INSTITUTE OF RADIOELECTRONICS

WARSAW UNIVERSITY OF TECHNOLOGY

FACULTY OF ELECTRONICS AND INFORMATION TECHNOLOGY

ANNUAL REPORT

2010

Warsaw, February 2011

Institute of Radioelectronics
Warsaw University of Technology
Nowowiejska 15/19
00-665 Warsaw
Poland

Head Office
room: 422
phone: +48 22 234 7233, +48 22 825 3929
fax: +48 22 825 3769

Internet information
http://www.ire.pw.edu.pl

Edited by:
W. Winiecki
A. Noińska
J. Marzec

Printed in Oficyna Wydawnicza Politechniki Warszawskiej

From the Director

Welcome to the 2010 edition of our Annual Report!

The last decade has been very successful for the Institute practically in all the fields of its activity – the staff advancement and promotion, research projects, building of the laboratory infrastructure and impressive number of international projects and co-operations.The main areas of research and development, in which the Institute has noted significant progress include: radiocommunications and radionavigations, multimedia techniques as well as biomedical engineering.

2010 was another productive year in both research and teaching activities – with about 150 courses in all levels of studies, over 160 B.Sc. and M.Sc. thesis (defended), 200 publications and research projects with the budget over 2 million dollars. Currently the biggest domestic project is PROTEUS – *Integrated Mobile System for Counterrorism and Rescue Operations* and the most interesting new international collaboration becomes the project on the *Neutrino Oscillations in the T2K Experiment* in Japan.

All the achievements that we were able to attain in the previous year, ought to be attributed to our excellent highly-motivated staff. Currently, most of our Professors, are universally recognized as authorities in their domains, among which one can particularly mention electromagnetic simulations, intelligent multimedia systems, smart antennas, signal theory and signal processing as well as the design of the apparatus for the experiments in high energy physics. Moreover, many of them have recently taken up appreciable positions in the world of science – they have become leaders of the world-famous conferences, professional associations as well as scientific projects. Apart from the above-mentioned details regarding our senior staff, it is worth paying special attention to the young crew and their scientific achievements. The past year will be remembered as the year of six successful Ph.D. dissertations defenses and many which are currently in their finishing phases as well as one habilitation. Moreover, most of these works are characterized by their strictly applicable contents. Such a trend gives a fair promise that next years will prove to be even more productive. What is also worth mentioning, is the fact that several members of our young staff have received special recognitions for outstanding papers or the best Ph.D. Dissertations.

2010 was the year of the 40th anniversary of our Institute and some facts are presented on the next page. More detailed information on the history, tradition and the current picture of the Institute can be found in the newly published *XL Years of the Institute of Radioelectronics* as well as in the previous issues of *Annual Reports*. Therefore, I strongly encourage all the colleagues interested in our unit to refer to the above-mentioned publications.

I would like to sincerely thank all the co-workers of the Institute for their deep involvement, hard work and dedicate service. Last but not least, I would also like to express gratitude to our Grantors, Sponsors as well as all the Co-operators and Friends of the Institute, without whom we would have not been able to achieve our aims. On the one hand, Polish science is suffering from chronic underfunding and on the other, one can observe an insufficient movement in Polish industry. But despite the difficult situation and unfavorable conditions, it was the good will of those people who still have confidence in the development of Polish science, that made our goals more easily attainable.

Warsaw, February 2011

Professor Józef Modelski

40 YEARS OF THE INSTITUTE OF RADIOELECTRONICS

SELECTED FACTS

The Institute of Radioelectronics, Warsaw University of Technology, was formed in 1970 on the basis of five departmental chairs: Radiotechnical and Television Devices, Radiolocation, Electroacoustics, Radiology as well as a part of the Electromedical Apparatus Construction Chair.

Our roots reach deep. The Institute was being created by people associated with the development of electronics in Poland from its very beginning - Stanisław Ryżko, Wilhelm Rotkiewicz, Stefan Darecki. Together with their mentor, Janusz Groszkowski, they were the pioneers of the Polish electronics before WWII, subsequently utilising their knowledge and skills in the fight against Nazi invaders, and eventually co-organising the Faculty of Communication after the war (in 1996 it was re-named the Faculty of Electronics). At its birth, the Institute of Radioelectronics had 183 employees, including 64 ones devoted to research and teaching. It was the largest one among six institutes being formed in the Faculty of Electronics at that time. Seven divisions were formed: Radiocommunications, Radiotechnical Devices, Television, Electroacoustics, Nuclear Electronics, Radiolocation, and Microwave Technology. The first director was prof. Stanisław Ryżko. He was followed by prof. Zdzisław Pawłowski, prof. Jan Ebert, prof. Tadeusz Morawski, and prof. Józef Modelski at present. Thanks to the initiative and efforts of prof. Ryżko and his colleagues, in early 1970s ZDAR was formed. It was an experimental unit involved with low-scale manufacturing of electronic devices designed at the Institute. There was also a large and well equipped mechanical workshop as well as a photo-chemical laboratory for printed circuit production. Within the Institute, in compliance with topical orientation of its divisions as well as the needs of the Polish electronics industry, works were focused on professional radioelectronic equipment, radioelectronic equipment for domestic use, and also apparatus for nuclear and medical electronics.

The Institute of Radioelectronics has always been a leader in the area of career development and diploma awards (see table below). It is also proud of its publication record over the last 40 years – approximately 200 monographs and text-books, 4500 papers in scientific journals and conference proceedings. It has also developed strong links with industry and non-academic research institutes. The numbers of new designs and their practical implementations over the first 20 years of the Institute's operation were impressive: over 150 positions in the catalogue of constructed apparatus attributed to over 200 of employees.

Career development 1970–2010

Habilitation Dissertations	21
Ph.D. Dissertations	161
M.Sc. / B.Sc. Thesis	> 4000
Participants of post-diploma courses	> 500
Participants of specialised courses	> 5000

The difficult years of martial law and system transformations in 1990s led to an inevitable crisis. Many companies who had been our traditional business partners collapsed. Public funding for education and statutory activities were too small to maintain high level of employment. Thus in 1991-1994 the number of staff was reduced by half. Several units such as ZDAR, the photochemical lab, and the mechanical workshop were liquidated. Directors of the Institute were therefore obliged to elaborate new strategies for its survival and development.

Over the last 40 years, the structure of the Institute was modified many times. Divisions were merged or divided, in our neverending attempt to keep pace with emerging technologies. At present, there are five divisions led by renown scientists: Electroacoustics (prof. Z. Kulka), Nuclear and Medical Electronics (prof. K. Zaremba), Radiocommunications (prof. Y. Yashchyshyn), Microwave and Radiolocation Engineering (prof. W. Gwarek), and Television (prof. W. Skarbek). The Institute employs 14 professors, 5 docents, and 45 assistant professors – in total, 104 staff of whom 78 are in research or didactics. There are also about 50 Ph.D. students and 3 scientific clubs. Following our vision of the Polish economy needs, we focus on three disciplines:– radiocommunications, multimedia technologies, and biomedical engineering.

Contents

This Annual Report summarizes the research activities
of the Institute in 2010, as well as the teaching activities
of the academic year 2009/2010

1 GENERAL INFORMATION

1.1 Mission of the Institute

In defining its mission, the Institute of Radioelectronics is amenable to contemporary needs of academia, industry, and society. Therefore, it aims at the three measurable objectives: to provide teaching of societal relevance; to seek excellence in scientific research; and to run projects meeting the international standards. Technically, we focus on the three well-defined specializations: radiocommunications, multimedia, and biomedical engineering. These are very well perceived by our students and partners in national and international activities.

As educators, our staff performs sterling work and exhibit immense stamina. The effects are directly measurable in terms of quality and numbers of supervised diplomas. Our graduates prove competitive on the demanding job market in Poland and abroad. They find employment in telecommunication services, mobile communications, information technology, television, and also in public services. We reach further into these sectors through the successful scheme of continuing education. The offer of courses including Radiocommunications and Multimedia Technologies attracts an increasing number of participants.

As researchers, we are faithful to the highest standards of the Faculty and the University. We also feel quite unique due to an extremely broad spectrum of addressed subjects, which comprise:

- electromagnetic and acoustic field theory, acoustic and electromagnetic wave generation and propagation,
- signal theory, processing, coding, transmission, with regard to electronic, electroacoustic, and TV signals,
- radio transmitting and receiving,
- radiocommunication terrestrial and satellite systems,
- physical phenomena in radio engineering, acoustic, nuclear engineering, and medical systems,
- biomedical signal analysis, medical imaging, medical informatics,
- X-ray, MR, and emission tomography,
- detection and spectrometry of radiation,
- analysis and synthesis of electronic systems,
- intelligent multimedia systems and multimedia converged (video, data, and voice),
- measuring methods and systems,
- analysis, measurement, and estimation of sound and image distortion.

It is also our ambition to implement the new scientific knowledge into a good engineering practice. The Institute covers the full process of technological development, from innovative ideas up to the construction of prototypes. The products are applicable in: radio communication systems, radio-location antennae, television equipment, radio-monitoring systems, high-efficiency energy sources, high-power radio engineering devices, equipment for time and frequency services, biomedical instrumentation, measurement systems involving industry, nuclear engineering for scientific research, medicine, and food industry.

The Foundation for Development of Radiocommunications and Multimedia Technologies plays a special role in perpetuating scientific research within our Institute and the whole Faculty. The Foundation subsidizes undergraduate and graduate scholarships. It monitors and awards the progress of young Polish researchers. Its generous support helps us face the socio-economical obstacles, and compete with commercial opportunities awaiting the young people on the open market.

1.2 Board of Directors

Director of the Institute

Józef Modelski, Prof. D.Sc., Tenured Professor
room: 422, phone: +48 22 2347233, +48 22 8253929
e-mail: J.Modelski@ire.pw.edu.pl

Secretariat

Anna Tratkiewicz
room: 422, phone: +48 22 2347233, +48 22 8253929
fax: +48 22 8253769
e-mail: A.Tratkiewicz@ire.pw.edu.pl

Anna Smenda
room: 422, phone: +48 22 2347742, +48 22 8253929
fax: +48 22 8253769
e-mail: A.Smenda@ire.pw.edu.pl

Deputy Director for Research

Wiesław Winiecki, D.Sc., Professor
room: 442, phone: +48 22 8255248, +48 22 2347341
e-mail: W.Winiecki@ire.pw.edu.pl

Secretariat

Anna Noińska
room: 424, phone: +48 22 2347829, +48 22 8255248
fax: +48 22 8255248
e-mail: A.Noinska@ire.pw.edu.pl

Deputy Director for Academic Affairs

Piotr Brzeski, Ph.D., Docent
room: 60, phone: +48 22 2347829, +48 22 8255248
e-mail: P.Brzeski@ire.pw.edu.pl

Secretariat

Izabela Sierankowska
room: 424, phone: +48 22 2347829, +48 22 8255248
fax: +48 22 8255248
e-mail: I.Sierankowska@ire.pw.edu.pl

1.3 Organization of the Institute

The Institute of Radioelectronics consists of the following research and teaching divisions:

- Electroacoustics Division;
- Microwave and Radiolocation Engineering Division;
- Nuclear and Medical Electronics Division;
- Radiocommunications Division;
- Television Division.

The structure of the Institute also includes Library, Financial Section, and Supply Section.

1.3.1 Electroacoustics Division

Head of Division

Zbigniew Kulka, D.Sc., Professor
room: 132, phone: +48 22 2347621
e-mail: Z.Kulka@ire.pw.edu.pl

Senior academic staff

Wiesław Winiecki, D.Sc., Professor

Jan Żera, D.Sc., Associate Professor (0.5)

Piotr Bilski, Ph.D., Assistant Professor

Piotr Bobiński, Ph.D., Assistant Professor

Ewa Kotarbińska, Ph.D., Assistant Professor (0.5)

Robert Łukaszewski, Ph.D., Assistant Professor

Krzysztof Mroczek, Ph.D., Assistant Professor

Maria Tajchert, Ph.D., Assistant Professor

Junior academic staff

Marcin Lewandowski, M.Sc., Assistant (0.75, from Nov., 2010)

Aleksandra Młyńska, M.Sc., Assistant (0.5, till Sept. 2010)

Technical staff

Andrzej Leszczyński, Ph.D., Senior R&D Eng. (0.5)

Piotr Nykiel, M.Sc., Senior Development Engineer

Ph.D. students

Paweł Czernik, M.Sc., from Oct. 2008

Rafał Korycki, M.Sc., from Feb. 2007

Marcin Lewandowski, M.Sc., from Feb. 2008

Jakub Olszyna, M.Sc., from Feb. 2008

Aneta Świercz, M.Sc., from Feb. 2008

Piotr Zawistowski, M.Sc., from Oct. 2010

Retired:

Andrzej Aronowski

Jerzy Narkiewicz-Jodko, Ph.D.

The activities of the Division concern electroacoustics and digital audio techniques including investigations, measurements and applications. They are focused on:

- foundamentals of acoustics;
- electroacoustics;
- psychoacoustics;
- digital audio;
- design and measurements of electroacoustic transducers;
- investigation and modeling of acoustic field distribution;
- noise control and active noise reduction;
- architectural and industrial acoustics;
- sound studio techniques;
- hearing protection.

Current research topics include:

- digital audio signal processing;
- low-level acoustic signals measurements and analysis;
- objective and subjective methods of sound quality evaluation;
- detection of auditory warning signals in the presence of industrial noise;
- elaboration of computation methods for acoustic field radiated in free space by surface acoustic sources and their implementation on a PC.

The other field of interest concerns fundamental and applied research associated with metrology, instrumentation and measuring systems. It is focused on design of automated computer-based measuring systems. Current research topics include:

- modern information technologies, e.g. LabVIEW, Java, XML, and modern communication technologies, e.g. the Internet, GSM, Bluetooth, ZigBee in distributed control and measuring systems;
- information security of distributed measuring systems;
- virtual instrumentation, plug-in boards for data acquisition, IEEE-488 equipment;
- modern real-time systems, eg.: cRIO, ETX, RTX.

The Division is equipped with an anechoic chamber and sound studio with two control rooms.

1.3.2 Microwave and Radiolocation Engineering Division

Head of Division

Wojciech Gwarek, Prof. D.Sc., Tenured Professor
room: 544, phone: +48 22 2347725
e-mail: W.Gwarek@ire.pw.edu.pl

Senior academic staff

Tadeusz Morawski, Prof. D.Sc., Tenured Professor
Stanisław Rosłoniec, Prof. D.Sc., Professor
Małgorzata Celuch, Ph.D., Assistant Professor
Daniel Gryglewski, Ph.D., Assistant Professor
Paweł Kopyt, Ph.D., Assistant Professor
Przemysław Miazga, Ph.D., Assistant Professor
Maciej Sypniewski, Ph.D., Assistant Professor
Andrzej Więckowski, Ph.D., Assistant Professor
Wojciech Wojtasiak, Ph.D., Assistant Professor
Jolanta Zborowska, Ph.D., Assistant Professor (till Jan. 2010)
Krzysztof Robaczyński, M.Sc., Senior Lecturer (0.5)

Technical staff

Krzysztof Robaczyński, M.Sc., Senior R&D Engineer (0.5)
Mirosław Lubiejewski, Foreman

Ph.D. students

Michał Grabowski, M.Sc., from Feb. 2007
Przemysław Korpas, M.Sc, from Feb. 2010
Marzena Olszewska, M.Sc., from Feb. 2010
Michał Sołtysiak, M.Sc., from Oct. 2007
Michał Żebrowski, M.Sc., from Oct. 2008

The Microwave and Radiolocation Engineering Division conducts scientific and applied research in the area of electromagnetic field theory, microwave theory and techniques, and measurement techniques for very high frequency ranges. This includes the subjects of computer-aided design, data acquisition and data processing. Specific research topics in 2010 included: design of high-frequency systems for radio-communication and radar applications (oscillators, synthesizers, modulators, amplifiers, transmitter/receiver modules); methods of synthesis and computer-aided design of passive and active microwave circuits (couplers, power combiners and dividers, switches, transistor circuits); analysis and design of multi-element planar in-phase radar antenna arrays intended to work at high power level; numerical electromagnetic compatibility analysis; methods for measurements of electric and magnetic properties of materials at microwave frequencies; development of numerical methods and implementation of computer programs for full-wave analysis and design of two- and three-dimensional microwave circuits (filters, periodic guiding structures, matching circuits, structures incorporating dispersive and anisotropic media, antennae); methods of coupled electromagnetic-thermodynamic simulations, design of microwave heating applicators for material science applications; methods of coupled electromagnetic-optical modeling; radio-frequency identification and wireless sensing; development of multithread and distributed programming techniques, non-linear programming, and artificial intelligence methods for application in automated design of microwave circuits.

