Ph.D. Student

**Control Engineering Group**  
room 571, tel. 22 234 7861  
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*Supervisor:* Maciej Ławryńczuk

**Paweł Piwowarski** Ph.D. Student

**Machine Perception Group**  
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*Supervisor:* Włodzimierz Kasprzak

**Dariusz Rocki** Ph.D. Student

**Control Engineering Group**  
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*Supervisor:* Paweł Domański

**Jakub Sawulski** Ph.D. Student (until October 2021)

**Control Engineering Group**  
room 571, tel. 22 234 7861  
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*Supervisor:* Maciej Ławryńczuk

**Paweł Szelaḡowski** Ph.D. Student

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**room**  
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*Supervisor:*

Włodzimierz Kasprzak

**Maciej Węgierek** Ph.D. Student

**Robot Programming Group**  
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*Supervisor:* Cezary Zieliński

**Grzegorz Maksymilian Zalewski** Ph.D. Student (until June 2021)

**Optimization and Decision Support Group**  
grzegorz.zalewski.dokt@pw.edu.pl

*Supervisor:* Andrzej Stachurski

## 2.5 Administrative and Technical Staff

**Elżbieta Matyjasiak** Secretary, Main office.

**room 521, tel. 22 234 7397, 22 825 0995**  
Elzbieta.Matyjasiak@pw.edu.pl

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

**Jolanta Niedbało** Office support.

**room 521, tel. 22 234 7397**  
J.Niedbalo@ia.pw.edu.pl

**Agnieszka Paprocka** Finances support.

**room 526, tel. 22 234 7122**  
Agnieszka.Paprocka@pw.edu.pl

*M.Sc. 2008 from Cardinal Stefan Wyszyński University in Warsaw.*

**Dorota Podniesińska** Menager, Finances.

**room 526, tel. 22 234 6096**  
Dorota.Podniesinska@pw.edu.pl

*M.Sc. 2007 from the M.Skłodowska-Curie Warsaw Academy*

**Agnieszka Słojewska** Finances specialist.

**room 526, tel. 22 234 7122**  
Agnieszka.Slojewska@pw.edu.pl

*baccalaureate 2005 from Leon Kozmiński Academy of Entrepreneurship and Management*

**Alicja Trojanowska** Secretary, Student affairs.

**room 518, tel. 22 234 7750**  
Alicja.Trojanowska@pw.edu.pl

*baccalaureate 2012 from WUT.*

**Beata Woźniak** Manager, Administration.

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

*M.Sc. 1993 from Warsaw University.*

### 3 Teaching Activities – Academic Year 2019/2020

#### 3.1 Undergraduate and Graduate Studies

##### 3.1.1 Spring

Course Title	Course code	Hours per semester	Notes
Advanced Process Control Techniques	103C-ARxxx-MSP-TAP	60	
Algorithms and Data Structures	103D-INxxx-ISP-AISDI	90	
Anatomy of Robots	103A-ARxxx-ISP-ANRO	45	
Artificial Intelligence Methods	639A-ETIKO-IEP-MESZ		for the WUT Distance Learning Center
Artificial Intelligence	1130-EMARO-MSA-2005	45	for EMARO+ programme
Biometrics Authentication	103B-IBxxx-ISP-BIT	45	
Biometrics Authentication	103B-IBxxx-ISP-BIT	45	
Case Studies (Biometry)	1120-MASMA-NSP-0241	30	for the Faculty of Mathematics and Information Science
Computer Management Systems	639B-INSWS-MEP-ISZUZ		for the WUT Distance Learning Center
Computer Networks	103B-CTxxx-ISA-ECONE	60	
Computer Networks	1030-IN000-ISP-0638	45	for the Faculty of Mathematics and Information Science
Computer Networks	103C-INxxx-ISP-SKM	60	
Computer Systems for Control and Measurement	103A-INxxx-ISP-SKPS	60	
Computer Vision Techniques	103A-INISY-MSP-TWM	75	
Data Bases 2	103C-INxxx-ISP-BD2	45	
Data Stream Processing and Data Science	103A-INISY-MSP-PSD	75	
Databases	1060-GI000-ISP-2009	15	for the Faculty of Geodesy and Cartography
Databases and Data Warehouses	1050-FTEDM-MSP-IBHD	45	for the Faculty of Physics
DCS and SCADA Systems	103A-ARxxx-ISP-DCS	60	
Decision Support	103B-INSID-ISP-WDEC	60	
Development of Control Systems (Group Project)	103A-ARxxx-ISP-PUST	75	
Dynamic Systems and Control	103A-CTxxx-ISA-EDYCO		
Essentials of Informatics and Programming	103A-INxxx-ISP-PIPR	75	
Formal Specification and Functional Programs	103B-INxxx-MSP-SPOP	45	
Fundamentals of Digital Technology	103B-INxxx-ISP-PTCY	60	
Fundamentals of Operation Research	103B-ARxxx-ISP-POBO	45	
Identification Methods	103B-ARxxx-MSP-MI	45	
Internet System Architectures and Technologies	639B-INSWS-MEP-ATSUZ		for the WUT Distance Learning Center
Introduction to Automatic Control, Electronics and Telecommunication	103A-INxxx-ISP-WAET	45	
Introduction to Management Systems	103A-INxxx-ISP-WSYZ	75	
Introduction to Robotics	103A-ARxxx-ISP-WR	60	



Course Title	Course code	Hours per semester	Notes
Management and Scheduling	103B-INxxx-ISP-ZAH	60	
Management Information Systems	103B-INxxx-ISP-SIZ	60	
Mathematical Modelling	103A-INISY-MSP-MOM	60	
Mobile Robots	1130-EMARO-MSA-2004	60	for EMARO+ programme
Modeling and Identification	103A-ARxxx-ISP-MODI	60	
Modelling and Computer Simulation	103A-ARxxx-DSP-MISK	60	
Networked Intelligent Devices	103A-INISY-MSP-SIU	60	
Networks and Control of Systems	103B-ARxxx-MSP-SST	45	
Neural Networks	103B-INSID-MSP-SNR	60	
Numerical Methods	103B-INxxx-ISP-MNUM	45	
Operating Systems	103B-CSCSN-ISA-EOPSY	60	
Optimization Techniques	1130-EMARO-MSA-2008	30	for EMARO+ programme
Organization and Management of Software Projects	639B-INxxx-MEP-OZPUZ		for the WUT Distance Learning Center
Parallel Numerical Methods	103A-CSCSN-MSA-EPNM	60	
Pattern Recognition Algorithms	6603A-KDPL-ARW	45	
Process Control	103B-ARxxx-ISP-STP	60	
Programmable Logic Controllers	103B-INSID-ISP-SP	45	
Programming Fundamentals	103A-CTxxx-ISA-EPFU	60	
Real-time Systems	103D-INSID-ISP-SCZR	45	
Reliable, Scalable and Maintainable IT Systems	103A-INISY-MSP-ERSMS	45	
Research Project	103A-INISY-MSP-PBAD	60	
Robot Programming Methods	1130-EMARO-MSA-2003	60	for EMARO+ programme
Smart Computer Techniques	639B-INxxx-MEP-ITOUZ		for the WUT Distance Learning Center
Software Engineering	103C-INIIT-ISP-IOP	45	
Software Project Management	103D-INxxx-ISP-ZPI	45	
System Architecture and Integration	103A-INxxx-MSP-AIS	45	
Team Project 1	103A-INxxx-ISP-PZSP1	60	

### 3.1.2 Fall

Course Title	Course code	Hours per semester	Notes
Advanced Technologies for Computer Network Security	639B-INxxx-MEP-ZTBUZ		for the WUT Distance Learning Center
Agent and Actor Decision Systems	103A-INISY-MSP-AASD	86	
Applied Operations Research in Enterprises	103A-INISY-MSP-ZBOP	60	
Artificial Intelligence Methods	639A-ETIKO-IEP-MESZ		for the WUT Distance Learning Center
Audio Signal Analysis and Speech Recognition	103A-INISY-MSP-EASAR	45	
Automation and Engineering Measurements	1020-TC000-ISP-PR30	60	for the Faculty of Chemistry
Automation and Engineering Measurements in Industry	1020-TC000-ISP-3006	30	for the Faculty of Chemistry
Biometrics Authentication	103B-IBxxx-ISP-BIT	45	

Course Title	Course code	Hours per semester	Notes
Biometrics Authentication	103B-IBxxx-ISP-BIT	45	
Commercial Data Bases – Oracle	103B-INSID-ISP-KBD2	60	
Computer Networks	103C-INxxx-ISP-SKM	60	
Computer Networks	1030-IN000-ISA-0352	45	for the Faculty of Mathematics and Information Science
Computer Networks	103B-INxxx-ISP-SKM	60	
Computer Vision	1130-EMARO-MSA-1006	45	for EMARO+ programme
Control Equipment	103A-ARxxx-ISP-APA	45	
Control Theory	103D-ARxxx-MSP-TST	60	
Data Bases 2	103B-INxxx-ISP-BD2	45	
DCS and SCADA Systems	103A-ARxxx-ISP-DCS	60	
Decision Support	103B-INSID-ISP-WDEC		for the WUT Distance Learning Center
Decision Support	103B-INSID-ISP-WDEC	60	
Diagnosis of Industrial Processes	103A-ARxxx-ISP-DIPR	30	
Discrete Optimization Methods	6603A-KDPL-MOD	45	
Dynamic Systems and Control	103A-CTxxx-ISA-EDYCO		
Event-Driven Programming	103C-INxxx-ISP-PROZ	60	
Formal Specification and Functional Programs	103B-INxxx-MSP-SPOP	45	
Fundamentals of Control Systems	103A-ARxxx-ISP-PODA	45	
Fundamentals of Information Technology	1060-GI000-ISP-1004	45	for the Faculty of Geodesy and Cartography
Fundamentals of Operation Research	103B-ARxxx-ISP-POBO	45	
Image and Speech Recognition	1120-INSZI-MSA-0113	60	for the Faculty of Mathematics and Information Science
Image and Speech Recognition	103A-CTCSN-MSA-EIASR	60	
Intelligent Robot Systems	103A-ARxxx-DSP-ISR	45	
Introduction to Automatic Control, Electronics and Telecommunication	103A-INxxx-ISP-WAET	45	
Introduction to Robotics	103A-ARxxx-ISP-WR	60	
Management Information Systems	103B-INxxx-ISP-SIZ	60	
Microprocessor Systems in Process Control	103B-ARxxx-ISP-SMS	60	
Modelling and Control of Manipulators	1130-EMARO-MSA-1002	60	for EMARO+ programme
Modelling and Control of Robots	103A-ARxxx-DSP-MORO	45	
Neural Networks	103B-INSID-MSP-SNR	60	
Numerical Methods	103A-CTxxx-ISA-ENUME	60	
Numerical Methods	103B-INxxx-ISP-MNUM	45	
Object-Oriented Programming	103B-INxxx-ISP-PROI	60	
Operating Systems	103B-INxxx-ISP-SOI	60	
Optimization Algorithms and Methods	6603A-KDPL-AMO	60	
Optimization Algorithms and Methods	103B-ARxxx-DSP-AMO	60	
Optimization in Decision Support	103A-INxxx-MSP-OWD	45	
Organization and Management of Software Projects	639B-INxxx-MEP-OZPUZ		for the WUT Distance Learning Center

Course Title	Course code	Hours per semester	Notes
Parallel and Distributed Programming	639B-INxxx-MEP-PRRUZ		for the WUT Distance Learning Center
Parallel and Distributed Programming	103A-INxxx-MSP-PORR	60	
Pattern Recognition Algorithms	6603A-KDPL-ARW	45	
Programmable Logic Controllers	103B-INSID-ISP-SP	45	
Programming Fundamentals	103A-CTxxx-ISA-EPFU	60	
Real-time Systems	103D-INSID-ISP-SCZR	45	
Real-time Systems	1130-EMARO-MSA-1003	75	for EMARO+ programme
Robot Control and Simulation	103A-ARxxx-ISP-STERO	60	
Robot Programming Methods	103A-INISY-MSP-ERPM	60	
Signal Processing	1130-EMARO-MSA-1004	45	for EMARO+ programme
Soft Computing in Process Control	103A-ARxxx-MSP-SZAU	60	
Soft Computing in Process Control	6603A-KDPL-SZAU	60	
Software Engineering	103C-INIIT-ISP-IOP	45	
Software Project Management	103D-INxxx-ISP-ZPI	45	
Synthesis of Decision Mechanisms	639B-INSWS-MEP-SMDUZ		for the WUT Distance Learning Center
System Architecture and Integration	103A-INxxx-MSP-AIS	45	
Team Project 1	103A-INxxx-ISP-PZSP1	60	
Techniques for Social Network Analysis	103A-INSID-MSP-TASS	60	
Unix System and TCP/IP Network Administration	103B-INSID-ISP-ASU	60	

### 3.2 Extramural Graduate Studies

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

Postgraduate studies **Project Management: Standards, Practice, Techniques and Tools** merge theoretical knowledge with practical skills necessary for successful project management. The program encompasses: business case and project efficiency assessment, basic project management standards: PMBoK, PRINCE2, IPMA, specialized project management methods e.g. for IT (software development methods including agile approaches), automotive or construction industries, soft-skills like facilitation, negotiations, conflict management, public relations for project management, hard skills like project planning, scheduling, budgeting.

Postgraduate studies **Designing Information Systems with Databases** are intended for IT specialists, who want to acquire new skills in field of design and development of databases and information systems based on them. The programme contains: modeling of processes and data structures, basics of databases usage, engineering of information systems, data management systems, development of applications in systems with databases. The classes take form of lectures and laboratories.

### 3.3 Graduate Distance Learning

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

## 4 Projects

- [PR1] NCBiR Grant No. AAL2/2/INCARE/2018: **Integrated Solution for Innovative Elderly Care INCARE, in International call: “AAL 2017 Call – AAL packages/Integrated solutions – Packages integrating different solutions based on ICT to support active, healthy and independent living of older adults”**

Granting period: 01-10-2018 31-12-2021.

Principal investigator from WUT: Tomasz Winiarski.

Investigators from WUT: Tomasz Winiarski, Wojciech Dudek, Dawid Sereżyński, Maciej Stefańczyk, Maciej Węgierek, Maciej Bogusz, Jerzy Kołakowski (IRE), Cezary Zieliński, Wojciech Szynekiewicz, Włodzimierz Kasprzak, Maksym Figat, Łukasz Zielinski, Daniel Giełdowski, Dawid Gruszczyński, Jakub Sikora, Krystian Chachuła, Vitomir Djaja-Joško (IRE), Jacek Cichocki (IRE), Marcin Kołakowski (IRE).