1.3.3 Nuclear and Medical Electronics Division

Head of Division

Krzysztof Zaremba, D.Sc., Professor
room: 72, phone: +48 22 2347955, +48 22 2345780
e-mail: K.Zaremba@ire.pw.edu.pl

Senior academic staff

Janusz Marzec, D.Sc., Professor
Piotr Brzeski, Ph.D., Docent
Roman Szabatin, Ph.D., Docent
Piotr Bogorodzki, Ph.D., Assistant Professor
Grzegorz Domański, Ph.D., Assistant Professor
Marian Kazubek, Ph.D., Assistant Professor (0.5)
Bogumił Konarzewski, Ph.D., Assistant Professor
Robert Kurjata, Ph.D., Assistant Professor
Ewa Piątkowska-Janko, Ph.D., Assistant Professor
Dariusz Radomski, Ph.D., Research Assistant Professor
Tymon Rubel, Ph.D., Assistant Professor (from Jun. 2010)
Waldemar Smolik, Ph.D., Assistant Professor
Tomasz Jamrógiewicz, M.Sc., Senior Lecturer
Tomasz Olszewski, M.Sc., Senior Lecturer

Junior academic staff

Marcin Ziembicki, M.Sc., Assistant (0.5)

Research staff of the EU Specific Targeted Research Project *PROTEUS*

Błażej Sawionek, Ph.D., Research Assist. Prof. (0.95 from Nov. 2009 till Dec. 2010)

Technical staff

Andrzej Wasilewski, Worker
Joanna Witkowska, Specialist

Ph.D. students

Stanisław Adaszewski, M.Sc., from Feb. 2009
Wojciech Gradkowski, M.Sc., from Oct. 2010
Karolina Kamińska, M.Sc., from Feb. 2009
Łukasz Kołaszewski, M.Sc., from Feb. 2009
Wojciech Obrębski, M.Sc., from Oct. 2008
Piotr Płoński, M.Sc., from Oct. 2010
Lech Raczyński, M.Sc., from Oct. 2006
Andrzej Smolnik, M.Sc., from Oct. 2008
Łukasz Włodarczyk, M.Sc., from Feb. 2010
Krzysztof Woźniak, M.Sc., from Oct. 2006

Retired:

Zdzisław Pawłowski, Prof. D.Sc.

The research and teaching activities carried out in the Nuclear and Medical Electronics Division are concentrated on two areas: biomedical engineering and nuclear electronics. Research in the interdisciplinary area of biomedical engineering covers a broad range of topics and integrates sophisticated electronics and information technology

with elements of medical knowledge. The activity in the area of nuclear engineering is concentrated on the design of electronics systems and data processing software for high energy physics experiments. The Division's research is focused on the following topics:

- nuclear medicine (emission tomography: SPECT, PET);
- magnetic resonance imaging (MRI), functional MRI, advanced applications of MRI;
- optical tomography;
- quantitative computer-aided tomography;
- tomographic dynamic studies;
- process tomography, impedance tomography;
- analogue and digital radiography;
- medical image processing and recognition;
- methods and instrumentation for electrocardiography;
- medical applications of isotope techniques;
- telemedicine;
- design of apparatus and software for high energy physics experiments;
- data analysis in genetics and proteomics;
- mathematical modeling of physiological and disease processes.

Areas of recent studies include:

- advanced applications of MRI and CT imaging systems, covering: dynamic scanning protocols, a new methodology and instrumentation for functional MRI, fMRI image analysis methods;
- a new contrast media for MRI: functional lung imaging with hyper-polarized He3, Xe129;
- multi-modal imaging of topographic, tomographic and functional studies in medicine;
- electrical instability of heart study research, high resolution ECG systems;
- digital structural radiography, modeling of radiographic imaging systems;
- optical tomography applications in medicine;
- algorithms for image reconstruction for electrical and process tomography;
- construction of capacitance tomographs and sensors for medical and industrial applications;
- study of a bioelectrical activity of a pregnant uterus and using EHG for telemetric monitoring of upcoming labor;
- application of nonlinear predictive algorithms to control of insulin dosing in diabetic patients;
- algorithms for the data analysis in genomics and proteomics;
- development of detectors, front-end electronics, and test devices for high energy physics experiments;
- applications of "soft-computing" methods (neural networks, evolutionary algorithms, etc.) for data processing and analysis in high energy physics experiments.

1.3.4 Radiocommunications Division

Head of Division

Yevhen Yashchyshyn, D.Sc., Professor
room: 33, phone: +48 22 2347727
e-mail: E.Jaszczyszyn@ire.pw.edu.pl

Senior academic staff

Józef Modelski, Prof. D.Sc., Tenured Professor
Jacek Wojciechowski, Prof. D.Sc., Tenured Professor
Jacek Cichocki, Ph.D., Docent
Tomasz Kosiło, Ph.D., Docent
Tomasz Buczkowski, Ph.D., Assistant Professor
Marek Bury, Ph.D., Assistant Professor
Krzysztof Czerwiński, Ph.D., Assistant Professor (0.5)
Krzysztof Derzakowski, Ph.D., Assistant Professor
Wojciech Kazubski, Ph.D., Assistant Professor
Tomasz Keller, Ph.D., Assistant Professor
Jerzy Kołakowski, Ph.D., Assistant Professor
Krzysztof Kurek, Ph.D., Assistant Professor
Ryszard Michnowski, Ph.D., Assistant Professor
Mirosław Mikołajewski, Ph.D., Assistant Professor
Juliusz Modzelewski, Ph.D., Assistant Professor
Karol Radecki, Ph.D., Assistant Professor
Kajetana Snopek, Ph.D., Assistant Professor
Henryk Chaciński, M.Sc., Senior Lecturer

Research staff of the EU Specific Targeted Research Project *PROTEUS*

Sebastian Kozłowski, M.Sc., Research Assistant (0.95 from Mar. 2010 till Jul. 2011)
Marcin Piasecki, Ph.D., Research Assistant Prof. (0.95 from Jul. 2009 till Dec. 2011)
Paweł Bajurko, M.Sc., Research Assistant (0.95 from Apr. 2010 till Jul. 2011)

Technical staff

Anna Czarnecka, M.Sc., Senior Admin. Specialist
Jacek Jarkowski, Ph.D., Senior R&D Engineer (0.25)
Marek Marcinkowski, Senior Foreman
Stanisław Żmudzin, M.Sc., Senior R&D Engineer (0.25)

Ph.D. students

Kamil Bryłka, M.Sc., from Oct. 2006
Cezary Jezierski, M.Sc., from Oct. 2007
Bartosz Majewski, M.Sc., from Oct. 2010
Piotr Makal, M.Sc., from Feb. 2008
Andrzej Piętak, M.Sc., from Oct. 2008
Wojciech Pieńkowski, M.Sc., from Oct. 2010
Paweł Ziętek, M.Sc., from Oct. 2006
Anna Urzędowska, M.Sc., from Oct. 2010

Retired:

Jan Ebert, Prof. D.Sc.
Stefan Hahn, Prof. D.Sc.
Waldemar Kiełek, D.Sc.

The research and teaching activities of the Radiocommunications Division are related to radiocommunication systems and networks including antennas, signal processing and measurement techniques. The research is focused on analog and digital radio transmission. It includes radio system design with advanced CAD software, particularly cellular and short range systems, as well as some aspects of electromagnetic compatibility, numerous measurements issues and deep insight into antenna techniques.

The most important research topics include analysis, development and investigation of:

- radiocommunication systems and networks – cellular networks (3G and beyond 3G), short range systems, ad-hoc networks, satellite systems and broadband access networks, MIMO systems;
- wireless ultra-wideband systems (UWB) – methods and systems for communication and localization, systems for road safety, microwave imaging systems;
- antennas and radio channel – electrodynamic modeling and design of various types of microwave, millimeter, submillimeters wavelengths and terahertz antennas, including electronically controlled and reconfigurable antennas, photonic antennas, integrated antennas; channel modeling and simulation for MIMO, UWB and cellular systems;
- measurements – spectrum monitoring methods and systems; channel and antenna including automatic far and near-field measurements of antennas characteristics in time and frequency domain, antenna and channel pulse response, transfer functions of UWB antennas, transient states in reconfigurable antennas;
- radio frequency circuits and microwave devices – high-efficiency resonant power amplifiers (class D, DE, E, F and G), linear wide-band short-wave amplifiers, high-power amplitude modulators, high-efficiency power supplies, power factor correctors, low-noise amplifiers, microwave filters and phase shifters and their applications in radio transmitters, receivers, and industrial electronics;
- digital radio broadcasting systems – medium- and short-wave DRM transmitters and receivers;
- theory of signals and modulations – multidimensional Hilbert transform and its applications, "time-frequency" transformations for radio-frequency signal processing, applications of "time-frequency" techniques in audio watermarking;
- environmental, biological and social problems – the influence of radiocommunication systems on a human health and environment as well as on electronic equipment, protection zones planning, radio systems for aid and support of disabled persons;
- design of large-scale telecommunication networks, designing of the topology of access and aggregation networks, localization of: Content Delivery Network nodes, gateway nodes in sensor networks. Routing in wireless sensor networks;
- fault diagnosis – detection and localization of faults in analog systems of different physical nature, e,g. electronic, mechanical;
- data exploration – large data basis is searched with the aid of graph models. Classification of graphs can be done on the basis of the graph structural patterns, e.g. contrast subgraphs and common subgraphs, Coulomb excitation data analysis – analysis of the data from nuclear physics experiments to approximate the shape of nuclei.

1.3.5 Television Division

Head of Division

Władysław Skarbek, Prof. D.Sc., Tenured Professor
room: 452, phone: +48 22 2345315
e-mail: W.Skarbek@ire.pw.edu.pl

Senior academic staff

Roman Z. Morawski, Prof. D.Sc., Professor

Artur Przelaskowski, D.Sc., Professor

Andrzej Buchowicz, Ph.D., Assistant Professor

Grzegorz Galiński, Ph.D., Assistant Professor

Krystian Ignasiak, Ph.D., Assistant Professor

Andrzej Miękina, Ph.D., Assistant Professor

Grzegorz Pastuszak, Ph.D., Assistant Professor

Andrzej Podgórski, Ph.D., Assistant Professor

Marek Rusin, Ph.D., Docent, (0.5)

Tomasz Krzymień, M.Sc., Senior Lecturer

Junior academic staff

Rafał Jóźwiak, M.Sc., Assistant (0.75)

Research staff of the EU Specific Targeted Research Project *PROTEUS*

Andrzej Abramowski, M.Sc., Research Assistant (0.95 from Jan. 2010 till Dec. 2011)

Grzegorz Brzuchalski, M.Sc., Research Assistant (0.95 from Jul. 2009 till Dec. 2011)

Marcin Morgoś, M.Sc., Senior R&D Eng. (from July 2009 till Dec. 2010)

Jacek Naruniec, M.Sc., Research Assistant (0.95 from Jul. 2010 till Dec. 2010)

Mikołaj Roszkowski, M.Sc., Research Assistant (0.95 from Jan. 2010 till Dec. 2011)

Radosław Sikora, Ph.D., Research Assistant Prof. (0.95 from Jul. 2009 till Jul. 2011)

Michał Wieczorek, Research Assistant (0.95 from Jul. 2010 till Dec. 2011)

Technical staff

Tomasz Smakuszewski, M.Sc., R&D Engineer (0.5)

Ph.D. students

Mariusz Jakubowski, M.Sc., from Oct. 2008

Magdalena Jasionowska, M.Sc., from Oct. 2009

Marcin Jędryka, M.Sc., from Feb. 2007

Rafał Jóźwiak, M.Sc., from Oct. 2006

Mariusz Leszczyński, M.Sc., from Oct. 2005

Artur Nowakowski, M.Sc., from Feb. 2006

Grzegorz Ostrek, M.Sc., from Oct. 2008

Marcin Rolewicz, M.Sc., from Oct. 2010

Mikołaj Roszkowski, M.Sc., from Oct. 2010

Aleksandra Rutczyńska, M.Sc., from Oct. 2009

Michał Wieczorek, M.Sc., form Oct. 2010

Television Division conducts scientific and applied research in multimedia technologies. The Division is also experienced in multimedia standards and platforms with a special emphasis on tools for collaborative e-learning using media streaming and searching techniques. The Di-

vision continues its efforts in the development of MPEG standards (MPEG-4 and MPEG-7). The staff of the division actively works in Multimedia Technical Committee no. 288 at Polish National Committee for Standardization. The Technical Committee is hosted at the Institute of Radioelectronics.

Specific research topics in 2010 included:

- video and audio compression;
- intelligent multimedia systems.

Telemedicine group extends the area of multimedia applications to teleradiology, e-health and computer-aided diagnosis systems. Fundamentals of medical imaging, image analysis and processing, soft computing for decision support, information theory and codes are used for the following research topics:

- image-based teleconsultations and telediagnosis;
- computer-assisted diagnosis for mammography, chest radiography;
- brain imaging and computer assistance of stroke diagnosis;
- computer assistance of abdominal CT examinations;
- ultrasound imaging and 3D visualization systems;
- medical information systems (HIS/RIS/PACS);
- medical image and data codecs;
- sparse data representation and compressive sensing for disease extraction.

The laboratory named *Digital Processing of Measurement Signals* is active in the field of measurement science and technology. Its research activities are focused on improving the quality of measurements by means of digital signal processing. The current research topics include:

- general-purpose algorithms for reconstruction of measurands and for calibration of measuring channels;
- spectrophotometric analyzers of food;
- portable sound-and-vibration analyzers for applications in technical diagnostics and in the environmental monitoring;
- ethical aspects measurement-based empirical research.