Aim of the project: Project main objective is to build upon two successful platforms (AAL-NITICS and FP7-RAPP) a new readily available product whose seamless operability and modularity are demonstrated in extensive end-user pilots that help its fast uptake by the market. We will start from previously validated user insights and will use a co-creation approach to tune the INCARE solution. Pilots carried out in three different countries, i.e. Poland, Slovenia and Hungary, will not only aid the development but will also bring evidence about the effectiveness of the INCARE solution. At larger scale, our aim is to increase awareness and strengthen the trust of primary, secondary and tertiary users (especially policy makers) in the positive effects and huge potential of high-tech AAL solutions, including realistic use of robotic platforms.

Expected results: INCARE, when taken up by the market, has the potential to sustain or even improve the quality of life of elderly in different dimensions and throughout the ageing process, i.e. Living a healthy, active and meaningful life, Living independently and safely for longer at home with support from their caregivers and community when needed, Living in dignity and satisfaction. From the point of view of caregiver the project is to: Reduce stress and care burden, Build resilience, Improve quality, efficiency and effectiveness of care.

Keywords: social robot, elderly care.

- [PR2] NCBiR Grant APAKT No. CYBERSECIDENT/455132/III/NCBR/2020: **Online child abuse reacting system emphasizing child pornography**

Granting period: 01-06-2020 31-05-2023.

Principal investigator: Włodzimierz Kasprzak. Investigator: Wojciech Szynekiewicz, Artur Wilkowski, Maciej Stefańczyk.

Aim of the project: The research goal of the APAKT project is to develop artificial intelligence methods for analyzing threats in cyberspace consisting of the offering of multi-media content (including attacking by such content) and texts depicting the sexual exploitation of children, namely, a pornographic content involving children, erotic content involving children, pornographic content with created child's image (hereinafter referred to as illegal content) and adult pornography that in an obvious way threatens children (hereinafter referred to as the sensitive content). It is expected to use deep neural networks and other machine learning techniques supported by classic techniques of automatic recognition and verification of multi-media content (text, image, video, sound).

Expected results: The practical result of the APAKT project will take the form of computational tools for analyzing threats related to the propagation of illegal and sensitive content in cyberspace, using automatically created models of their classification, which are built using modern techniques of artificial intelligence and pattern recognition. The content classification will be built into a hotline system that reacts to child pornography and monitors the infrastructure employed to these attacks.

Keywords: child pornography, cyberspace security, classification, deep neural networks

[PR3] NCBR Grant LaVA No. CYBERSECIDENT/488240/IV/NCBR/2021: **Laboratory for Vulnerability Analysis (LaVA) of stationary and mobile IT devices and algorithms and software**

Granting period: 01-05-2021 31-12-2023.

Principal investigator: Wojciech Szynkiewicz. Investigators: Krzysztof Cabaj, Patryk Chaber, Wojciech Dudek, Daniel Giełdowski, Maciej Ławryńczuk, Piotr Marusak, Robert Nebeluk, Sebastian Plamowski, Andrzej Wojtulewicz, Krzysztof Zarzycki, Cezary Zieliński.

Aim of the project: The project's main objective is to build a vulnerability analysis laboratory equipped with an experimental laboratory station for testing vulnerabilities, devices, and software; vulnerability scanning in IT systems using innovative methods developed during the project; tools for static analysis of applications and behavioural analysis. The project will develop a coherent methodology for conducting security research on next-generation ICT network backbone components (in particular 5G), mobile devices and applications, Internet of Things systems, and Cyber-Physical Systems. Important results of the project will also include new methodologies for vulnerability detection of advanced control algorithms based on artificial intelligence techniques. Methods and algorithms developed within the project will contribute to the automatic identification of vulnerabilities in exploited software.

Keywords: vulnerability, cyber security, lab, IT device testing, software testing

[PR4] NCN Grant No. 505/00808/1031: **Using depth data for perspective correction of RGB descriptors**

Granting period: 28-03-2018 27-03-2023.

Principal investigator: Maciej Stefańczyk.

Aim of the project: In almost every service-robotics task, that requires cooperating with people or working in human environment, one of the key aspects is object recognition. In contrast to structured factory environments, where objects are placed in specific places (e.g. on conveyors) objects in house may be placed virtually anywhere. They can be also occluded (by other objects), distorted (e.g. creased box or bag) or deformed in anyway. Thus, robust object recognition methods are required. A lot of objects, that people cope with every day, contain distinct texture. For textured objects the existing recognition and localization methods rely on matching feature point sets of object's model to the points extracted from current scene. There is, however, crucial problem in this approach measurement distortions (scaling, rotation, perspective). Current algorithms cope with some of those problems, but there are no universal methods for distortion removal in object recognition task. The biggest problem is, undoubtedly, perspective distortion. In case, when measurements are supplemented with depth maps (aligned with color image) it is possible to calculate surface characteristics of the object around the keypoint. This information can then be used to apply perspective correction either to image itself or, if possible, inside feature descriptor algorithm.

This additional step, in general, can be applied to any RGB descriptor, making them robust against perspective distortions and, as a result, making object detection and localization algorithms work better.

Expected results: Research in the project will start from recreation of already carried out feasibility studies (described in following section) and creation of initial algorithm version working with planar or nearly planar surfaces. Next, more surface types will be added, with spherical and cylindrical for example. For every surface types mathematical models of reprojection to camera frame and rejection of unstable points will be created. In parallel to those tasks, preparation of testing environment will be carried out. This includes preparation of simulator and gathering multiple test images (extension of object database). Last task is algorithms testing itself. This will be interleaved with theoretical and implementation works.

Keywords: computer vision, image processing, object recognition, feature points, descriptors, RGB-D

[PR5] NCN Grant SHENG 1 No. UMO-2018/30/Q/HS4/00764: **Advancing methodology of integrated decision-making support for sustainable development**

Granting period: 21-08-2019 20-08-2023.

**Project in association with Systems Research Institute of the Polish Academy of Sciences and collaboration with the East China University of Science and Technology.**

Principal investigator: Janusz Granat

Aim of the project: The overall project objective is to advance methods for science-based decision-making support in key problems of sustainable development, especially in trade-off analysis between attainable goals for economic efficiency, quality of environment, and human well-being. The overall objective is decomposed into the following Operational Objectives (OOs), each advancing methods in specific elements of Multi-Criteria Analysis (MCA) and verifying the developed methods through applications to real-life complex problems:

OO-1: Fairness. Build into the MCA methods minimizing inequalities in representing interests of diverse stakeholders. Verify the approach on multi-level supply chain in the China energy system model.

OO-2: Robust portfolios. Develop effective methods for handling uncertain factors of technological advancement and market prices. Verify the methods on technology portfolios with China's energy systems.

OO-3: Pareto set analysis. Develop methods for representing efficient-solutions' subsets fitting diverse preferences. Verify the methods on the China's model focused on decarbonization of energy-intensive industries.

OO-4: Post-interactive analysis. Develop methods for supporting users in effective selection of manageable subsets of Pareto-solutions that fit best diverse user preferences on attainable goals for competing criteria. Verify the approach on the China's energy system models.

Expected results: Rational decision-making, especially related to sustainable development, requires consistent consideration of societal and industrial problems that are increasingly complex and involve analysis of conflicts and synergies between diverse attainable goals for criteria measuring the development, such as various types costs and key elements of human well-being (e.g., availability of energy, clean water, as well as health impacts, quality of environment). Here, effective and efficient MCA methods are indispensable. Science, understood as organized knowledge, provides methods

for integrating knowledge into model representations of relations between possible decisions and consequences of their implementation, as well as for knowledge creation through the model MCA. However, despite much progress in model-based decisionmaking support, some elements of the MCA still inadequately support problem analysis, which results in oversimplifications of the analysis, and thus hampers the effectiveness of the decision-making support. The project will, by filling the gaps in the MCA methods, not only provide effective methods for solving problems in sustainable development but also improve the basis for further development of science.

Keywords: sustainable development, decision-making support, multi-criteria analysis, fairness, uncertainty, robust.

- [PR6] Warsaw University of Technology Centre for Priority Research Area Artificial Intelligence and Robotics Grant No. 504/04496/1031/45.010201: **Look & learn: Skill acquisition by a companion robot based on task demonstration**

Granting period: 10-07-2020 30-06-2022.

Principal investigator: Wojciech Szynekiewicz. Investigators from ICCE: Patryk Chaber, Paweł D. Domański, Wojciech Dudek, Maksym Figat, Włodzimierz Kasprzak, Maciej Ławryńczuk, Piotr Marusak, Robert Nebeluk, Piotr Pałka, Dawid Seredyński, Maciej Stefańczyk, Maciej Węgierek, Artur Wilkowski, Tomasz Winiarski, Cezary Zieliński.

Aim of the project: The aim of the project is to develop key technologies and methods necessary to construct a companion robot control system. A robot of this type must not only operate autonomously in home or office environments, but also interact socially with humans. The project is focused on the most important research issues related to robot programming by demonstration. The robot learns from examples of tasks performed by humans (look-and-learn). The way to delegate tasks to the robot must be easy to master by unskilled users.

Expected results: The result of the research work will be the structure of the robot control system that will contain modules responsible for: knowledge representation and processing, task planning and control of robot effectors and receptors. Knowledge representation module will take into account perception, i.e. the results of processing of current observation of the environment. The methods developed in the project will be experimentally verified on real robots.

Keywords: robot companion, programming by demonstration, skills, control system

- [PR7] Warsaw University of Technology Centre for Priority Research Area Artificial Intelligence and Robotics Grant No. 504/04496/1031/45.010601: **WUT Experts for Engineering and Scientific Projects (E2SP) at NICA**

Granting period: 07-07-2020 30-06-2022.

Principal investigator: Maciej Ławryńczuk. Investigators from ICCE: Patryk Chaber, Paweł D. Domański, Robert Nebeluk, Sebastian Plamowski, Tomasz Traczyk, Andrzej Wojtulewicz, Krzysztof Zarzycki.

Aim of the project: The purpose of the e-PIN project is to significantly develop the participation of WUT in the Nuclotron based Ion Collider fAcility (NICA) project being developed in Joint Institute for Nuclear Research (JINR), including participation in scientific research as part of both experiments, Monte-Carlo simulation of heavy-ion collisions, development of model predictions for physical processes and detector parameters, and a very wide contribution to design, construction, commissioning and use of all elements of the detection systems.



Expected results: Development of model predictions for nuclear collisions at NICA energies, and their registration process by MPD detector systems. Support of the monitoring of test equipment installation by EqDb (Equipment Database). SCADA WinCC SIEMENS for MPD. ECS Experiment Control System for NICA-MPD-PLATFORM. Support Systems for MPD. MCORD electronic muon subsystem. MPD thermal stabilisation.

Keywords: Joint Institute for Nuclear Research, Nuclotron-based Ion Collider facility, ion collision physics, measurement electronics, experiment support systems

- [PR8] Warsaw University of Technology Centre for Priority Research Area Artificial Intelligence and Robotics Grant No. 504450100039: **Development of artificial intelligence algorithms in the study of archival digital images from the crime scene**

Granting period: 01.2021-12.2022

Principal investigator: Dorota Zawieska, Other investigators: Kamila Barbara Kalinowska (WUT), Artur Wilkowski (WUT), Jakub Markiewicz (WUT), Robert Sitnik (WUT), Patryk Kot (Liverpool John Moores University), Mogomed Muradov (Liverpool John Moores University)

Aim of the project: The aim of the project is to develop a methodology for the use of image processing algorithms and Deep Neural Networks in the process of detecting and classifying injuries on the outer skin of the body on the basis of postmortem images of victims of criminal incidents. The research is conducted in cooperation with the Department of Forensic Medicine (abbr. ZMS) of the Medical University of Warsaw and Liverpool John Moores University

Expected results: As part of the first phase of the research, the proprietary TIP (Tissue-Injuries of Postmortem dataset) database was developed with over 150,000 digital images obtained as a result of the scientific internship of one of the contractors at the Department of Forensic Medicine of the Medical University of Warsaw. There was also proposed and experimentally verified a method for injury detection and classification. As part of the second phase of the research, it is planned to develop 3D model of the human body silhouette and to combine it with injury detection and classification results obtained during the first phase of the research into a common model.

Keywords: postmortem imaging, injury detection, injury classification, pathology, forensic pathology

- [PR9] Scientific Council for the Discipline of Automatic Control, Electronics and Electrical Engineering Grant No. 504/04549/1031/43.020003: **Computationally efficient nonlinear model predictive control algorithms with alternative cost-functions**

Granting period: 22-07-2020 31-12-2021.

Principal investigator: Maciej Ławryńczuk. Investigator: Robert Nebeluk.

Aim of the project: The aim of the project is to develop computationally efficient nonlinear predictive control algorithms with alternative cost-functions. Currently, classical quadratic cost-functions are used, which do not always lead to good regulation quality. It is planned to use more complex cost-functions, e.g. a differential approximation of the absolute value function. Statistical indicators of control quality will also be considered. The rudimentary nonlinear optimisation problem will be transformed to a quadratic form, which shorten calculation time.

Expected results: An accepted article for an open access journal with a minimum score of 70 points, with the ultimate goal of 100+ points. An accepted paper in a foreign conference. Significant advancement of the PhD dissertation.

Keywords: Model predictive control, nonlinear models, optimisation

- [PR10] Scientific Council for the Discipline of Automatic Control, Electronics and Electrical Engineering Grant No. 504/04549/1031/43.020001: **Flexible programmable matrix of model predictive controllers working in parallel in real time.**

Granting period: 22-07-2020 31-12-2021.

Principal investigator: Patryk Chaber. Investigator: Andrzej Wojtulewicz.

Aim of the project: The aim of this project is to design a novel software-hardware structure to control fast dynamic processes. This structure will allow for simultaneous use of Model Predictive Control for many processes of independent dynamics from each other.

Expected results: The designed matrix of controllers managed by the specialized subsystem will allow the user to utilize advanced control algorithms in a single embedded system, thus speeding up the process of design and development of industrial controllers.

Keywords: Field Programmable Gate Array, model predictive control. advanced control algorithms, matrix of controllers, embedded systems, industrial processes

- [PR11] Scientific Council for the Discipline of Automatic Control, Electronics and Electrical Engineering Grant No. 504/04549/1031/43.020002: **Outliers in Control Engineering**

Granting period: 22-07-2020 31-12-2021.

Principal investigator: Paweł D. Domański. Investigators: Michał Falkowski, Dariusz Rocki, Maciej Ławryńczuk.

Aim of the project: Preparation of the multi-author monography entitled: "Outliers in Control Engineering - Fractional Calculus Perspectives", which will be published by De Gruyter.

Expected results: Proposed book includes a collection of contributions addressing different yet cohesive subjects, like dynamic modelling, classical control, advanced control, fractional calculus, statistical analytics focused on an ultimate goal: robust and outlier-proof analysis. All studied problems show that outliers play an important role and classical methods, in which outlier are not taken into account, do not give good results. Applications from different engineering areas are considered such as semiconductor process control and monitoring, MIMO peltier temperature control and health monitoring, networked control systems, and etc.

Keywords: outliers, fractional calculus, control engineering, performance assessment

- [PR12] Rector's Grant No. 504440300031: **Development of educational and sports robot platforms**

Granting period: 19-06-2020 20-06-2021.