1.4 Evening Studies and Continuing Education

1.4.1 M.Sc. Evening Studies on Radiocommunications and Multimedia Technologies

Head

Kajetana Snopek, Ph.D.
room: 435, phone: +48 22 2347647
e-mail: K.Snopek@ire.pw.edu.pl

Secretariat

Anna Noińska
room: 424, phone: +48 22 2347829, +48 22 8255248
fax: +48 22 8255248
e-mail: A.Noinska@ire.pw.edu.pl

1.4.2 Engineer Degree Evening Studies on Radiocommunications and Multimedia Technologies

Head

Tomasz Kosiło, Ph.D., Docent
room: 434, phone: +48 22 2347576
e-mail: T.Kosilo@ire.pw.edu.pl

Secretariat

Anna Noińska
room: 424, phone: +48 22 2347829, +48 22 8255248
fax: +48 22 8255248
e-mail: A.Noinska@ire.pw.edu.pl

1.4.3 Postgraduate Studies on Radiocommunication Systems and Multimedia Technologies STRIM

Head

Jacek Cichocki, Ph.D., Docent
room: 27, phone: +48 22 2347635
e-mail: J.Cichocki@ire.pw.edu.pl

Secretariat

Małgorzata Jaworska, M.A.
room: 426, phone: +48 22 2346089,
e-mail: M.Jaworska@ire.pw.edu.pl

Program Board

Józef Modelski, Prof. D.Sc. (chairman),
Andrzej Buchowicz, Ph.D.,
Jacek Cichocki, Ph.D.,
Andrzej Dąbrowski, Prof. D.Sc.

1.4.4 Studies on Radiocommunications, Multimedia Technologies and Biomedical Engineering "RADEM"

Head

Marek Rusin, Ph.D., Docent
room: 422, phone: +48 22 2347742, +48 22 8253929
fax: +48 22 8253769
e-mail: M.Rusin@ire.pw.edu.pl

Secretariat

Anna Smenda,
room: 422, phone: +48 22 2347742,+48 22 8253929
fax: +48 22 8253769
e-mail: A.Smenda@ire.pw.edu.pl

Program Board

Józef Modelski, Prof. D.Sc. (chairman),
Andrzej Buchowicz, Ph.D.,
Jacek Cichocki, Ph.D.,
Sławomir Kula, Ph.D.,
Marek Rusin, Ph.D.,

1.4.5 Studies on Audiological Techniques

Head

Andrzej Leszczyński, Ph.D.
room: 130, phone: +48 22 2347748
e-mail: A.Leszczynski@ire.pw.edu.pl

Secretariat

Joanna Witkowska
room: 66, phone: +48 22 2347955, +48 22 8251363
e-mail: J.Witkowska@ire.pw.edu.pl

1.5 Other Institute's Units

1.5.1 Library

Curator

Teresa Miąsek, M.A.
room: 557, phone: +48 22 2347627
e-mail: T.Miasek@ire.pw.edu.pl

1.5.2 Accounting Department

Head

Janina Nowak
room: 416, phone: +48 22 2347645
e-mail: J.Nowak@ire.pw.edu.pl

Staff

Grażyna Betlejewska
room: 416, phone: +48 22 2347743
e-mail: G.Betlejewska@ire.pw.edu.pl

Dorota Podniesińska, M.A.
room: 416, phone: +48 22 2347743
e-mail: D.Podniesinska@ire.pw.edu.pl

1.5.3 Supply Section

Head

Bohdan Kwiatkowski, M.Sc.
room: 426, phone: +48 22 2345367
e-mail: B.Kwiatkowski@ire.pw.edu.pl

Staff

Andrzej Laskowski
room: 419, phone: +48 22 2345018
e-mail: A.Laskowski@ire.pw.edu.pl

Andrzej Skrzypkowski
room: 419, phone: +48 22 2345018
e-mail: A.Skrzypkowski@ire.pw.edu.pl

1.5.4 Auxiliary Administrative Staff

Janina Chmielak (em.)

Andrzej Owczarek, M.Sc.

1.5.5 Secretariat of Multimedia Technical Committee no. 288 at Polish Committee for Standardization

Bohdan Kwiatkowski, M.Sc., secretary
room: 426, phone: +48 22 2345367
e-mail: B.Kwiatkowski@ire.pw.edu.pl

1.5.6 Office of the Fundation for the Development of Radiocommunication and Multimedia Technologies

Anna Czarnecka, M.Sc., Senior Admin. Specialist
room: 535, phone: +48 22 2347910
e-mail: A.Czarnecka@ire.pw.edu.pl

1.5.7 Office of the EU Specific Targeted Research Project PROTEUS

Małgorzata Jaworska, M.A.
room: 426, phone: +48 22 2346089
e-mail: M.Jaworska@ire.pw.edu.pl

Monika Kalinowska (from Jun. 2010 till Aug. 2013)
room: 535, phone: +48 22 2347910
e-mail: M.Kalinowska@ire.pw.edu.pl

Aleksandra Mundzik, M.A. (from Mar. 2010 till Jun. 2013)
room: 426, phone: +48 22 2346089
e-mail: A.Mundzik@ire.pw.edu.pl

2 STAFF

2.1 Senior academic staff

Piotr Bilski

room: 440, phone: +48 22 2347340
e-mail: P.Bilski@ire.pw.edu.pl

M.Sc. ('01), Ph.D. ('06); measurement systems, virtual instrumentation, distributed systems and web technology, digital signal processing, diagnostics of analog systems; **Assistant Professor**, Electroacoustics Division.

[Edu78], [Edu79], [Edu80];
[Pro24];
[Pub14], [Pub33], [Pub108], [Pub109].

Piotr Bobiński

room: 125, phone: +48 22 2347637
e-mail: P.Bobinski@ire.pw.edu.pl

M.Sc. ('98), Ph.D. ('04); multimedia and measurement systems, distributed systems and web technology, digital audio signal processing, digital sound synthesis; **Assistant Professor**, Electroacoustics Division.

[Edu5], [Edu62], [Edu94], [Edu152];
[Pro9], [Pro23];
[BSc39], [BSc58], [BSc59], [BSc60];
[Pub34], [Pub35].

Piotr Bogorodzki

room: 70, phone: +48 22 2347918
e-mail: P.Bogorodzki@ire.pw.edu.pl

M.Sc. ('88), Ph.D. ('98); biomedical engineering; **Assistant Professor**, Nuclear and Medical Electronics Division.

Member of the Biomedical Engineering Commission of the Committee on Medical Physics, Radiobiology and Image Diagnostics PAN (08-); Member of the Review Board of *IEEE Trans. on Medical Imaging* ('06-); Evaluator in the Seventh Research Framework Program (FP7) in the Information and Communication Technologies (ICT) Call ('07-); Member of Center of Excellence PROKSIM ('04-); Deputy Director for Research of the Center for Imaging and Biomedical Research ('08-).

[Edu89];
[Pro10], [Pro26], [Pro38], [Pro42];
[MSc7], [MSc15], [MSc51];
[BSc52];
[Pub19], [Pub142], [Pub182], [Pub183], [Pub186], [Pub190], [Pub191], [Pub192], [Pub197].

Piotr A. Brzeski

room: 60, phone: +48 22 2347577
e-mail: P.Brzeski@ire.pw.edu.pl

M.Sc. ('70), Ph.D. ('82); biomedical engineering; **Docent**, Nuclear and Medical Electronics Division.

Deputy Director for Academic Affairs of the Institute of Radioelectronics ('93-); Member of the Faculty Council ('90-); Member of the Dean's Financial Committee ('93-); Member of the Faculty Council Com. on Education ('05-).

[Edu8], [Edu9], [Edu26], [Edu27], [Edu28], [Edu82], [Edu120], [Edu121], [Edu127];
[Pro8], [Pro26].

Andrzej Buchowicz

room: 452, phone: +48 22 2347840
e-mail: A.Buchowicz@ire.pw.edu.pl

M.Sc. ('88), Ph.D. ('97); television, digital signal and image processing, digital television systems; **Assistant Professor**, Television Division.

Member of the Faculty Council ('05); Member of the Multimedia Technical Committee no. 288 at Polish Committee for Standardization ('99-); Member of the Management Board of the Foundation for the Development of Radiocommunications and Multimedia Technologies ('02-)

[Edu25], [Edu125], [Edu142], [Edu144], [Edu152];
[Pro1], [Pro19], [Pro34], [Pro44];
[BSc19], [BSc22], [BSc69];
[Pub38], [Pub39], [Pub119].

Tomasz Buczkowski

room: 34, phone: +48 22 2347796
e-mail: T.Buczkowski@ire.pw.edu.pl

M.Sc. ('67), Ph.D. ('78); electronics and telecommunications, environmental and health aspects of electronics; **Assistant Professor**, Radiocommunications Division.

Member of the Scientific Advisory Board, Polish Association for the Blind ('95-); Chairman of the ITU-R (CCIR) Study Group 7 "Time and Frequency" (‘83-); Foresight Mazovia Project Expert ('06-); Member of the Polish Society of e-Health ('08-).

[Edu83], [Edu134], [Edu138], [Edu168];
[Pro31];
[MSc33], [MSc46], [MSc53];
[BSc13], [BSc16], [BSc53];
[Pub40], [Pub41], [Pub66].

Marek Bury

room: 444, phone: +48 22 2346088
e-mail: M.Bury@ire.pw.edu.pl

M.Sc. ('04), Ph.D. ('09); broadband microwave signals **Assistant Professor**, Radiocommunications Division, Award of the Rector ('10).

[Pro1], [Pro2], [Pro17], [Pro18], [Pro27];
[Pub42], [Pub43].

Małgorzata Celuch

room: 543, phone: +48 22 2347631
e-mail: M.Celuch@ire.pw.edu.pl

M.Sc. ('88), Ph.D. ('96); microwaves; **Assistant Professor**, Microwave and Radiolocation Engineering Division.

Member of the Review Board of *IEEE Trans. on Microwave Theory and Techniques* ('96-), *IEEE Trans. on Antennas and Propagation* ('97-), *IEEE Microwave & Wireless Components Letters* ('00-), *Journal of Applied Computational Electromagnetics Society* ('06-), *Journal of Microwave Power and Electromagnetic Energy* ('07-), *International Journal of Infrared and Milimeter Waves* ('08-), *Physica Status Solidi B* ('08-), *IEEE AP-S Magazine* ('08-); Member of the Technical Programme Committee of IEEE International Microwave Symposium ('02-); Chair of

Subcommittee; Vice-Chair of the IEEE AP/AES/MTT Joint Chapter, Poland Section ('07-); Award of the Rector ('10).
[Edu34], [Edu74];
[Pro25];
[BSc18];
[Pub25], [Pub111], [Pub112], [Pub158], Pub159],
[Pub163], [Pub164], [Pub184], [Pub195].

Henryk Chaciński

room: 433, phone: +48 22 2347841
e-mail: H.Chacinski@ire.pw.edu.pl

M.Sc. ('75); electronics and telecommunications; **Senior Lecturer**, Radiocommunications Division.
[Edu16], [Edu96], [Edu125];
[Pro15], [Pro29];
[MSc4], [MSc21], [MSc26];
[BSc46];
[Pub44], [Pub135], [Pub179].

Jacek Cichocki

room: 27, phone: +48 22 2347635, fax: +48 22 8253759
e-mail: J.Cichocki@ire.pw.edu.pl

M.Sc. ('79), Ph.D. ('92); measurement and instrumentation, radiocommunications, cellular systems; **Docent**, Radiocommunications Division.

Member of the Faculty Council ('02-); Member of the Faculty Council Committee on History and Tradition ('09-); Member of the Faculty Council Committee on Education ('08-); Head of the Area of Radiocommunications and Multimedia Technologies ('08-); Member of the Polish Society for Measurement, Automatic Control and Robotics POLSPAR ('92-); Member of the Programme Committee of the National Conference of Radiocommunications and Broadcasting: KKRRiT. ('08-)
[Edu52], [Edu67], [Edu104],
[Edu126], [Edu140], [Edu146];
[Pro28];
[MSc40];
[BSc71];
[Pub60], [Pub204].

Krzysztof Czerwiński

room: 35, phone: +48 22 2347796
e-mail: K.Czerwinski@ire.pw.edu.pl

M.Sc. ('68), Ph.D. ('86); electronics and telecommunications; **Assistant Professor,** Radiocommunications Division.

Member of the Technical Committee 183 of the Polish Normalization Committee ('95-).
[Edu11], [Edu100],
[Edu102], [Edu138];
[Pro31];
[BSc80].

Krzysztof Derzakowski

room: 550, phone: +48 22 2347933
e-mail: K.Derzakowski@ire.pw.edu.pl

M.Sc. ('84), Ph.D. ('91); radio-frequency engineering, microwave technique; **Assistant Professor**, Radiocommunications Division.du11], [Edu35], [Edu100];
[Pro1], [Pro18], [Pro27];
[MSc58], [MSc62];
[BSc76];
[Pub116].

Grzegorz Domański

room: 61, phone: +48 22 2347626
e-mail: G.Domanski@ire.pw.edu.pl

M.Sc. ('94), Ph.D. ('01); nuclear and medical electronics; **Assistant Professor**, Nuclear and Medical Electronics Division.

Secretary of the the Warsaw Branch of Polish Society of Medical Physics ('01-); Faculty Coordinator of Radiological Protection ('02-).
[Edu54], [Edu59];
[Pro4], [Pro5], [Pro26], [Pro45];
[MSc3], [MSc12], [MSc27], [MSc37], [MSc54];
[BSc17], [BSc50];
[Pub51], [Pub52], [Pub91], [Pub118], [Pub162].

Grzegorz Galiński

room: 452, phone: +48 22 2345016
e-mail: G.Galinski@ire.pw.edu.pl

M.Sc. (97'), Ph.D. ('03); image and video processing, multimedia systems, multimedia indexing; **Assistant Professor**, Television Division.

Member of Multimedia Technical Committee no. 288 at Polish Committee for Standardization ('99-).
[Edu40], [Edu116],
[Edu145], [Edu152];
[Pro1], [Pro19], [Pro34];
[MSc31];
[BSc20], [BSc68];
[Pub38], [Pub39], [Pub119].

Daniel Gryglewski

room: 545, phone: +48 22 2345886
e-mail: D.Gryglewski@ire.pw.edu.pl

M.Sc. ('96), Ph.D. ('01); microwave technique; **Assistant Professor**, Microwave and Radiolocation Engineering Division.
[Edu108];
[Pro7], [Pro14], [Pro16],
[Pro25], [Pro46];
[MSc13], [MSc42];
[Pub94], [Pub120], [Pub131], [Pub154], [Pub169].

Wojciech K. Gwarek

room: 544, phone: +48 22 2347725
e-mail: W.Gwarek@ire.pw.edu.pl

M.Sc. ('70; '74 at MIT), Ph.D. ('77), D.Sc. ('88), Prof. Title ('00); electronics; **Tenured Professor**, Microwave and Radiolocation Engineering Division, Head ('06-).

Fellow Member of IEEE ('00-); Member of the Review Board of *IEEE Trans. on Microwave Theory and Techniques* ('88-), *IEEE Trans. on Antennas and Propagation* ('96-), *IEEE Microwave & Wireless Components Letters* ('96-); Member of the International Microwave Conf. MIKON ('93-); Chair of the Faculty Awards Committee and Member of the University Awards Committee ('08-), Mem-

ber of the Organizational Committee of MIKON 2010, Award of the Rector ('10).
[Edu33], [Edu49], [Edu77], [Edu85];
[Pro3], [Pro6], [Pro25], [Pro39];
[PhD5];
[MSc28];
[BSc31];
[Pub17], [Pub18], [Pub25], [Pub112], [Pub129], [Pub130], [Pub131], [Pub148], [Pub157], [Pub164], [Pub184], [Pub187].

Krystian Ignasiak

room: 452, phone: +48 22 2345016
e-mail: K.Ignasiak@ire.pw.edu.pl

M.Sc. ('94), Ph.D. ('99); informatics, multimedia systems, distributed systems, web technology; **Assistant Professor**, Television Division.
Member of Multimedia Technical Committee no. 288 at Polish Committee for Standardization (‘99-).
[Edu31], [Edu47], [Edu111], [Edu137];
[Pro19], [Pro34];
[MSc41], [MSc50], [MSc52];
[BSc24], [BSc28], [BSc48].