Principal investigator: Tomasz Winiarski. Investigators: Maciej Bogusz, Wojciech Dudek, Kamil Foryszewski, Daniel Giełdowski, Piotr Kostrzeński, Hubert Kowalski, Maciej Radzimirski, Dawid Seredyński, Michał Stolarz, Klaudia Stpiczyńska, Maciej Węgierek.

Aim of the project: The main goal of the project is to develop a research and teaching platform consisting of the group of MiniRyś robots, a modular board and a global location system. Part of the work has already been started, the main objectives of the grant are to improve the electronics and software of the MiniRyś robot and to verify the operation of its next version.

Expected results: The expected result: It is planned to conduct courses in the field of sports robotics, introducing students and new members of the robotic club to the basics of mobile robotics. For this purpose, Lego Mindstorms sets and the necessary construction parts will be purchased..

Keywords: robot, didactics

- [PR13] Research agreement No. 501210102369 with Valmet Automation Sp. z o.o.: **Feasibility study document preparation aimed at the validation of the planned modernization of the Ammonia Production Installation at ZAK SA**

Granting period: 10-12-2020 23-01-2021.

Principal investigator: Paweł D. Domański.

Aim of the project: Preparation of the feasibility study for the modernization project, which aims at the improvement of the process steam distribution network including different pressure collectors. The project is dedicated for the Ammonia Production Line in the Zakłady Azotowe Kędzierzyn in Kędzierzyn Koźle.

- [PR14] Research agreement No. 501210102377 with Multi-Aut Sp. z o.o.: **Development and implementation of algorithms for the distributor's pallet loading problem**

Granting period: 30-12-2020 30-09-2021.

Principal investigator from WUT: Krzysztof Pieńkosz. Investigators: Mariusz Kaleta, Krzysztof Kasprzak, Tomasz Śliwiński, Izabela Żółtowska

Aim of the project: The aim of the project is to develop algorithms for the distributor's pallet loading problem. They will be implemented and tested in the real life environment and applied to the robotic pallet loading system developed by Multi-Aut Sp. z o.o. company.

Expected results: A prototype planer application for the robotic system of pallet loading.

Keywords: distributor's pallet loading, 3D bin packing problem, combinatorial optimization

- [PR15] Research agreement No. 1/PZ/09/2021 with PayEye Sp.z o.o.: **Evaluation of the PayEye payment terminal with eye biometrics: field tests planning, supervision of testing, analysis and reporting of results of the tests.**

Granting period: 09-09-2021 30-09-2021.

Principal investigator: Mariusz Kamola. Investigators: Ewelina Bartuzi-Trokielewicz, Michał Hałoń, Karolina Gabor-Siatkowska.

Aim of the project: Evaluation of the quality of iris-based person identification by PayEye payment terminal, in various conditions (lighting, humidity, temperature) and on varied population (age, sex, wearing lenses or glasses) of 150 persons.

Expected results: A conclusion in the form of a report with selected PayEye payment terminal parameters estimates.

Keywords: payment terminal, biometrics, iris recognition

- [PR16] Research agreement No. 1/PZ/11/2021 with PayEye Sp.z o.o.: **Evaluation of the PayEye payment terminal with face biometrics: field tests planning, supervision of testing, analysis and reporting of results of the tests.**

Granting period: 18-11-2021 30-11-2021.

Principal investigator: Mariusz Kamola. Investigators: Ewelina Bartuzi-Trokielewicz.

Aim of the project: Evaluation of the quality of face-based person identification by PayEye payment terminal, in various conditions (lighting, indoor/outdoor) and on varied population (age, sex, eye color) of 100 persons.

Expected results: A conclusion in the form of a report with selected PayEye payment terminal parameters estimates.

Keywords: payment terminal, biometrics, face recognition

[PR17] Research agreements with Sąd Okręgowy w Warszawie, Sąd Okręgowy w Lublinie, Sąd Okręgowy w Rzeszowie and Sąd Okręgowy w Krakowie: **Expert opinions on the information systems and services.**

Principal investigator: Andrzej Zalewski.

## 5 Degrees Awarded

### 5.1 Ph.D. Degrees

Advisor: **Wojciech Szynkiewicz**

Wojciech Dudek

*Prudent Management of Interruptible Tasks Executed by a Service Robot*

Thesis defended on Sept. 29, 2021

Advisor: **Włodzimierz Ogryczak and Andrej Stachurski**

Grzegorz Zalewski

*Wielokryterialne modele sprawiedliwej optymalizacji dla rozdziału zasobów sieciowych*

Thesis defended on June 29, 2021

### 5.2 M.Sc. Degrees

Advisor: **Piotr Arabas**

M. Bochenek

*Hierarchiczny, oparty o relaksację algorytm alokacji zadań dla chmury obliczeniowej wykorzystującej wirtualizację*

Degree awarded on June 2021

Advisor: **Patryk Chaber**

K. Godleś

*Wpływ obciążenia na jakość regulacji quadcoptera*

Degree awarded on March 2021

J. Skłodowski

*Detektor ataków Man-in-the-Middle w przemysłowych systemach sterowania*

Degree awarded on October 2021 (with honors)

Advisor: **Paweł Domański**

A. Dunajska

*Odporne wykrywanie anomalii w szeregach czasowych*

Degree awarded on March 2021

B. Maziarz

*System pozycjonowania w oparciu o znaczniki i kontrola trajektorii autonomicznej platformy mobilnej*

Degree awarded on June 2021 (with honors)

B. Rajkowski

*Badanie odporności na wartości odstające metod estymacji charakterystyk statycznych*

Degree awarded on December 2021

Advisor: **Janusz Granat**

M. Krysa

*Wykorzystanie rozwiązań Big Data w analizie danych pozyskiwanych z liczników energii*

Degree awarded on March 2021

K. Bienias

*Systemy poboru opłat bazujących na urządzeniach GNSS i wykorzystanie w tych systemach modeli analitycznych*

Degree awarded on June 2021

J. Kochanowski

*Detekcja anomalii w strukturach grafowych na potrzeby systemów cyberbezpieczeństwa*

Degree awarded on October 2021

Advisor: **Mariusz Kaleta**

P. Walkowiak

*Modele wspomaganie decyzji o zakupach energii dla klastra energii w Polsce*

Degree awarded on March 2021

P. Jabłonowski

*Obsługa błędów komunikacji w integracji aplikacji wykorzystującej architekturę SOA*

Degree awarded on October 2021 (with honors)

Advisor: **Andrzej Karbowski**

J. Kalisiak

*Efektywne metody jednoczesnego wyznaczania bliskiego optymalnemu routingu i przydziału pasma w sieciach energooszczędnych*

Degree awarded on March 2021

Advisor: **Włodzimierz Kasprzak**

V. K. Do

*Image classification in terms of two-person interactions based on keypoint detection and machine learning*

Degree awarded on October 2021

M. Hryciów

*System analizy mowy do rozpoznawania emocji mówcy*

Degree awarded on October 2021

Advisor: **Szymon Kijas**

M. Kłos (OKNO)

*Analiza porównawcza interfejsów API udostępnionych w ramach Otwartej Bankowości*

Degree awarded on October 2021

Advisor: **Jacek Komorowski (II)**

K. Stec

*Śledzenie wielu obiektów przy pomocy głębokich sieci neuronowych i filtru Kalmana*

Degree awarded on June 2021

Advisor: **Przemysław Korpas (II)**

P. Machnowski (OKNO)

*Modelowanie propagacji sygnału radiowego z wykorzystaniem numerycznego modelu terenu*

Degree awarded on June 2021

Advisor: **Adam Kozakiewicz**

T. Madycki (OKNO)

*Dynamiczny honeypot w oparciu o klaster Kubernetes*

Degree awarded on March 2021

P. Grabski

*Detekcja i analiza ataków DDoS*

Degree awarded on June 2021

Advisor: **Stanisław Kozdrowski (II)**

M. Konieczka

*Prognozowanie i analiza wydajności sieci optycznych nowej generacji*

Degree awarded on October 2021 (with honors)

Advisor: **Marek Kozłowski (II)**

P. Gawroński

*Głęboka sieć neuronowa zastosowana do problemu rekomendacji w e-commerce*

Degree awarded on October 2021

Advisor: **Tomasz Kruk**

M. Korzeniewski

*Tworzenie bezpiecznych aplikacji w środowisku chmurowym - bezpieczna orkiestracja kontenerów*

Degree awarded on March 2021

Advisor: **Adam Krzemienowski**

J. Król

*Optymalizacja portfela inwestycyjnego z zastosowaniem miary ryzyka ekstremalnego i metody zarządzania kapitałem*

Degree awarded on October 2021

Advisor: **Maciej Ławryńczuk**

P. Janicki

*Stanowisko laboratoryjne elastyczne wahadło odwrócone: konstrukcja, modelowanie i regulacja*

Degree awarded on March 2021

M. Skrzyczewski

*Zastosowanie kaskadowych sieci neuronowych do modelowania procesów dynamicznych i w algorytmach regulacji predykcyjnej*

Degree awarded on June 2021

Advisor: **Jan Mulawka (II)**

M. Umański

*Zastosowanie metod przetwarzania języka naturalnego w procesie diagnozy pacjenta*

Degree awarded on October 2021

Advisor: **Ewa Niewiadomska- Szynkiewicz**

M. Lipiński

*Środowisko wspierające analizę potencjalnie złośliwych aplikacji mobilnych*

Degree awarded on March 2021

B. Cybulski

*Symulator urzędnika mobilnego do wspomagania wykrywania zaawansowanych cyberataków*

Degree awarded on June 2021

W. Piątek (OKNO)

*Zastosowanie metaheurystyk do lokalizacji węzłów w bezprzewodowych sieciach sensorowych*

Degree awarded on June 2021

P. Szadkowski

*System do budowy profili zachowań użytkowników na podstawie danych z czujników urządzenia mobilnego*

Degree awarded on October 2021 (with honors)

Advisor: **Piotr Pałka**

D. Pietruchowski (OKNO)

*Analiza bezkolizyjnych skrzyżowań drogowych z zastosowaniem autonomicznych menadżerów skrzyżowań oraz z wykorzystaniem systemu wieloagentowego*

Degree awarded on March 2021 (with honors)

M. Mirowski

*Implementacja wieloagentowego systemu geolokalizacji miejsc postojowych w przestrzeni miejskiej*

Degree awarded on March 2021

M. Olechno

*Wieloagentowy system sterowania sygnalizacją świetlną na potrzeby karetek*

Degree awarded on March 2021

W. Natur

*Analysis of the quality of methods for emergency vehicles routing, using road traffic simulation tool*

Degree awarded on April 2021

J. Kaleta

*Poszukiwanie architektur sieci neuronowych za pomocą metaheurystyk inspirowanych naturą na przykładzie zagadnienia klasyfikacji faz snu*

Degree awarded on June 2021 (with honors)

M. Weigle

*Analiza wariantowa symulacji car sharingu za pomocą przestrzennego agentowego modelu symulacyjnego*

Degree awarded on October 2021 (with honors)

Advisor: **Krzysztof Pieńkosz**



K. Kasprzak

*Algorytm planowania rozmieszczenia towarów na paletach*

Degree awarded on June 2021

Advisor: **Sebastian Plamowski**

M. Hejduk

*Porównanie jakości regulacji w strukturach ze śledzeniem modelu i strukturach o jednym stopniu swobody na przykładzie rzeczywistego obiektu*

Degree awarded on January 2021

R. Janicki

*Algorytmy wykrywania anomalii w procesach przemysłowych jako element systemu cyberbezpieczeństwa*

Degree awarded on June 2021

Advisor: **Andrzej Ratkowski**

K. Łowicka (OKNO)

*Migracja aplikacji webowej z hostingu współdzielonego do chmury obliczeniowej*

Degree awarded on October 2021

K. Biduś

*Horyzontalne skalowanie systemów rozproszonych*

Degree awarded on October 2021

Advisor: **Michał Rudowski (II)**

S. Kulesza

*Porównanie efektywności przechowywania i przetwarzania danych przestrzennych w Oracle Database i MongoDB*

Degree awarded on October 2021

Advisor: **Andrzej Stachurski**

T. Jakubczyk

*Zastosowanie metod sieci neuronowych do automatycznego wyznaczania właściwości próbki zawiesiny*

Degree awarded on March 2021

P. Tympalski (OKNO)

*Analiza i porównanie wybranych algorytmów klasyfikacji tekstów*

Degree awarded on June 2021

K. Szymczyk

*Wykrywanie ukrytych informacji w zdjęciach cyfrowych*

Degree awarded on October 2021

Advisor: **Marcin Szlenk**

S. Szymborski

*Modelowanie decyzji architektonicznych przy użyciu modelu cech*

Degree awarded on March 2021

T. Zieliński

*Wizualizacja programów funkcyjnych*

Degree awarded on March 2021

A. Barej

*Analiza oprogramowania przy użyciu środowiska Glamorous Toolkit*

Degree awarded on October 2021

M. Jezierski

*Dziedziczne języki modelowania gier komputerowych*

Degree awarded on October 2021

P. Masłowski

*Transformacja modeli w języku Alloy do kodu w językach funkcyjnych*

Degree awarded on October 2021

Advisor: **Wojciech Szynkiewicz**

P. Szostak

*System autonomicznej nawigacji wielokierunkowej bazy jezdnej*

Degree awarded on March 2021

A. Ogonowski

*Stabilizacja bezzałogowej maszyny latającej z wykorzystaniem metod głębokiego uczenia ze wzmocnieniem*

Degree awarded on June 2021 (with honors)

Advisor: **Mateusz Trokielewicz**

K. Anuszkiewicz

*Creating fake iris images using generative adversarial networks for use in presentation attacks detection methods in iris biometric systems*

Degree awarded on March 2021

Advisor: **Tomasz Trzeciński**

M. Kurzynka

*Identyfikacja cząstek w eksperymencie ALICE z użyciem modeli adaptacji domeny*

Degree awarded on March 2021

Advisor: **Artur Wilkowski**

K. Stachurka (OKNO)

*Problem detekcji, śledzenia i klasyfikacji przeszkód dynamicznych na podstawie skanów laserowych i obrazu z kamery 2D w zadaniu nawigacji robotów*

Degree awarded on March 2021

P. Lis

*Rozpoznawanie aktywności osób o charakterze cyklicznym w sekwencjach wideo*

Degree awarded on October 2021

Advisor: **Tomasz Winiarski**

D. Giełdowski

*Struktura i implementacja systemu robotycznego zawierającego robota MiniRyś*

Degree awarded on June 2021 (with honors)

M. Bogusz

*Platforma sprzętowo-programowa czasu rzeczywistego robota mobilnego "MiniRyś"*

Degree awarded on October 2021

J. Sikora

*Komunikacja głosowa z robotem społecznym Rico*

Degree awarded on October 2021 (with honors)