Tomasz Jamrógiewicz

room: 68, phone: +48 22 2347917
e-mail: T.Jamrogiewicz@ire.pw.edu.pl

M.Sc. ('72); nuclear and medical electronics; **Senior Lecturer**, Nuclear and Medical Electronics Division.
Member of Technical Committees for Standardization: TC 173 – Interfaces and Building Electronic Systems ('94-), the vice-chairman ('07-), and TC 302 – Using of Informatics in the Health Protection ('03-); Member of the Presidium of Polish CAMAC Committee ('89-); Member of the Committee of Auditors of the Warsaw Branch of the Polish Society of Medical Physics ('00-), Engineer Degree Evening Studies on Radiocommunications – tutorial assistance ('02-).
[Edu18], [Edu38], [Edu115], [Edu131];
[Pro26], [Pro38], [Pro42];
[MSc14];
[BSc26], [BSc35], [Bsc47], [BSc61], [BSc63].

Marian Kazubek

room: 67, phone: +48 22 2347917
e-mail: M.Kazubek@.pw.edu.pl

M.Sc. ('69), Ph.D. ('78); signal & image processing, pattern recognition, telediagnostics; **Assistant Professor**, Nuclear and Medical Electronics Division.
[Edu66], [Edu82], [Edu110];
[Pro26], [Pro42];
[MSc9].

Wojciech Kazubski

room: 427, phone: +48 22 2347378
e-mail: W.Kazubski@ire.pw.edu.pl

M.Sc. ('86), Ph.D. ('98); radio frequency engineering, radio receivers, RF measurement techniques, shortwave propagation; **Assistant Professor**, Radiocommunications Division.
[Edu3], [Edu129];
[Pro15], [Pro29], [Pro31];
[MSc29], [MSc61], [MSc67];
[BSc29], [BSc32], [BSc86], [BSc87];
[Pub56], [Pub135], [Pub179].

Tomasz Keller

room: 540, phone: +48 22 2347833
e-mail: T.Keller@ire.pw.edu.pl

M.Sc. ('99), Ph.D. ('04); radiocommunications; **Assistant Professor**, Radiocommunications Division.
[Edu41], [Edu53], [Edu142], [Edu150],[Edu151],
[Edu152], [Edu153];
[Pro1], [Pro15], [Pro17], [Pro27];
[MSc55];
[BSc10], [BSc14], [BSc70];
[Pub37], [Pub49], [Pub57].

Jerzy Kołakowski

room: 27, phone: +48 22 2347635, fax: +48 22 8253759
e-mail: J.Kolakowski@ire.pw.edu.pl

M.Sc. ('88), Ph.D. ('00); ultrawideband systems, cellular systems, measurement and instrumentation; **Assistant Professor**, Radiocommunications Division.
Member of the Management Board of the Foundation for the Development of Radiocommunications and Multimedia Technologies ('02-).
[Edu21], [Edu67], [Edu141], [Edu146];
[Pro28];
[BSc49], [BSc72];
[Pub60], [Pub125], [Pub126].

Bogumił Konarzewski

room: 64, phone: +48 22 2347916
e-mail: B.Konarzewski@ire.pw.edu.pl

M.Sc. ('91), Ph.D. ('98); nuclear and medical electronics; **Assistant Professor**, Nuclear and Medical Electronics Division.
[Edu1], [Edu11];
[Pro4], [Pro5], [Pro26], [Pro45];
[MSc17], [MSc18];
[BSc7], [BSc34];
[Pub51], [Pub91], [Pub118], [Pub162],

Paweł Kopyt

room: 546, phone:+48 22 2345829
e-mail: P.Kopyt@ire.pw.edu.pl

M.Sc. ('01), Ph.D. ('06), microwave technique, modeling of multiphysics effects involving electromagnetic phenomena; **Assistant Professor**, Microwave and Radiolocation Engineering Division.
Award of the Rector ('10).
[Edu23];
[Pro6], [Pro25], [Pro39];
[BSc5], [BSc55], [BSc73];
[Pub128], [Pub129], [Pub130], [Pub187].

Tomasz Kosiło
room: 434, phone: +48 22 2347576
e-mail: T.Kosilo@ire.pw.edu.pl

M.Sc. ('70), Ph.D. ('77); radiocommunications; **Docent**, Radiocommunications Division.

Faculty Coordinator of the Engineer Degree Evening Studies on Radiocommunications ('05-); Member of the Polish National Committee of the URSI ('02-).

[Edu13], [Edu51], [Edu105], [Edu123], [Edu124], [Edu132], [Edu139], [Edu148], [Edu153], [Edu168];
[Pro31];
[MSc10];
[BSc40];
[Pub97], [Pub179], [Pub203].

Ewa Kotarbińska
room: 127, phone: +48 22 2347999
e-mail: E.Kotarbinska@ire.pw.edu.pl

M.Sc. ('73), Ph.D. ('81); acoustics, noise control, environmental acoustics; **Assistant Professor**, Electroacoustics Division.

Expert of the Technical European Committee for Standardization CEN/TC/159, Hearing Protectors ('96-); Expert of Working Group WG5CEN/TC 159 ('96-); Member of the Technical Polish Committee for Standardization 21 Personal Protective Equipment ('96-), Head of the Working Group 6 Hearing Protectors of the Polish Committee for Standardization ('04-), Member of the Polish Acoustics Society ('73-); Member of the European Acoustics Society ('02-).

[Edu43];
[Pro23];
[MSc34];
[Pub62].

Tomasz Krzymień
room: 11a, phone: +48 503510402
e-mail: T.Krzymien@ire.pw.edu.pl

M.Sc. (‘86); television; **Senior Lecturer**, Television Division.

[Edu11].

Zbigniew Kulka
room: 132, phone: +48 22 2347621
e-mail: Z.Kulka@ire.pw.edu.pl

M.Sc. ('67), Ph.D. ('80), D.Sc. ('96); analog electronics, a/d and d/a converters, digital audio; **Professor**, Electroacoustics Division, Head ('98-).

Secretary of the Board of the Foundation for the Development of Radiocommunications and Multimedia Technologies ('01-); Member of the Audio Engineering Soc. ('01-); Chair of the Polish Section of the Audio Engineering Society ('07-), Member of the Scientific Committee of the Symposium on the New Trends in Audio and Video ('99-).

[Edu26], [Edu27], [Edu81], [Edu133], [Edu166], [Edu167];
[Pro9], [Pro23], [Pro47];
[MSc57];
[BSc11], [BSc12], [BSc79];
[Pub134], [Pub199].

Krzysztof Kurek
room: 551, phone: +48 22 2345476
e-mail: K.Kurek@ire.pw.edu.pl

M.Sc. ('96), Ph.D. ('02); radiocommunications, radio-frequency engineering, space technologies; **Assistant Professor**, Radiocommunications Division.

Tutorial assistance of Space Engineering Student Scientific Group ('04-); Member of the Committee on Space Research of Polish Academy of Sciences (PAN) ('07-).

[Edu57], [Edu101], [Edu122], [Edu147];
[Pro1], [Pro15], [Pro17], [Pro27], [Pro36];
[MSc8], [MSc16], [MSc20];
[BSc25], [BSc88];
[Pub37], [Pub57], [Pub59], [Pub64], [Pub135].

Robert Kurjata
room: 61, phone: +48 22 2347626
e-mail: R.Kurjata@ire.pw.edu.pl

M.Sc. ('00), Ph.D. ('07); nuclear and medical electronics; **Assistant Professor**, Nuclear and Medical Electronics Division.

Treasurer of the Warsaw Branch of Polish Society of Medical Physics ('08-).

[Edu63], [Edu97], [Edu112], [Edu119];
[Pro4], [Pro5], [Pro26], [Pro45];
[MSc25];
[Pub15], [Pub28], [Pub51], [Pub52], [Pub91], [Pub118], [Pub162].

Andrzej Leszczyński
room: 130, phone: +48 22 2347748
e-mail: A.Leszczynski@ire.pw.edu.pl

M.Sc. ('61), Ph.D. ('72); acoustics, electroacoustics, ultrasonics; **Assistant Professor**, Electroacoustics Division.

Head of the Studies on Audiological Techniques of the Institute of Radioelectronics ('96-).

[Edu166], [Edu167];
[Pro23], [Pro34];
[Pub203].

Robert Łukaszewski
room: 440, phone: +48 22 2347340
e-mail: R.Lukaszewski@ire.pw.edu.pl

M.Sc. ('97), Ph.D. ('07); measurement and instrumentation; **Assistant Professor**, Electroacoustics Division.

[Edu84];
[Pro24];
[MSc56];
[Pub4], [Pub63], [Pub137].

Janusz Marzec
room: 62, phone: +48 22 2347643
e-mail: J.Marzec@ire.pw.edu.pl

M.Sc. ('75), Ph.D. ('83), D.Sc. ('03); nuclear and medical electronics, HEP detectors and front-end electronics; **Professor**, Nuclear and Medical Electronics Division.

Member of the Faculty Council Committee on Faculty Organization ('08-); Member of the University Disciplinary Committee of Appeal ('08-).

[Edu20], [Edu92];
[Pro4], [Pro5], [Pro26], [Pro45];
[MSc23];
[BSc2], [BSc38];

[Pub10], [Pub11], [Pub12], [Pub13], [Pub15], [Pub28], [Pub51], [Pub52], [Pub91], [Pub118], [Pub162].

Przemysław Miazga

room: 545, phone: +48 22 2347878
e-mail: P.Miazga@ire.pw.edu.pl

M.Sc. ('80), Ph.D. ('89); microwaves, computer engineering, measurements; **Assistant Professor**, Microwave and Radiolocation Engineering Division.

Tutorial assistance of Innovative Information Technologies Student Scientific Group ('05-).

[Edu22], [Edu86];
[Pro25];
[Pub139], [Pub140].

Ryszard Michnowski

room: 27, phone: +48 22 2347635
e-mail: R.Michnowski@ire.pw.edu.pl

M.Sc. ('97), Ph.D. ('06), measurement and instrumentation, radiocommunications, microwave technique; **Assistant Professor**, Radiocommunications Division.

[Pro28];
[MSc6];
[Pub60].

Andrzej Miękina

room: 439, phone: +48 22 2347346
e-mail: A.Miekina@ire.pw.edu.pl

M.Sc. ('85), Ph.D. ('98); measurement and instrumentation; **Assistant Professor**, Television Division.

Treasurer of the IEEE Poland Section ('99-), Award of the Rector ('10).

[Edu36], [Edu44], [Edu45], [Edu117];
[Pro12], [Pro33];
[MSc38];
[Pub141].

Mirosław G. Mikołajewski

room: 539, phone: +48 22 2347724
e-mail: M.Mikolajewski@ire.pw.edu.pl

M.Sc. ('87), Ph.D. ('93); radio-frequency engineering, power electronics, radio transmitters, switch-mode power supplies; **Assistant Professor**, Radiocommunications Division.

[Edu30];
[Pro29];
[MSc64];
[BSc83].

Józef W. Modelski

room: 535a, phone: +48 22 2347233, +48 22 8256555
e-mail: J.Modelski@ire.pw.edu.pl

M.Sc. ('73), Ph.D. ('78), D.Sc. ('87), Prof. Title ('94); radio-frequency engineering, microwave techniques; **Tenured Professor**, Radiocommunications Division.

Director of the Institute of Radioelectronics ('96-); Corresponding Member of the Polish Academy of Sciences – PAN (‘07-); Fellow Member of IEEE (’00-); Director of the IEEE Region 8 (’09-'10); Chairman of the Committee on Electronics and Telecommunications PAN ('07-); Member of the Committee on Space Research ('01-); Head of Satellite Commission ('03-); Associated Member of the Ukrainian National Academy of Sciences ('99-); Member of Scientific Councils: Telecommunications Research Institute – PIT, Chairman ('07-), National Institute of Telecommunications ('03-); President of the Foundation for the Development of Radiocommunications and Multimedia Technologies ('00-); Member of Editorial Board of *IEEE Transactions on MTT* ('95-); Chairman of the Microwave and Radar Week in Poland (’04-); TPC Member of the IEEE MTT-S International Microwave Symposium ('95-); University Senate Elected Member ('05-); Chair of the Council of AZS PW (Academic Sports Association of Warsaw University of Technology) ('06-); *SibirCon 2010, IEEE International Conference on Computational Technologies in Electrical and Electronics Engineering*; Honorary Chair, Plenary speech; *HistelCon 2010, The 2nd IEEE Conference on the History of Telecommunications*, Plenary speech; *EnergyCon 2010, IEEE International Energy Conference & Exhibition,* Honorary Chair, Opening address; Silver Medal granted by the Senat of the Republic of Poland ('10), Golden Medal for Contribution to Defences of Country ('10), Medal im. Prof. J. Groszkowskiego ('10).

[Edu26], [Edu27];
[Pro1], [Pro15], [Pro17], [Pro18], [Pro20],[Pro27], [Pro44];
[PhD2], [PhD6];
[Pub5], [Pub43], [Pub57], [Pub67], [Pub68], [Pub69], [Pub70], [Pub113], [Pub174], [Pub175], [Pub201], [Pub202], [Pub203].

Juliusz S. Modzelewski

room: 537, phone: +48 22 2347793
e-mail: J.Modzelewski@ire.pw.edu.pl

M.Sc. ('77), Ph.D. ('93); radio-frequency engineering, power electronics, radio transmitters; **Assistant Professor**, Radiocommunications Division.

Member of ISCAS Review Committee ('06-).

[Edu3], [Edu56], [Edu129];
[Pro15], [Pro29];
[MSc66];
[BSc78], [BSc85];
[Pub20], [Pub71], [Pub93], [Pub135], [Pub143], [Pub179].

Roman Z. Morawski

room: 445, phone: +48 22 2347721
e-mail: R.Morawski@ire.pw.edu.pl

M.Sc. ('72), Ph.D. ('79), D.Sc. ('90), Prof. Title ('01); measurement and instrumentation; **Professor**, Television Division.

Member of the Committee for Metrology and Scientific Instrumentation, Polish Academy of Sciences ('93-'96, '99-); POLSPAR Representative in the General Council of International Measurement Confederation IMEKO (‘98-); Member of the IMEKO Advisory Board ('06-); Senior Member of IEEE ('99-); Member of the Editorial Board of *Measurement – Journal of IMEKO* ('97-); Chairman of the International Programme Committee of *Metrology and Measurement Systems* ('07-); Reviewer of *IEEE* journals and of *IET Science, Measurement and Technology* ('07-); Member of Editorial Board of “Strategy for Developement of Warsaw University of Technology 2010-2020” ('10-); Chairman of the Faculty Council Committee on History and Tradition ('08-), Chairman of the Dean's Board of English-medium Studies ('08-), Member of the Senate Committee on History and Tradition ('08-), 3 Awards of the

Rector ('10); Honorary Senior Fellow of City University London ('10-).
[Edu32], [Edu36], [Edu44], [Edu45], [Edu168];
[Pro12], [Pro33];
[Pub6], [Pub98], [Pub101], [Pub102], [Pub103], [Pub141], [Pub144], [Pub145], [Pub203].

Tadeusz Morawski

room: 541, phone: +48 22 2347402
e-mail: T.Morawski@ire.pw.edu.pl

M.Sc. (electronics '63), M.Sc. (mathematics '66), Ph.D. ('70), D.Sc. ('73), Prof. Title ('80); microwave technique; **Tenured Professor**, Microwave and Radiolocation Engineering Division.