Advisor: **Andrzej Wojtulewicz**

T. Stawowy

*Uniwersalny system programowania funkcji zaworów elektropneumatycznych Festo Motion Terminal VTEM*

Degree awarded on March 2021

Advisor: **Andrzej Zalewski**

P. Lubecki (OKNO)

*Analiza i ocena architektur korporacyjnych systemów klasy CRM reprezentowanych językiem ArchiMate*

Degree awarded on March 2021 (with honors)

T. Walesiak (OKNO)

*Słownik komponentów oprogramowania systemów informatycznych*

Degree awarded on March 2021

M. Gromek (OKNO)

*Jak funkcjonują zespoły deweloperskie w wytwarzaniu oprogramowania metodykami zwinnymi (Agile)?-wywiady z zespołami*

Degree awarded on October 2021

A. Brela

*Jak funkcjonują zespoły deweloperskie w wytwarzaniu oprogramowania metodykami zwinnymi (agile) - wywiad z zespołami*

Degree awarded on October 2021

S. Skowroński

*Ocena architektury korporacyjnej opisanej językiem Archimate*

Degree awarded on October 2021

Advisor: **Izabela Żółtowska**

B. Grudniewski

*Wybrane metody i modele harmonogramowania pracy zmianowej z uwzględnieniem preferencji pracowników*

Degree awarded on March 2021

B. Mielczarek

*Wykorzystanie modeli zestawiania połączeń VPN w kontekście sieci wrażliwych na opóźnienie*

Degree awarded on March 2021. Niewiński\* Opracowanie i analiza algorytmu do zarządzania szkoleniami przedsiębiorstwa branży lotniczej\* March 2021\*\*

M. Skowrońska (OKNO)

*Modele wspomaganie koordynacji odbioru odpadów w dwustopniowym łańcuchu dostaw*

Degree awarded on October 2021

### 5.3 B.Sc. Degrees

Advisor: **Piotr Arabas**

T. Józwik

*Lekki zarządca sieci dla małego klastra obliczeniowego*

Degree awarded on February 2021

B. Partyka

*Analizator ruchu TCP*

Degree awarded on September 2021

Advisor: **Jarosław Arabas (II)**

M. Szpunar

*Implementacja gotowych algorytmów optymalizacji w językach Python i R*

Degree awarded on February 2021

Advisor: **Patryk Chaber**

A.Chlebosz

*Bezpieczny system SCADA*

Degree awarded on February 2021

A.Dailida

*Sieć neuronowa jako regulator MPC w języku Python*

Degree awarded on March 2021

R. Szczepanik

*Realizacja algorytmu śledzącego trajektorię w oparciu o dynamiczną rekonfigurację kamery w robocie typu Line Follower*

Degree awarded on February 2021 (with honors)

D. Koss

*Zastosowanie algorytmów upraszczania sztucznych sieci neuronowych w algorytmach regulacji*

Degree awarded on February 2021

I.Pawlak

*Modelowanie wytrzymałości fizycznej człowieka w planowaniu treningu*

Degree awarded on September 2021

Advisor: **Paweł Domański**

D. Wojciechowicz

*Metody wykrywania wartości odstających w przestrzeni dwuwymiarowej*

Degree awarded on February 2021

Advisor: **Maksym Figat**

P. Gurudatt

*Motion Synthesis of Legged Robot for Optimized Gaits and Body Balance*

Degree awarded on February 2021

K. Bieliński

*System robotyczny służący do konstrukcji modelu budynku na podstawie formalnego planu*

Degree awarded on September 2021 (with honors)

R. Wiercioch

*System robotyczny przygotowujący hot dogi z wykorzystaniem planowania symbolicznego*

Degree awarded on September 2021 (with honors)

W. Bara

*A Swarm of Robots Performing Delivery Tasks Based on Embodied Agent Approach*

Degree awarded on September 2021 (with honors)

Advisor: **Jerzy Gustowski**

M. Zych

*Wyszukiwarka meczów piłki nożnej*

Degree awarded on February 2021 (with honors)

P. Rawicki

*Rozbudowa sprzętowa i modyfikacja sterowania prototypu robota mobilnego*

Degree awarded on June 2021

K. Konrad

*Projekt aplikacji wspomagającej osoby z chorobą Alzheimera "Zapamiętnik"*

Degree awarded on June 2021

D. Szulim

*Aplikacja wspierająca właścicieli pojazdów "CarCare"*

Degree awarded on June 2021

A. Bieniek

*Program do bilansowania diety wegetariańskiej*

Degree awarded on September 2021

K. Luchowski

*Aplikacja mobilna na platformę Android do nauki języków obcych z wykorzystaniem fiszek*

Degree awarded on September 2021

D. Piskorz

*Algorytm do rozpoznawania i odczytywania danych z tabel na dokumentach fakturowych*

Degree awarded on September 2021

M. Puchalski

*Aplikacja mobilna do wyszukiwania i zarządzania lekami oraz powiązanych z nimi zamiennikami*

Degree awarded on September 2021 Ł. Rombel\* Aplikacja "Próba generalna"- pomoc dla aktorów i recytatorów\* September 2021\*\*

Advisor: **Mariusz Kaleta**

M. Kondraciuk

*Aplikacja wspierająca dobór źródeł wytwórczych w klastrze energetycznym*

Degree awarded on February 2021

M. Kawski

*Aplikacja internetowa przewidująca wyniki meczów piłkarskich z wykorzystaniem sztucznej sieci neuronowej*

Degree awarded on September 2021

Advisor: **Mariusz Kamola**

M. Kiliański

*Aplikacja "Tu byłem" śledząca trasy użytkowników za pomocą znaczników NFC*

Degree awarded on September 2021

Advisor: **Adam Kozakiewicz**

S. Sidoruk

*Wykrywanie phishingu na poziomie przeglądarki*

Degree awarded on September 2021

Advisor: **Stanisław Kozdrowski (II)**

M. Findeisen

*Zastosowanie algorytmów uczenia maszynowego do wykrywania anomalii w problemie lokalizacji terminali w sieciach mobilnych*

Degree awarded on September 2021

Advisor: **Tomasz Kruk**

T. Mazur

*Problem konsensusu w systemach rozproszonych*

Degree awarded on February 2021

M. Mozolewski

*Bezpieczne zarządzanie automatyzacją z wykorzystaniem Terraform*

Degree awarded on February 2021

S. Grzelak

*The challenges of embedding distributed applications in Kubernetes containers*

Degree awarded on September 2021

K. Kowalski

*OAuth 2.0 as a method of authorization in distributed environments*

Degree awarded on September 2021

S. Bieńkowski

*Zarządzanie systemami komputerowymi przy użyciu Ansible*

Degree awarded on October 2021

Advisor: **Maciej Ławryńczuk**

J. Morawski

*Sterowanie serwomechanizmu laboratoryjnego*

Degree awarded on February 2021 (with honors)

Advisor: **Piotr Marusak**

R. Pietkun

*Symulacyjne badania porównawcze metod uwzględniania ograniczeń wyjść obiektu w algorytmach regulacji predykcyjnej*

Degree awarded on February 2021

P. Małyszek

*Oprogramowanie do interaktywnego strojenia regulatorów rozmytych*

Degree awarded on February 2021

J. Świerlikowski

*Sterowanie predykcyjne nieliniowego obiektu chemicznego*

Degree awarded on September 2021

Advisor: **Ewa Niewiadomska-Szynkiewicz**

R. Litka

*Detekcja złośliwych aplikacji na urządzenia mobilne z wykorzystaniem uczenia maszynowego*