Member of the Technical Program Committee of MIKON ('80-); Member of the Faculty Council Committee on Academic Staff Development ('05-); Member of the Committee on Electronics and Telecommunications KEiT, Polish Academy of Sciences PAN ('90-); Member of the Microwave Section of KEiT ('96-); Senior Member of IEEE ('80-), Award of the Rector ('10).

[Edu28], [Edu33], [Edu106], [Edu107], [Edu109];
[Pro14], [Pro25];
[Pub199], [Pub203].

Krzysztof Mroczek

room: 441, phone: +48 22 2347946
e-mail: K.Mroczek@ire.pw.edu.pl

M.Sc. (95'), Ph.D. ('02); measurement and instrumentation, programmable logic devices, System-on-a-Programmable-Chip (SoPC); **Assistant Professor**, Electroacoustics Division.

[Edu4], [Edu10], [Edu29];
[Pro24];
[BSc56].

Tomasz Olszewski

room: 58, phone: +48 22 2347577
e-mail: T.Olszewski@ire.pw.edu.pl

M.Sc. ('82); nuclear and medical electronics, capacitance tomography, digital electronics, programmable logic devices; **Senior Lecturer**, Nuclear and Medical Electronics Division.

Member of the Technical Committee for Standardization TC 302 – Using Informatics in the Health Protection ('07-).

[Edu10], [Edu29], [Edu38];
[Pro8], [Pro26], [Pro37].

Grzegorz Pastuszak

room: 452; phone: +48 22 2347840
e-mail: G.Pastuszak@ire.pw.edu.pl

M.Sc. ('01), Ph.D. ('06); integrated circuit design, multimedia systems, video processing; **Assistant Professor**, Television Division.

[Pro1], [Pro34];
[MSc45];
[BSc57], [BSc67], [BSc77];
[Pub54], [Pub57], [Pub87], [Pub104], [Pub110], [Pub122], [Pub155], [Pub156], [Pub168].

Ewa Piątkowska-Janko

room: 69, phone: +48 22 2347918
e-mail: E.Piatkowska@ire.pw.edu.pl

M.Sc. ('78), Ph.D. ('01); medical and nuclear engineering; **Assistant Professor**, Nuclear and Medical Electronics Division.

Member of Center of Excellence PROKSIM ('04-); tutorial assistance of Biomedical and Nuclear Engineering Students Scientific Group ('06-), and Beskid Mountain Guides Student Circle (-99'); qualification levels PRINCE2 Foundation ('09-).

[Edu38];
[Pro10], [Pro26], [Pro35], [Pro38], [Pro42];
[MSc2], [MSc11], [Msc22], [MSc39], [MSc43];
[BSc3], [BSc65];
[Pub19], [Pub142], [Pub170], [Pub181], [Pub182], [Pub183], [Pub186], [Pub190], [Pub191], [Pub192], [Pub196].

Andrzej Podgórski

room: 431, phone: +48 22 2345453
e-mail: A.Podgorski@ire.pw.edu.pl

M.Sc. ('75), Ph.D. ('83); measurement and instrumentation; **Assistant Professor**, Television Division.

[Edu12], [Edu36], [Edu44], [Edu45];
[Pro12], [Pro33].

Artur Przelaskowski

room: 11, phone: +48 22 2347332
e-mail: A.Przelaskowski@ire.pw.edu.pl

M.Sc. ('90), Ph.D. ('95), D.Sc. ('04); computer-aided diagnosis in medicine, telemedicine, multimedia techniques, signal & image processing, data compression, imaging informatics; **Professor,** Television Division.

Member of the International Scientific Board of Advances in International Telemedicine and e-Health ('06-); Tutorial assistance of Technique in Medicine Student Scientific Group ('08-).

[Edu7], [Edu17], [Edu76], [Edu80];
[Pro21], [Pro30];
[Pub3], [Pub7], [Pub8], [Pub9], [Pub16], [Pub22], [Pub58], [Pub75], [Pub76], [Pub77],[Pub78], [Pub99], [Pub152], [Pub180], [Pub185], [Pub189], [Pub194], [Pub203], [Pub205].

Karol W. Radecki

room: 29, phone: +48 22 2347620
e-mail: K.Radecki@ire.pw.edu.pl

M.Sc. ('70), Ph.D. ('78); radio-frequency engineering and measurement; **Assistant Professor**, Radiocommunications Division.

Member of the National Committee of URSI ('90-); Member of the Programme Committee of the National Symp. of Radio Science ('99-); National Chairman of URSI Commission of Electromagnetic Metrology ('90-); Member of the Scientific Advisory Board, Polish Association for the Blind ('95-); Golden Medal for Long-lasting Service ('10).

[Edu113], [Edu128], [Edu138];
[Pro28];
[MSc63];
[BSc64];
[Pub40], [Pub41], [Pub66], [Pub179].

Dariusz Radomski

room: 4, phone: +48 22 2345017
e-mail: D.Radomski@ire.pw.edu.pl

M.Sc. ('96), Ph.D. (automatics and robotics '01), Ph.D. (medical science '06); mathematical modeling of physiological and disease processes, biostatistical methods, experiments design methods; **Assistant Professor**, Nuclear and Medical Electronics Division.
Rector's Deputy for Handicapped Persons at WUT ('05-).
[Pro11], [Pro13], [Pro26];
[MSc19];
[Pub81], [Pub82], [Pub161].

Krzysztof Robaczyński

room: 548, phone: +48 22 2347622
e-mail: K.Robaczyński@ire.pw.edu.pl

M.Sc. (‘69); microwave technique; **Senior Lecturer** (0.5), Microwave and Radiolocation Engineering Division.
Faculty Coordinator for the Program of Study ('94-).
[Edu99];
[Pro25].

Stanisław Rosłoniec

room: 552, phone: +48 22 2347956
e-mail: S.Rosloniec@ire.pw.edu.pl

M.Sc. ('72), Ph.D. ('76), D.Sc. ('91); Prof. Title ('01); microwave technique; **Professor**, Microwave and Radiolocation Engineering Division. Golden Medal for Contribution to Defences of Country ('10).
[Edu14], [Edu69];
[Pro25];
[PhD1];
[BSc15], [BSc36], [BSc74];
[Pub86].

Tymon Rubel

room: 74, phone: +48 22 2347739
e-mail: T.Rubel@ire.pw.edu.pl

M.Sc. ('03), Ph.D. ('10); medical and nuclear engineering; **Assistant Professor**, Nuclear and Medical Electronics Division.
[Edu114];
[PhD4];
[Pub79], [Pub80].

Marek Rusin

room: 422a, phone: +48 22 2347742
e-mail: M.Rusin@ire.pw.edu.pl

M.Sc. ('66), Ph.D. ('75); radiocommunications, television; **Docent** (0.5), Television Division.
President of the Board of European Sport Radio-orienteering Federation ('00-).
[Edu15], [Edu58];
[Pub203].

Władysław Skarbek

room: 451, phone: +48 22 2345315
e-mail: W.Skarbek@ire.pw.edu.pl

M.Sc. ('72), Ph.D. ('77), D.Sc. ('94); Prof. Title ('03); information technology, image processing, digital media; **Tenured Professor**, Television Division, Head ('00-).
Head of Multimedia Technical Committee no. 288 at Polish Committee for Standardization (‘99-); ISO /S.C.29/WG11 (MPEG) expert ('00-); Member of Advisory Board of *Image Processing and Communications* ('95-), *Fundamenta Informaticae* ('06-), “*Optoelectronics Review”* ('06-).
[Edu68], [Edu71], [Edu88], [Edu90];
[Pro34], [Pro40], [Pro43];
[PhD3];
[MSc5], [MSc24], [MSc35];
[Pub124], [Pub146], [Pub203].

Waldemar Smolik

room: 5, phone: +48 22 2345786
e-mail: W.Smolik@ire.pw.edu.pl

M.Sc. ('91), Ph.D. ('97); biomedical engineering, computer engineering; **Assistant Professor**, Nuclear and Medical Electronics Division.
[Edu46], [Edu50], [Edu75];
[Pro8], [Pro11], [Pro26], [Pro37];
[BSc4], [Bsc37], [BSc43];
[Pub1], [Pub26], [Pub27], [Pub32], [Pub90],
[Pub107], [Pub160], [Pub161], [Pub171].

Kajetana Snopek

room: 435, phone: +48 22 2347647
e-mail: K.Snopek@ire.pw.edu.pl

M.Sc. ('91), Ph.D. ('02); signal and system theory and applications; **Assistant Professor**, Radiocommunications Division.
Faculty Coordinator of M.Sc. Evening Studies on Radiocommunications ('05-).
[Edu60], [Edu61], [Edu128], [Edu136];
[Pro31];
[BSc41];
[Pub181].

Maciej Sypniewski

room: 547, phone: +48 22 2347347
e-mail: M.Sypniewski@ire.pw.edu.pl

M.Sc. ('83), Ph.D. ('96); microwave technique; **Assistant Professor**, Microwave and Radiolocation Engineering Division.
[Edu48];
[Pro25];
[Pub127].

Roman Szabatin

room: 60, phone: +48 22 2347577
e-mail: R.Szabatin@ire.pw.edu.pl

M.Sc. ('70), Ph.D. ('82); biomedical engineering; **Docent**, Nuclear and Medical Electronics Division.
Associate Dean for Student Affairs ('05-); Member of the European Association of Nuclear Medicine ('89-); Vice President of Polish Society of Process Tomography ('03-).
[Edu38], [Edu93];
[Pro8], [Pro26], [Pro37];
[MSc36];
[BSc1], [BSc54];
[Pub1], [Pub32], [Pub105].

Maria Tajchert

room: 127, phone: +48 22 2347644
e-mail: M.Tajchert@ire.pw.edu.pl

M.Sc. ('69), Ph.D. ('78); electroacoustics, acoustic measurements, architectural acoustics; **Assistant Professor**, Electroacoustics Division.

Member of the Polish Acoustics Society ('70-); Member of the Audio Engineering Society ('91-); Treasurer of the Audio Engineering Society Polish Section ('07-).

[Edu64], [Edu95], [Edu166], [Edu167];
[Pro23];
[BSc9].

Andrzej Więckowski

room: 547, phone: +48 22 2347347
e-mail: A.Wieckowski@ire.pw.edu.pl

M.Sc. ('70), Ph.D. ('80); microwaves, computer engineering, measurements; **Assistant Professor**, Microwave and Radiolocation Engineering Division.

[Edu48];
[Pro25].

Wiesław Winiecki

room: 442, phone: +48 22 2347341
e-mail: W.Winiecki@ire.pw.edu.pl

M.Sc. ('75), Ph.D. ('86), D.Sc. ('03); measurement and instrumentation; **Professor**, Electroacoustics Division.

Deputy Director for Research of the Institute of Radioelectronics ('08-); Member of the WUT Science Council ('06-); Member of the Senate Committee on Research ('05-); Member of the Metrology and Instrumentation Committee, Polish Academy of Sciences ('07-); President of the Polish Society for Measurement, Automatic Control and Robotics POLSPAR ('04-); Member of the Scientific and Programme Committee of the National Conferences: SP ('01-), KM ('06-), PD ('06-), MWK ('08-), and International Conference IEEE IDAACS ('01-); Member of the *IEEE IDAACS* International Advisory Board; Reviewer of the *IEEE Transactions on Instrumentation and Measurement* ('03-) and *Measurement – Journal of IMEKO* ('08-); Member of the Editorial Board of the *International Journal of Computing* ('06-); Guest Editor of the Special Issue of the International Journal *Sensors and Systems* ('09-'10); Member of Programme Board of the Journal *Pomiary Automatyka Kontrola* ('07-).

[Edu37], [Edu62], [Edu84], [Edu103];
[Pro24];
[BSc33];
[Pub14], [Pub33], [Pub73], [Pub74], [Pub109], [Pub115], [Pub149].

Jacek Wojciechowski

room: 443, phone: +48 22 2347713
e-mail: J.Wojciechowski@ire.pw.edu.pl

M.Sc. (electronics '66), M.Sc. (mathematics '75), Ph.D. ('76), D.Sc. ('89); Prof. Title ('02); telecommunications, teleinformatics, signals and systems, computer aided design, graphs and networks, mathematical methods in engineering; **Tenured Professor**, Radiocommunications Division.

Member of the Circuit Theory and Signal Processing Section of the Electronics and Telecommunication Committee of the Polish Academy of Sciences ('97-); Member of the Scientific Committees of: International Conference on Signals and Electronics Systems ('97-), Conference on Evolutionary Algorithms and Global Optimization ('97-);

Coordinator of the cooperation agreement between WUT and University of Waterloo, Canada ('93-); Adviser to Wydawnictwo Komunikacji i Łączności – a publishing house in engineering ('97-); Associate Editor of *Journal of the Franklin Institute* ('07-); Medal of National Education Commiittee ('10).

[Edu24], [Edu61], [Edu87], [Edu133];
[Pro32];
[MSc44];
[BSc42];
[Pub45], [Pub93], [Pub181], [Pub206].

Wojciech Wojtasiak

room: 549, phone: +48 22 2345886
e-mail: W.Wojtasiak@ire.pw.edu.pl

M.Sc. ('84), Ph.D. ('98); microwave technique; **Assistant Professor**, Microwave and Radiolocation Engineering Division.

[Edu39], [Edu130];
[Pro7], [Pro14], [Pro16], [Pro25], [Pro46];
[Pub94], [Pub120], [Pub131], [Pub154], [Pub169].

Yevhen Yashchyshyn

room: 33, phone: +48 22 2347727
e-mail: E.Jaszczyszyn@ire.pw.edu.pl

M.Sc. ('79), Ph.D. ('86), D.Sc. ('06); antennae and antenna array; **Professor**, Radiocommunications Division, Head ('09-).

Member of the Organizing Committee of the International Conference TCSET ('98-); Reviewer of the *IEEE Transactions on MTT"* ('04-), *IEEE Transactions on AP* ('06-) and *IEEE Microwave and Wireless Components Letters* ('04-); Member of Editorial Board of Izwestiya Wuzow Radioelektronika ('09-); Member of the Microwave and Radiolocation Section of the Electronics and Telecommunication Committee of the Polish Academy of Sciences ('07-); TPC Member of the MIKON ('09-), Member of the Scientific and Programme Committee of the National Conference KKRRiT ('09-).

[Edu2], [Edu70], [Edu149];
[Pro1], [Pro2], [Pro17], [Pro18], [Pro27], [Pro41];
[BSc30], [BSc45];
[Pub29], [Pub30], [Pub31], [Pub43], [Pub92], [Pub95], [Pub113], [Pub123], [Pub173], [Pub174], [Pub175].

Krzysztof Zaremba

room: 72, phone: +48 22 2347955, +48 22 2345780
e-mail: K.Zaremba@ire.pw.edu.pl

M.Sc. ('81), Ph.D. ('90), D.Sc. ('03); biomedical engineering, nuclear electronics; Professor, Nuclear and Medical Electronics Division, Head ('03-). Member of CERN ('89-); Head of the Warsaw Branch of Polish Society of Medical Physics ('01-); Head of the Dean's Financial Committee ('02-); Member of the Faculty Accreditation Board ('07-); Member of the University Council Committee on Property and Finances ('05-); Member of the Board and Treasurer of the Polish Society of Medical Physics ('05-); Member of the Programme Committee of the International Forum of Innovative Technologies for Medicine ITMED ('07-), Mem-

ber of the Programme Committee of IEEE International Workshop on Medical Measurements and Applications IEEE MeMeA (’07-), Member of the Scientific Board of the PhD Students and Young Scientists Conference *Young scientists towards the challenges of modern technology* (‘08-); Member of the Scientific Board of the International Forum on Innovative Technologies for Medicine ITMED (‘07-), Chair (2010); Member of the Scientific Committee of the Symposium *New Trends in Audio and Video* (‘08-); Member of the Editorial Advisory Board of the *Polish Journal of Medical Physics and Engineering* (’07-), Head of the Area of Concentration Electronics and Information Technology in Medicine ('06-); Deputy Chairman of the Board of the Center for Imaging and Biomedical Research ('06-); Member of the Biomedical Engineering Commission of the Committee on Medical Physics, Radiobiology and Image Diagnostics PAN ('08-); Member of the Board of Polish Eastern Medical Cluster ('08-), Member of the Coordinating Committee (‘10-); Faculty Coordinator of Faculty Development ('08-); Faculty Coordinator of Area of Studies Biomedical Engineering ('08-); University Coordinator of Area of Studies Biomedical Engineering ('09-); Member of the Committee for the Costs of Teaching MSHE (‘10), Award of Rector (‘10).

[Edu55], [Edu72], [Edu91], [Edu127];
[Pro4], [Pro5], [Pro45];
[PhD4];
[MSc1], [MSc30];
[BSc6], [BSc8], [BSc21], [BSc44], [BSc66];
[Pub10], [Pub11], [Pub12], [Pub13], [Pub15], [Pub28], [Pub51], [Pub52], [Pub79], [Pub80], [Pub91], [Pub118], [Pub162], [Pub201], [Pub203], [Pub204].

Jolanta Zborowska

room: 542, phone: +48 22 2347642
e-mail: J.Zborowska@ire.pw.edu.pl

M.Sc. ('74), Ph.D. ('83); microwave technique; **Assistant Professor**, Microwave and Radiolocation Engineering Division.

[Edu39];
[Pro25].

Jan Żera

room: 131, phone: +48 22 2347999
e-mail: J.Zera@ire.pw.edu.pl

M.Sc. ('76), Ph.D. ('90), D.Sc. ('04); acoustics, electroacoustics, psychoacoustics, noise control; **Associate Professor**, Electroacoustics Division.

Member of the ISO Working Group – ISO/TC 159/S.C5/WG3 ('97-); Member of Polish Acoustical Society ('78-), European Acoustics Association ('01-), Acoustical Society of America ('90-); Member of the Committee on Acoustics, the Polish Academy of Sciences ('07-); Member of Scientific Council of the Central Institute for Labour Protection – National Research Institute ('09-), Member of Technical Committee KT 105: Electroacoustics of Polish Committee for Standarization ('09-).

[Edu6], [Edu42], [Edu169];
[Pro22], [Pro23];
[MSc48];
[BSc62], [BSc75];
[Pub176], [Pub177], [Pub178].

2.2 Junior academic staff

Rafał Jóźwiak, M.Sc., Assistant (0.5)
room: 11, phone: +48 22 2345772
e-mail: R.Jozwiak@ire.pw.edu.pl

Marcin Lewandowski, MSc., Assistant (0.75, from Nov. 2010)
room: 125, phone: +48 22 2347637
e-mail: M.Lewandowski@ire.pw.edu.pl

Aleksandra Młyńska, M.Sc., Assistant (0.5, till Sept. 2010)
room: 127, phone: +48 22 2347644
e-mail: A.Mlynska@ire.pw.edu.pl

Marcin Ziembicki, M.Sc., Assistant (0.5)
room: 62, phone: +48 22 2347643
e-mail: M.Ziembicki@ire.pw.edu.pl

2.3 Ph.D. students (the third-level studies)

Ph.D. Student	**(tutor)**
Stanisław Adaszewski, M.Sc.	*(K. Zaremba)*
Kamil Bryłka, M.Sc.*	*(Y. Yashchyshyn)*
Paweł Czernik, M.Sc.	*(W. Winiecki)*
Marcin Dąbrowski, M.Sc.*	*(J. Modelski)*
Michał Grabowski, M.Sc.*	*(S. Rosłoniec)*
Wojciech Gradkowski, M.Sc.	*(J. Marzec)*
Mariusz Jakubowski, M.Sc.*	*(W. Skarbek)*
Magdalena Jasionowska, M.Sc.	*(A. Przelaskowski)*
Cezary Jezierski, M.Sc.*	*(J. Modelski)*
Marcin Jędryka, M.Sc.*	*(W. Skarbek)*
Rafał Jóźwiak, M.Sc.*	*(A. Przelaskowski)*
Karolina Kamińska, M.Sc.	*(K. Zaremba)*
Łukasz Kołaszewski, M.Sc.	*(K. Zaremba)*
Przemysław Korpas, M.Sc.	*(W. Gwarek)*
Rafał Korycki, M.Sc.*	*(Z. Kulka)*
Marcin Lewandowski, M.Sc.	*(Z. Kulka)*
Bartosz Majewski, M.Sc,*	*(Y. Yashchyshyn)*
Piotr Makal, M.Sc.	*(J. Modelski)*
Jacek Naruniec, M.Sc.	*(W. Skarbek)*
Artur Nowakowski, M.Sc.*	*(W. Skarbek)*
Wojciech Obrębski, M.Sc.	*(K. Zaremba)*
Marzena Olszewska, M.Sc.	*(W. Gwarek)*
Jakub Olszyna, M.Sc.	(*W. Winiecki)*
Grzegorz Ostrek, M.Sc.	*(A. Przelaskowski)*
Wojciech Pieńkowski, M.Sc.*	*(J. Modelski)*
Andrzej Piętak, M.Sc.	*(J. Wojciechowski)*
Piotr Płoński, M.Sc.	(*K. Zaremba)*
Lech Raczyński, M.Sc.*	*(K. Zaremba)*
Marcin Rolewicz, M.Sc.*	*(W. Skarbek)*
Mikołaj Roszkowski, M.Sc.*	*(W. Skarbek)*
Aleksandra Rutczyńska, M.Sc.	*(A. Przelaskowski)*
Andrzej Smolnik, M.Sc.*	*(K. Zaremba)*
Michał Sołtysiak, M.Sc. *	*(W. Gwarek)*
Aneta Świercz, M.Sc.*	*(J. Żera)*
Anna Urzędowska, M.Sc.	*(Y. Yashchyshyn)*
Michał Wieczorek, M.Sc.*	*(W. Skarbek)*
Łukasz Włodarczyk, M.Sc.	*(J. Marzec)*
Krzysztof Woźniak, M.Sc.*	*(K. Zaremba)*
Piotr Zawistowski, M.Sc.	(*W. Winiecki)*
Paweł Ziętek, M.Sc.*	*(J. Modelski)*

Michał Żebrowski, M.Sc.* *(S. Rosłoniec)*
* – without scholarship

2.4 Technical and administrative staff

Andrzej Abramowski, M.Sc., Research Assist. (0.95)*
room: 450, phone: +48 22 2347957
e-mail: A.Abramowski@ire.pw.edu.pl

Paweł Bajurko, M.Sc., Research Assist. (0.95)*
room: 552A, phone: +48 22 2347795
e-mail: P.Bajurko@ire.pw.edu.pl

Grażyna Betlejewska, Accountant
room: 416, phone: +48 22 2347743
e-mail: G.Betlejewska@ire.pw.edu.pl

Grzegorz Brzuchalski, M.Sc., Research Assist. (0.95)*
room: 450, phone: +48 22 2347957
e-mail: G.Brzuchalski@ire.pw.edu.pl

Janina Chmielak, Senior Technician (em.)
room: 420, phone: +48 22 2347987
e-mail: J.Chmielak@ire.pw.edu.pl

Anna Czarnecka, M.Sc., Senior Admin. Specialist
room: 535, phone: +48 22 2347910
e-mail: A.Czarnecka@ire.pw.edu.pl

Jacek Jarkowski, Ph.D., Senior R&D Engineer (0.25)
room: 433, phone: +48 22 2347841
e-mail: J.Jarkowski@ire.pw.edu.pl

Małgorzata Jaworska, M.A., Senior Financial Specialist
room: 426, phone: +48 22 2346089
e-mail: M.Jaworska@ire.pw.edu.pl

Sebastian Kozłowski, M.Sc., Research Assist. (0.95)*
room: 444, phone: +48 22 2346088
e-mail: S.Kozlowski@ire.pw.edu.pl

Bohdan Kwiatkowski, M.Sc., Senior R&D Engineer (0.75)
room: 426, phone: +48 22 2345367
e-mail: B.Kwiatkowski@ire.pw.edu.pl

Andrzej Laskowski, Worker
room: 419, phone: +48 22 2347987
e-mail: A.Laskowski@ire.pw.edu.pl

Andrzej Leszczyński, Ph.D., Senior R&D Engineer (0.5)
room: 130, phone: +48 22 2347748
e-mail: A.Leszczynski@ire.pw.edu.pl

Mirosław Lubiejewski, Foreman
room: 532, phone: +48 22 2347633
e-mail: M.Lubiejewski@ire.pw.edu.pl

Marek Marcinkowski, Senior Foreman
room: 427, phone: +48 22 2347378
e-mail: M.Marcinkowski@ire.pw.edu.pl

Teresa Miąsek, M.A., Curator of the Library
room: 557, phone: +48 22 2347627
e-mail: T.Miasek@ire.pw.edu.pl

Marcin Morgoś, M.Sc., Research Assist.*
room: 450, phone: +48 22 2347957
e-mail: M.Morgos@ire.pw.edu.pl

Anna Noińska, Secretary
room: 424, phone:+48 22 2347829, +48 22 8255248
e-mail: A.Noinska@ire.pw.edu.pl

Janina Nowak, Accountant
room: 416, phone: +48 22 2347645
e-mail: J.Nowak@ire.pw.edu.pl

Piotr Nykiel, M.Sc., Senior Devel. Engineer
room: 125, phone: +48 22 2347637
e-mail: P.Nykiel@ire.pw.edu.pl

Andrzej Owczarek, M.Sc., Senior Devel. Engineer (0.25)
room: 552A, phone: +48 22 2347233
e-mail: A.Owczarek@ire.pw.edu.pl

Marcin Piasecki, Ph.D., Research Assist. (0.95)*
room: 539, phone: +48 22 2347724
e-mail: M.Piasecki@ire.pw.edu.pl

Dorota Podniesińska, M.A., Financial Spec.
room: 416, phone: +48 22 2347645
e-mail: D.Podniesinska@ire.pw.edu.pl

Krzysztof Robaczyński, M.Sc., Senior R&D Engineer (0.5)
room: 548, phone: +48 22 2347622
e-mail: K.Robaczyński@ire.pw.edu.pl

Mikołaj Roszkowski, M.Sc., Research Assist. (0.95)*
room: 450, phone: +48 22 2347957
e-mail: M.Roszkowski@ire.pw.edu.pl

Marek Rusin, Ph.D., Senior Adm. Spec. (0.5)
room: 422, phone:+48 22 2347742, +48 22 82553929
e-mail: M.Rusin@ire.pw.edu.pl

Błażej Sawionek, Ph.D., Research Assist. Prof. (0.95)*
room: 68, phone: +48 22 2347917
e-mail: B.Sawionek@ire.pw.edu.pl

Izabela Sierankowska, Secretary
room: 424, phone:+48 22 2347829, +48 22 8255248
e-mail: I.Sierankowska@ire.pw.edu.pl

Radosław Sikora, Ph.D., Research Assist. Prof. (0.95)*
room: 450, phone: +48 22 2347957
e-mail: R.@ire.pw.edu.pl

Andrzej Skrzypkowski, Foreman
room: 419, phone: +48 22 2345018
e-mail: A.Skrzypkowski@ire.pw.edu.pl

Tomasz Smakuszewski, M.Sc., R&D Engineer
room: 451, phone: +48 22 2347957
e-mail: T.Smakuszewski@ire.pw.edu.pl

Anna Smenda, Secretary
room: 422, phone: +48 22 2347742, +48 22 8253929
fax: +48 22 8253769
e-mail: A.Smenda@ire.pw.edu.pl

Anna Tratkiewicz, Secretary
room: 422, phone: +48 22 2347233, +48 22 8253929
e-mail: A.Tratkiewicz@ire.pw.edu.pl

Andrzej Wasilewski, Worker
room: 73, phone: +48 22 2347919
e-mail: A.Wasilewski@ire.pw.edu.pl

Michał Wieczorek, M.Sc., Research Assist. (0.95)*
room: 450, phone: +48 22 2347957
e-mail: M.Wieczorek@ire.pw.edu.pl

Joanna Witkowska, Specialist
room: 66, phone: +48 22 2347955, +48 22 8251363
e-mail: J.Witkowska@ire.pw.edu.pl

Stanisław Żmudzin, M.Sc., Senior R&D Engineer (0.25)
room: 27, phone: +48 22 2347635
e-mail: S.Zmudzin@ire.pw.edu.pl

* temporary research staff of the EU Specific Targeted Research project PROTEUS

3 TEACHING ACTIVITIES (academic year 2009/2010)

3.1 Regular studies – Areas of Focus:

Radiocommunications and Multimedia Technologies

Head

Jacek Cichocki, Ph.D., Docent
room: 27, phone: +48 22 2347635
e-mail: J. Cichocki@ire.pw.edu.pl

1. **Electronics and Information Technology in Medicine**
2. **Biomedical Engineering**

Head

Krzysztof Zaremba, D.Sc., Professor
room: 72, phone: +48 22 2347955, +48 22 2345780
e-mail: K.Zaremba@ire.pw.edu.pl

3.1.1 Basic Courses

[Edu1] *Analysis of Measurement Data in Medicine* (Analiza danych pomiarowych w medycynie – ADP); 45h/sem.; B. Konarzewski.

[Edu2] *Antennae and Radiowave Propagation* (Anteny i propagacja fal – AIPF); 45h/sem.; Y. Yashchyshyn.

[Edu3] *Basic Radio-frequency Circuits* (Podstawowe układy radioelektroniczne – PURAD); 45h/sem.; J. Modzelewski, W. Kazubski.

[Edu4] *Basics of Digital Technique* (Podstawy techniki cyfrowej – PTCY); 45h/sem.; L. Raczyński, K. Mroczek.

[Edu5] *Basics of Electroacoustics* (Podstawy elektroakustyki – PEL); 45h/sem.; P. Bobiński.

[Edu6] *Basics of Hearing and Sound Perception* (Podstawy słyszenia i percepcja dźwięku – PSPD); 30h/sem.; J. Żera.

[Edu7] *Basics of Image Diagnostics Engineering* (Podstawy inżynierii diagnostyki medycznej – PIDOM); 45h/sem.; A. Przelaskowski.

[Edu8] *Basics of Medical Imaging* (Podstawy obrazowania medycznego – POMED); 45h/sem.; P. Brzeski.

[Edu9] *Basics of Medical Imaging Techniques* (Podstawy technik obrazowania w medycynie – PTOM); 60h/sem.; P. Brzeski.

[Edu10] *Basics of Microelectronics – Lab.* (Podstawy mikroelektroniki – PMK); 30h/sem.; T. Olszewski, K. Mroczek.

[Edu11] *Basics of Microprocessor Technique* (Podstawy techniki mikroprocesorowej – TMIK); 60h/sem.; K. Czerwiński, B. Konarzewski, K. Derzakowski, T. Krzymień.

[Edu12] *Basics of Programming* (Podstawy programowania – PRM); 60h/sem.; A. Podgórski.