Degree awarded on September 2021

M. Góra

*Porównanie technologii Big Data na przykładzie analizy sieci społecznych*

Degree awarded on September 2021

Advisor: **Robert Nowak (II)**

M. Konefał

*Projekt i implementacja asemblera DNA dla sekwencerów trzeciej generacji*

Degree awarded on October 2021

Advisor: **Andrzej Pacut**

V. Bureau

*Generating new types of spiders using Generative Adversarial Network*

Degree awarded on February 2021

Advisor: **Piotr Pałka**

W. Paszko

*Agregacja preferencji w grach politycznych*

Degree awarded on February 2021

M. Sitarczyk

*Dostosowanie mechanizmów środowiska gry Cities: Skylines do rozwiązywania problemów społecznych w gminie Żuromin*

Degree awarded on February 2021

J. Prugarewicz

*Wieloagentowa Aplikacja Mobilna – QUIZ*

Degree awarded on June 2021

A. Wrzosek

*Ski Station Steering Application (in Java)*

Degree awarded on September 2021

Advisor: **Krzysztof Pieńkosz**

M. Burda  
*Aplikacja do generowania wybranych klas grafów*  
Degree awarded on June 2021

Advisor: **Sebastian Plamowski**

K. Kobyliński  
*System do strojenia i symulacji algorytmów regulacji*  
Degree awarded on February 2021

R. Tuzimek  
*Zastosowanie modelu w diagnostyce na przykładzie obiektu laboratoryjnego*  
Degree awarded on February 2021

Advisor: **Andrzej Ratkowski**. Świtaj\* Śledzenie pozycji na rynku akcji amerykańskich z wykorzystaniem aplikacji mobilnej oraz usługi Backend as a Service\* February 2021\*\*

Advisor: **Andrzej Stachurski**

K. Sapiński  
*Interaktywna mapa pomników i tablic pamiątkowych w Warszawie na urządzenia mobilne*  
Degree awarded on February 2021

S. Kałuski  
*Aplikacja sieciowa wspomagająca wyszukiwanie w Internecie zgodna ze specyfikacją Progressive Web Application*  
Degree awarded on June 2021

Advisor: **Maciej Stefańczyk**

M. Palkowski  
*System automatycznej kontroli budżetu domowego wykorzystujący wizję komputerową*  
Degree awarded on February 2021

K. Michalski  
*Wykorzystanie analizy obrazów w celu automatyzacji wykrywania książek*  
Degree awarded on February 2021

K. Majchrzak  
*System wizyjny do poszukiwania zagubionych przedmiotów codziennego użytku*  
Degree awarded on September 2021

Advisor: **Marcin Szlenk**

B. Malewski  
*Silnik do tworzenia tekstowych gier przygodowych*  
Degree awarded on June 2021

K. Krukowski  
*Tworzenie aplikacji wieloplatformowych w oparciu o framework Electron*  
Degree awarded on September 2021

Advisor: **Wojciech Szynkiewicz**



M. Hanas

*System planowania zadań robota Velma w warunkach niepewności*

Degree awarded on February 2021(with honors)

Advisor: **Tomasz Śliwiński**

M. Witkowski

*Optymalizacja polityki cenowej hotelu przy pomocy sieci neuronowych*

Degree awarded on September 2021

Advisor: **Mateusz Trokiewiewicz**

P. Bugyi

*Dobór parametrów kodowania cech tęczy dla obrazów pobieranych w świetle widzialnym*

Degree awarded on February 2021 (with honors)

W. Kaczorkiewicz

*Biblioteka do wielowymiarowej oceny jakości zdjęć tęczy wykonanych w świetle widzialnym*

Degree awarded on February 2021

P. Domański

*Implementacja metody rozpoznawania tęczy na platformie Raspberry Pi*

Degree awarded on February 2021

M. Górecka

*Implementacja rozpoznawania tęczy metodą Daugmana na urządzeniu mobilnym*

Degree awarded on February 2021 (with honors)

R. Komorowski

*Oprogramowanie realizujące rozpoznawanie odcisku palca na podstawie fotografii palca*

Degree awarded on February 2021

Advisor: **Artur Wilkowski**

M. Pestka

*Szacowanie wieku osoby na podstawie sekwencji obrazów*

Degree awarded on February 2021

D. Kopiczko

*Social Distancing Monitoring using Computer Vision Methods*

Degree awarded on June 2021

Advisor: **Tomasz Winiarski**

C. Dudkiewicz

*Robot TIAGo w zadaniu poszukiwania przedmiotów*

Degree awarded on February 2021

K. Winnicki

*Układ sterowania specjalizowanego urządzenia drukującego*

Degree awarded on February 2021

T. Indeka

*Sztuczna skóra zastosowana w robotach asystujących*

Degree awarded on June 2021

W. Rokicki

*Sterowanie robotem Velma za pomocą gestów dłoni*

Degree awarded on June 2021

M. Wójcik

*Robot kroczący śledzący linię za pomocą systemu wizyjnego*

Degree awarded on September 2021

Advisor: **Andrzej Wojtulewicz**

M. Kędziński

*Opracowanie systemu regulacji cyfrowej trójfazowego silnika asynchronicznego*

Degree awarded on February 2021

E. Turska

*Projekt modernizacji linii technologicznej do produkcji ciast*

Degree awarded on February 2021

Advisor: **Izabela Żółtowska**

M. Jarek

*Implementacja systemu do koordynacji zamówień w łańcuchu dostaw w oparciu o model aukcyjny*

Degree awarded on February 2021

P. Makaruk

*Aplikacja do modelowania algorytmu podziału i ograniczeń na potrzeby dydaktyczne*

Degree awarded on February 2021

P. Kurowski

*Opracowanie aplikacji do modelowania problemów programowania dynamicznego na potrzeby dydaktyczne*

Degree awarded on September 2021

## 6 Publications

### 6.1 Scientific or Technical Books

- [B1] R. Szewczyk, C. Zieliński, and M. Kaliczyńska, Eds., *Automation 2021: Recent Achievements in Automation, Robotics and Measurement Techniques*, 2021, vol. 1390.

### 6.2 Scientific and Technical Papers in Books and Conference Proceedings

- [P1] M. Azimi and A. Pacut, "The effects of social issues and human factors on the reliability of biometric systems: A review," in *Intelligent Systems and Applications. Proceedings of the 2020 Intelligent Systems Conference (IntelliSys)*, ser. Advances in Intelligent Systems and Computing, A. Kohei, K. Supriya, and B. Rahul, Eds., 2021, vol. 1251, pp. 103–110.
- [P2] K. Bargieł and P. Pałka, "Communication protocol for the parallel multilateral negotiations: a building plots case study," in *Prace naukowe Wydziału Elektroniki i Technik Informacyjnych Politechniki Warszawskiej. Tom 2*, A. Jakubiak, Ed., 2021, vol. 2, pp. 9–19.
- [P3] K. Borowa, A. Zalewski, and S. Kijas, "The influence of cognitive biases on architectural technical debt," in *2021 IEEE 18th International Conference on Software Architecture (ICSA)*, 2021, pp. 115–125.
- [P4] M. Drabecki, "A method for ensuring technical feasibility of distributed balancing in power systems, considering peer-to-peer balancing energy trade," in *Intelligent Computing and Optimization*, P. Vasant, I. Zelinka, and G.-W. Weber, Eds., 2021, pp. 118–131.
- [P5] M. Drabecki, "Integrating feasible balancing of the network system with the p2p energy trade mechanisms for flexible peers," in *Euro 2021- CONFERENCE E-HANDBOOK*. The European Association of Operational Research Society, 2021, pp. 201–201.
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