[Edu13] *Basics of Radiocommunications* (Podstawy radiokomunikacji – PR); 45h/sem.; T. Kosiło.

[Edu14] *Basics of Radiolocation and Radionavigation* (Podstawy radiolokacji i radionawigacji – PRIR); 45h/sem.; S. Rosłoniec.

[Edu15] *Basics of Television* (Podstawy telewizji – POTE); 45h/sem.; M. Rusin.

[Edu16] *Broadcasting Systems* (Systemy radiofoniczne – SYR); 45h/sem.; H. Chaciński.

[Edu17] *Computer Graphics* (Grafika komputerowa – GRK); 30h/sem.; A. Przelaskowski.

[Edu18] *Computer Systems* (Systemy komputerowe – SYKO); 45h/sem.; T. Jamrógiewicz.

[Edu19] *Construction of High Quality Audio Equipment* (Konstrukcja urządzeń audio wysokiej jakości – KUA); 30h/sem.; P. Nykiel.

[Edu20] *Detection of Nuclear and Biomedical Signals* (Detekcja sygnałów biomedycznych i jądrowych – DSBJ); 60h/sem.; J. Marzec.

[Edu21] *Digital Cellular Systems* (Cyfrowe systemy komórkowe – CSK); 45h/sem.; J. Kołakowski.

[Edu22] *Digital Circuits* – EDC1; 30h/sem.; elective; P. Miazga (English-medium studies).

[Edu23] *Digital Circuits – Lab.* (Układy logiczne; laboratorium – ULOG); 30h/sem.; P. Kopyt.

[Edu24] *Digital Communications* – EDICO; 60h/sem.; J. Wojciechowski (English-medium studies).

[Edu25] *Digital and Interactive Television* (Telewizja cyfrowa i interaktywna – TCI); 60h/sem.; elective; A. Buchowicz.

[Edu26] *Diploma Seminar for Graduate Students 1* (Seminarium dyplomowe magisterskie 1 – SDM1); 30h/sem.; J. Modelski, P. Brzeski, Z. Kulka.

[Edu27] *Diploma Seminar for Graduate Students 1* (Seminarium dyplomowe magisterskie 1 – SDM2); 30h/sem.; Z. Kulka, J. Modelski, P. Brzeski.

[Edu28] *Diploma Seminar for Undergraduate Students* (Seminarium dyplomowe inżynierskie – SDI); 30h/sem.; P. Brzeski, T. Morawski.

[Edu29] *Digital Systems* (Układy cyfrowe – UCYF); 15h/sem.; K. Mroczek, T. Olszewski.

[Edu30] *Electronic Circuits Supply* (Zasilanie układów elektronicznych - ZUE); 45h/sem.; M. Mikołajewski.

[Edu31] *Event-Driven Programming* (Programowanie zdarzeniowe – PZDT); 45h/sem.; K. Ignasiak.

[Edu32] *Ethical Aspects of Research and Engineering* – EEARE; 30h/sem; R. Z. Morawski (English-medium studies).

[Edu33] *Fields and Waves* (Pola i fale – POFAT); 45h/sem.; T. Morawski, W. Gwarek .

[Edu34] *Fields, Waves and Antennae* – EFWA; 60h/sem.; elective; M. Celuch (English-medium studies).

[Edu35] *Influence of Electromagnetic Waves on Living Organisms* (Oddziaływanie fal elektromagnetycznych na organizmy żywe – OFE); 30h/sem.; K. Derzakowski.

[Edu36] *Introduction to Numerical Methods* (Wstęp do metod numerycznych – WNUM); 45h/sem.; R. Z. Morawski, A. Miękina, A. Podgórski.

[Edu37] *Measurement Systems* (Systemy pomiarowe – SPOM); 30h/sem.; W. Winiecki.

[Edu38] *Medical Electronic Instrumentation* (Elektroniczna aparatura medyczna – EAME); 60h/sem.; T. Olszewski, R. Szabatin, T. Jamrógiewicz, E. Piątkowska-Janko.

[Edu39] *Microwave Technique (*Technika mikrofalowa – TMO); 60h/sem.; J. Zborowska, W. Wojtasiak.

[Edu40] *Multimedia Standards and Algorithms* (Algorytmy i standardy multimedialne – ASM); 45h/sem.; G. Galiński.

[Edu41] *Multi-service and Multimedia Networks* – EMSMN; 60h/sem.; T. Keller (English-medium studies).

[Edu42] *Music Acoustics* (Akustyka muzyczna – AM); 30h/sem.; J. Żera.

[Edu43] *Noise Control* (Ochrona przed hałasem – OPH); 30h/sem.; E. Kotarbińska.

[Edu44] *Numerical Methods* (Metody numeryczne – MNUB); 45h/sem.; R. Z. Morawski, A. Miękina, A. Podgórski (Biomedical Engineering).

[Edu45] *Numerical Methods* – ENUME; 60h/sem.; R. Z. Morawski, A. Miękina, A. Podgórski (English-medium studies).

[Edu46] *Object-oriented Programming M* (Programowanie obiektowe M – PROE); 60h/sem.; W. Smolik.

[Edu47] *Object-oriented Programming of Multimedia Applications in Java (*Java – obiektowe programowanie aplikacji multimedialnych – OPA); 45h/sem.; K. Ignasiak.

[Edu48] *Operating Systems* (Systemy operacyjne – SOE); 15h/sem.; M. Sypniewski, A. Więckowski.

[Edu49] *Orientation* (Orientacja – ORM); 15h/sem.; W. Gwarek.

[Edu50] *Programming Languages* (Języki programo–wania - JPJ); 75h/sem.; W. Smolik.

[Edu51] *Radiocommunication Systems* (Systemy radiokomunikacyjne – SRKO); 45h/sem.; T. Kosiło.

[Edu52] *Radioelectronics Measurements (*Miernictwo radioelektroniczne – MR); 45h/sem.; J. Cichocki.

[Edu53] *Radio Networks and Systems* (Systemy i sieci radiowe – SISR); 45h/sem.; T. Keller.

[Edu54] *Radiological Apparatus in Medical Diagnostics* (Aparatura radiologiczna w diagnostyce medycznej – ARDM); 30h/sem.; G. Domański.

[Edu55] *Radiology and Nucleonics* (Radiologia z nukleoniką – RN); 45h/sem.; K. Zaremba.

[Edu56] *Radio Transmitting Technique and its Applications* (Technika nadawania radiowego i jej aplikacje – TNR); 60h/sem.; J. Modzelewski.

[Edu57] *Satellite Communications* (Łączność satelitarna – LS); 45h/sem.; K. Kurek.

[Edu58] *Selected Problems of Modern Television* (Wybrane zagadnienia współczesnej telewizji – WZWT); 30h/sem.; M. Rusin.

[Edu59] *Radiological Instrumentation in Medical Diagnostics* (Aparatura radiologiczna w diagnostyce medycznej – ARDM); 30h/sem.; G. Domański.

[Edu60] *Signals and Systems* (Sygnały i systemy – SYGSY); 60h/sem.; K. Snopek (Biomedical Engineering).

[Edu61] *Signals, Modulations and Systems (*Sygnały, modulacje i systemy – SYMSE); 60h/sem.; J. Wojciechowski, K. Snopek.

[Edu62] *Software for Measuring Systems* (Oprogramowanie systemów pomiarowych – OSP); 60h/sem.; elective; W. Winiecki, P. Bobiński.

[Edu63] *Software for Medical Systems (*Oprogramowanie systemów medycznych – OSM); 45h/sem.; R. Kurjata.

[Edu64] *Receiving and Forming of Sound* (Odbiór i kształtowanie dźwięku – OKD); 45h/sem.; M. Tajchert.

[Edu65] *Study Audio Techniques – Lab.* (Dźwiękowa technika studyjna – DTS); 15h/sem.; R. Korycki.

[Edu66] *Ultrasonography Instrumentation* (Aparatura ultrasonograficzna – AUS); 45h/sem.; M.Kazubek.

[Edu67] *UMTS System (System UMTS – UMTS);* 45h/sem.; J. Kołakowski, J. Cichocki.

3.1.2 Advanced courses

[Edu68] *Adaptive Image Recognition* – EADIR; 60h/sem.; W. Skarbek (English-medium studies).

[Edu69] *Analysis and Synthesis of Microwave Circuits* (Analiza i synteza układów mikrofalowych – ASUM); 45h/sem.; S. Rosłoniec.

[Edu70] *Antennae Theory and Design* (Teoria i projektowanie anten – TPA); 60h/sem.; Y. Yashchyshyn.

[Edu71] *Applied Geometry* (Geometria stosowana – GS); 60h/sem.; W. Skarbek.

[Edu72] *Artificial Neural Networks in Medicine* (Sztuczne sieci neuronowe w medycynie – SESN); 45h/sem.; K. Zaremba.

[Edu73] *Biomedical Accelerators* (Akceleratory biomedyczne – ABM); 30h/sem.; S. Wronka.

[Edu74] *Computional Electromagnetics for Telecommunications* – ECOET; 60h/sem.; M. Celuch (English-medium studies).

[Edu75] *Computed Tomography* (Tomografia komputerowa – TOM); 60h/sem.; W. Smolik.

[Edu76] *Computer - Aided Medical Image Diagnostics* (Komputerowe wspomaganie obrazowej diagnostyki medycznej – KWOD); 45h/sem.; A. Przelaskowski.

[Edu77] *Computer Analysis of Electrodynamics Problems* (Komputerowa analiza problemów elektrodynamiki – KAPE); 45h/sem.; W. Gwarek.

[Edu78] *Contemporary Heuristic Techniques* – ECOHT; 60h/sem.; P. Bilski (English-medium studies).

[Edu79] *Contemporary Heuristic Techniques* (Współczesne techniki heurystyczne – WMH); 60h/sem.; P. Bilski.

[Edu80] *Data Compression* (Kompresja danych – KODA); 45h/sem.; A. Przelaskowski.

[Edu81] *Digital Audio Signal Processing* (Cyfrowe przetwarzanie sygnałów fonicznych – CPSF); 45h/sem.; Z. Kulka.

[Edu82] *Digital Image Processing* (Cyfrowe przetwarzanie obrazów – CPOO); 30h/sem.; elective; M. Kazubek, P. Brzeski, R. Jóźwiak.

[Edu83] *Digital Transmission of Information* (Cyfrowa transmisja informacji – CTIN); 45h/sem.; T. Buczkowski.

[Edu84] *Distributed Measurement Systems* (Rozproszone systemy pomiarowo-kontrolne – RSPK); 45h/sem.; W. Winiecki, R. Łukaszewski.

[Edu85] *Electromagnetic Compatibility* (Kompatybilność elektromagnetyczna – KE); 30h/sem.; W. Gwarek.

[Edu86] *Evolutionary Algorithms* – EEVAL; 60h/sem.; P. Miazga (English-medium studies).

[Edu87] *Graphs and Networks* (Grafy i sieci – GIS); 30h/sem.; elective; J. Wojciechowski.

[Edu88] *Image and Audio Semantic Analysis (*Analiza semantyczna obrazu i dźwięku – ASOD); 45h/sem; W. Skarbek.

[Edu89] *Magnetic Resonance Imaging* (Tomografia rezonansu magnetycznego – TRM); 45h/sem.; P. Bogorodzki.

[Edu90] *Multimedia Indexing* (Indeksowanie multimediów – INM); 60h/sem.; W. Skarbek.

[Edu91] *Neural Networks in Biomedical Applications* (Sieci neuronowe w zastosowaniach biomedycznych – SNB); 45h/sem., K. Zaremba.

[Edu92] *Noise and Electromagnetic Interference in Electronics Devices* (Szumy i zakłócenia w aparaturze elektronicznej – SZAE); 30h/sem; J. Marzec.

[Edu93] *Nuclear Medicine Techniques* (Techniki medycyny nuklearnej – TMN); 60h/sem.; R. Szabatin.

[Edu94] *Signal Processors in Audio Techniques* (Procesory sygnałowe w technice audio – PSTA); 45h/sem; P. Bobiński.

3.2 Special courses

3.2.1 Engineer Degree Evening Studies on Radiocommunications and Multimedia Technologies

[Edu95] *Acoustic Techniques* (Techniki dźwiękowe – TDRM); 30h/sem.; semester 7; M. Tajchert.

[Edu96] *Antennae* (Anteny – ANM); 30h/sem.; semester 4; H. Chaciński.

[Edu97] *Basics of Computer Techniques* (Podstawy techniki komputerowej – PKOM); 45h/sem.; semester 1; R. Kurjata.

[Edu98] *Basics of Fiberglass Technique* (Podstawy techniki światłowodowej – PTSRM); 45h/sem.; semester 3; L. Lewandowski.

[Edu99] *Basics of High-Frequency Techniques* (Podstawy techniki w.cz. – PTWM); 60h/sem.; semester 3; K. Robaczyński.

[Edu100] *Basics of Logical Circuits and Microprocessor Technique* (Układy logiczne i podstawy techniki mikroprocesorowej – PULM); 60h/sem.; semester 4; K. Czerwiński, K. Derzakowski.

[Edu101] *Basics of Satellite Communications* (Podstawy łączności satelitarnej – SATM); 15h/sem.; semester 4; K. Kurek.

[Edu102] *Circuits and Signals* (Obwody i sygnały – OSRM); 45h/sem.; semester 2; K. Czerwiński.

[Edu103] *Computer Control and Data Processing* (Komputerowe sterowanie i przetwarzanie danych – KSTM); 45h/sem.; semester 5; W. Winiecki.

[Edu104] *Digital Cellular Systems* (Cyfrowe systemy komórkowe – CSKM); semester 7; 36h/sem.; J. Cichocki.

[Edu105] *Digital Signals Transmission* (Cyfrowa transmisja sygnałów – CTSM); 45h/sem.; semester 5; T. Kosiło.

[Edu106] *Diploma Seminar* (Seminarium dyplomowe – SDM); 15h/sem.; semester 6; T. Morawski.

[Edu107] *Diploma Seminar 2* (Seminarium dyplomowe 2 – SD2M); 15h/sem.; semester 7; T. Morawski.

[Edu108] *Electronic Circuits* (Układy elektroniczne – UEM); 45h/sem.; semester 3; D. Gryglewski.

[Edu109] *Fields and Waves* (Pola i fale – PFM); 60h/sem.; semester 2; T. Morawski.

[Edu110] *Imaging Techniques* (Techniki obrazowe – TORM); 30h/sem.; semester 7; M. Kazubek.

[Edu111] *Internet Techniques* (Techniki internetowe – TINM); 30h/sem.; semester 7; K. Ignasiak.

[Edu112] *Introduction to Programming* (Wstęp do programowania – WPRM); 15h/sem.; semester 2; R. Kurjata.

[Edu113] *Materials and Elements* (Materiały i elementy – MEM); 15h/sem.; semester 4; K. Radecki.

[Edu114] *Multimedia Applications* (Aplikacje multimedialne – AMRM); 15h/sem.; semester 5; T. Rubel.

[Edu115] *Multimedia Computer Systems* (Multimedialne systemy komputerowe – MSKM); 30h/sem.; semester 4; T. Jamrógiewicz.

[Edu116] *Multimedia Techniques* (Techniki multimedialne – TMM); 15h/sem.; semester 6; G. Galiński.

[Edu117] *Numerical and Statistical Techniques* (Techniki obliczeniowe i symulacyjne – TOSM); 30h/sem.; semester 4; A. Miękina.

[Edu118] *Programmable Digital Devices* (Programowalne układy cyfrowe – PUCM); 30h/sem.; semester 5; M. Ziembicki.

[Edu119] *Programming* (Programowanie – PMRM); 30h/sem.; semester 3; R. Kurjata.

[Edu120] *Project 1* (Projekt 1 – PJUM); 30h/sem.; semester 5; P. Brzeski.

[Edu121] *Project 2* (Projekt 2 – PSRM); 60h/sem.; semester 6; P. Brzeski.

[Edu122] *Propagation of Waves* (Propagacja fal – PFAM); 15h/sem.; semester 4; K. Kurek.

[Edu123] *Radiocommunication Systems 1* (Systemy radiokomunikacyjne 1 – SRKM); 60h/sem.; semester 6; T. Kosiło.

[Edu124] *Radiocommunication Systems 2* (Systemy radiokomunikacyjne 2 – SRK2M); 30h/sem.; semester 7; T. Kosiło.

[Edu125] *Radiodiffusion Systems* (Systemy radiodyfuzyjne – SRDM); 60h/sem.; semester 6; A. Buchowicz, H. Chaciński.

[Edu126] *Radioelectronics Measurements* (Miernictwo radioelektroniczne – MRM); 45h/sem.; semester 5; J. Cichocki.

[Edu127] *Selected Techniques of Medical Imaging* (Wybrane techniki obrazowania medycznego – PW-S5); 30h/sem.; Ph.D. studies, P. Brzeski, K. Zaremba.

[Edu128] *Signals and Modulations* (Sygnały i modulacje – SMRM); 60h/sem.; semester 3; K. Snopek, K. Radecki.

[Edu129] *Technique of Emission and Receiving* (Technika emisji i odbioru – TEM); 45h/sem.; semester 4; J. Modzelewski, W. Kazubski.

3.2.2 M.Sc. Evening Studies on Radiocommunications and Multimedia Technologies

[Edu130] *Analysis and Synthesis of Microwave Units* (Analiza i synteza układów mikrofalowych – ASUMW); 60h/sem.; semester 2; W. Wojtasiak.

[Edu131] *Computer Systems* (Systemy komputerowe – SMKW); 30h/sem.; semester 2; T. Jamrógiewicz.

[Edu132] *Designing of Radiocommunication Systems* (Projektowanie systemów radiokomunikacyjnych – PSRW); 60h/sem.; semester 3; T. Kosiło.

[Edu133] *Digital Signals Processing* (Cyfrowe przetwarzanie sygnałów – CPSW); 75h/sem.; semester 1; J. Wojciechowski, Z. Kulka.

[Edu134] *Digital Transmission of Information* (Cyfrowa transmisja informacji – CTIW); 75h/sem.; semester 2; T. Buczkowski.

[Edu135] *Diploma Seminar* (Seminarium dyplomowe – SDMW); 30h/sem.; semester 4; J. Ebert.

[Edu136] *Numerical Methods* (Metody numeryczne – MNW); 30h/sem.; semester 2, K. Snopek.

[Edu137] *Programming in Java Language* (Programowanie w języku Java – PJJW); 45h/sem.; semester 1; K. Ignasiak.

[Edu138] *Radio Navigation Systems* (Radiowe systemy nawigacyjne – RSNW); 45h/sem.; semester 4; T. Buczkowski, K. Czerwiński, K. Radecki.

[Edu139] *Radiocommunication Systems Design* (Projektowanie systemów radiokomunikacyjnych – PSRW); 60h/sem.; semester 3; T. Kosiło.

3.2.3 Postgraduate Studies on Radiocommunication Systems and Multimedia Techniques STRIM

[Edu140] *Cellular Systems – part 1* (Systemy komórkowe – cz.1), 20h, J. Cichocki.

[Edu141] *Cellular Systems – part 2* (Systemy komórkowe – cz.2), 25h, J. Kołakowski.

[Edu142] *Digital Broadcasting* (Telewizja i radiofonia cyfrowa), 26h, A. Buchowicz, T. Keller .

[Edu143] *Final Project* (Projekt końcowy), 6h.

[Edu144] *Multimedia Techniques* (Techniki multimedialne), 26h, A. Buchowicz.

[Edu145] *Perception and Coding of Images and Sounds* (Percepcja oraz kodowanie dźwięków i obrazów), 24h, G. Galiński.

[Edu146] *Radio Transmission in Next Generation Systems* (Transmisja radiowa w systemach przyszłych generacji), 14h, J. Cichocki, J. Kołakowski.

[Edu147] *Satellite Communication Systems* (Systemy łączności satelitarnej), 12h, K. Kurek.

[Edu148] *Selected Problems of Digital Radio Transmission* (Wybrane zagadnienia cyfrowej transmisji radiowej), 28h, T. Kosiło.

[Edu149] *Trends in Antenna Technology* (Nowości techniki antenowej), 16h, Y.Yashchyshyn.

[Edu150] *WiMAX Networks* (System WiMax), 22h, T. Keller.

[Edu151] *Wireless Networks WLAN and WPAN* (Sieci bezprzewodowe WLAN i WPAN), 26h, T. Keller.

3.2.4 Studies on Radiocommunications, Multimedia Technologies and Biomedical Engineering "RADEM"

[Edu152] *Basics of Electronic Communication* (Podstawy komunikacji elektronicznej); 30h, once a year, A. Buchowicz, P. Bobiński, G. Galiński, T. Keller.

[Edu153] *WIMAX Systems* (Systemy WIMAX); 12h, once a year, T. Kosiło, T. Keller, A. Kurek.

[Edu154] *Basics of Multimedia Technologies* (Podstawy technik multimedialnych); 30h, once a year, S. Kula, K. Wostowski.

3.2.5 Studies on Audiological Techniques

Studies on Audiological Techniques offer a series of courses: 180h, twice a year.

[Edu155] *Anatomy and Physiology of Hearing* (Anatomia i fizjologia słyszenia); 12h.

[Edu156] *Audiometry* (Audiometria); 30h.

[Edu157] *Aural Rehabilitation* (Rehabilitacja); 7h.

[Edu158] *Basics of Acoustics* (Podstawy akustyki); 16h.

[Edu159] *Earmold Techniques* (Wkładki douszne); 8h.

[Edu160] *Ear Pathology* (Patologia ucha); 9h.

[Edu161] *Elements of Psychology* (Elementy psychologii); 6h.

[Edu162] *Sign Languages and Cued Speech* (Język gestów); 8h.

[Edu163] *Hearing Aid Fitting* (Dobór aparatów słuchowych); 40h.

[Edu164] *Hearing Aid Measurements* (Miernictwo aparatów słuchowych); 14h.

[Edu165] *Hearing Aid Technology and Elements of Electronics* (Technika aparatów słuchowych i elementy elektroniki); 30h.

3.2.6 B.Sc. Level e-learning Special Courses

Warsaw University of Technology Distant Learning Center – OKNO (Ośrodek Kształcenia na Odległość Politechniki Warszawskiej – OKNO)

[Edu166] *Basics of Sound Technique* (Podstawy techniki dźwiękowej); 30h/sem.; Z. Kulka, A. Leszczyński M. Tajchert.

[Edu167] *Systems and Devices of Sound Technique* (Urządzenia i systemy techniki dźwiękowej); 30h/sem.; Z. Kulka, A. Leszczyński, M. Tajchert.

3.3 International co-operation

[Edu168] **SOCRATES Program: Higher Education**
T. Kosiło, T. Buczkowski,
1999 – 2010

Institute of Radioelectronics of the WUT has a working bilateral SOCRATES agreement with Katholieke Hogeschool Sint-Lieven (KaHo), Gent, Belgium and Instituto Superior Tecnico, Universidade Tecnica de Lisboa, Lisbon, Portugal. Student Mobility actions were realized within the framework of Electronics and Telecommunication Engineering. The aim of the program is to realize a student project at the partner University.

[Edu169] Advanced Technology Higher Education Network / Socrates (**ATHENS**)

Within the Advanced Technology Higher Education Network / Socrates (ATHENS), the following courses were offered:

- "Ethical Aspects of Research and Engineering" was offered by **R. Z. Morawski** in the periods: March 15-19, 2010, and November 15-19, 2010;
- "Sound Hearing and Acoustical Measurements" was offered by **J. Żera** in the period: November 15-19, 2010;

All students who attended this course were from the following EU institutions of higher education:

- Czech Technical University, Prague, Czech Republic (Jana Hradilova);
- Delft University of Technology, Delft, The Netherlands (Michael Kouli Prodromou, Bassem Zaarour);
- École des Mines de Paris, Paris, France (Philippe Jantzem, Jean Lafleur, Xavier Lambin, Etienne Servais);
- École Nationale des Ponts et Chaussées, Paris, France (Quentin Levesque, Marie-Caroline Augueres, Zeineb Mhiri, Nathalie Saba);
- École Nationale Supérieure des Télécommunications, Paris, France (Jean-Sébastien Gomez, Vincent Hache, Ugo Philippart, Cyril Riffaud, Benjamin Bonny, Cédric Le Ninivin);
- Instituto Superior Técnico, Lisbon, Portugal (José Cardoso, João Freitas, João Pereira);
- École Nationale Supérieure d'Arts et Métiers, Paris, France (Abdelilah Chouai, Amine Ghazi);
- École Nationale Supérieure des Techniques Avancées, Paris, France (Noémie Boissier, Alexia Marchand, Clement Paradis);
- Katholieke Universiteit Leuven, Leuven, Belgium (Joost Kerkhofs, Sofia Rahiminejad, Nicolas Vaninbroukx, Jérôme Soete);
- Politechnika Warszawska, Warszawa, Poland (Mohammadhossein Fadaghi, Piotr Mirkowicz);
- Politecnico di Milano, Milano, Italy (Raffaele Sala, Giacomo Callegari);
- Technische Universität Wien, Wien, Austria (Michaela Fraubaum, Patrick Neudorfer, Verena Trinkel);
- École Nationale Supérieure d'Arts et Métiers, Paris, France (Abdelilah Chouai, Amine Ghazi);
- École Nationale Supérieure des Techniques Avancées, Paris, France (Noémie Boissier, Alexia Marchand, Clement Paradis);
- École Supérieure de Physique et de Chimie Industrielles, Paris, France (Audrey Gaudard, Magali Thomas Desessarts, Laura Vauche);
- Technische Universität München, München, Germany (Patrick Woryna);
- Technische Universität Wien, Wien, Austria (Michaela Fraubaum, Patrick Neudorfer, Verena Trinkel);
- Universidad Politécnica de Madrid, Madrid, Spain (Janina Lissete Moscoso León).

The courses included 20 hours of lectures and 10 hours of class tutorials.

4 RESEARCH ACTIVITIES

4.1 International projects

4.1.1 European grants

[Pro1] **Integrated Mobile System for Counterterrorism and Rescue Operations** (Zintegrowany mobilny system wspomagający działania antyterrorystyczne i antykryzysowe).
J. Modelski, Y. Yashchyshyn, M. Bury, K. Derzakowski, T. Keller, K. Kurek, J. Naruniec, G. Pastuszak, M. Piasecki, B. Sawionek, M. Jaworska, A. Abramowski, P. Bajurko, K. Bryłka, G. Brzuchalski, M. Darmento, M. Jakubowski, M. Kalinowska, S. Kozłowski, A. Linkowski, B. Majewski, M. Morgoś, Ł. Mosdorf, M. Mosdorf, A. Mundzik, M. Klocek, A. Kurek, M. Roszkowski, A. Rudziński, R. Sikora, A. Skrzypkowski R. Szumny, M. Wieczorek;
Apr. 1, 2007 – Aug. 31, 2013
PROTEUS, EU Specific Targeted Research Project (Partially funded by MSHE)

The task of PROTEUS is to break a number of the technological barriers and to create a demonstrator of the system, which will offer a new quality of the actions in the critical situations. As a result of the planned project in the years 2009-2013 integrated system will come into being, which will include: unmanned plane to remote monitoring, three robots for various use, mobile command center.

[Pro2] **Photonics and Terahertz Technologies – Development of Department Research Center – Antenna Laboratory Modernization** (Fotonika i Technologie Terahercowe – Rozwój Wydziałowego Centrum Badawczego – Modernizacja laboratorium antenowego).
Y. Yashchyshyn, P. Bajurko, M. Bury, A. Skrzypkowski;
Jan. 1, 2010 – Dec. 31, 2011
FOTEH, POIG 2.1, the Innovative Economy Program

Funds from the project are being used to purchase measurement equipment operating in the frequency range up to 0.5 THz as well as to adapt the antenna laboratory room to sub-THz measurements.

[Pro3] **Innovative Technologies of Multi–functional Materials and Structures for Nanoelectronics, Photonics, Spinotronics and Sensors** (Innowacyjne technologie wielofunkcyjnych materiałów i struktur dla nanotechniki, fotoniki, spinotroniki i technik sensorowych).
Wojciech Gwarek;
Feb. 26, 2009 – Dec. 31, 2013
INTechFun, EU Integrated Project

This project is carried out at Institute of Electron Technology, Institute of Physics Polish Academy of Sciences, Silesian University of Technology, Technical University of Lodz, Military University of Technology. The main aim of this project is to integrate different semiconductors and technologies and develop new semiconductor devices based on creative and innovative technological solutions and designs. The project is focused on wide bandgap materials like zinc oxide and related film, gallium nitride and related epitaxial layers, silicon carbide. The functional thin layers for ohmic and rectifying contacts, interconnections, gate dielectrics have been developing based on four material groups: stable thermal oxides, nitrides, carbides and borides.

4.2 Projects granted by the Ministry of Science and Higher Education (MSHE)

4.2.1 MSHE international grants

[Pro4] **The COMPASS Experiment – the Research on the Spin Structure of Nucleon** (Eksperyment COMPASS – badanie spinowej struktury nukleonu).
Krzysztof Zaremba, J. Marzec, M. Dziewiecki, G. Domański, B. Konarzewski, R. Kurjata, R.Sulej M. Ziembicki;
COMPASS, International project realized in collaboration with the Soltan Institute for Nuclear Studies and Faculty of Physics, Warsaw University;
Oct. 30, 2007 – Jan. 30, 2011

The project is a part of the long-term collaboration between the Institute of Radioelectronics and the international high-energy physics experiment COMPASS (Na58) at CERN (Geneva). Within the framework of a new program the team from the Institute of Radioelectronics is responsible (together with the teams from Soltan Institute of Nuclear Studies, and Warsaw University) for the design of new methods of the experimental data analysis, including applications of the "soft computing" methods (neural networks, genetic algorithms etc.). The Institute is also involved in preparations of the hardware upgrade of the COMPASS experiment for the new physical program scheduled for 2010-2012.

[Pro5] **The Research of the Neutrino Oscillations – the Second Generation Experiment – Design of the Detector and Participation in the Data Acquisition in the T2K Experiment** (Badanie oscylacji neutrin – eksperyment drugiej generacji – budowa detektora i udział w pomiarach przeprowadzanych w eksperymencie T2K).
Krzysztof Zaremba, J. Marzec, M. Dziewiecki, G. Domański, B. Konarzewski, R. Kurjata, R.Sulej, M. Ziembicki, P. Płoński;
T2K, International project realized in collaboration with the Faculty of Physics, Warsaw University, Andrzej Soltan Institute for Nuclear Studies, Institute of Nuclear Physics, Polish Academy of Sciences, Faculty of Physics and Astronomy, University of Wroclaw, Faculty of Mathematics, Physics and Chemistry, Silesian University;
Oct. 30, 2007 – Oct. 30, 2011

The project is a part of the collaboration with the T2K experiment in Japan. The T2K is a component of the second generation long-baseline neutrino-oscillation experiment intended for studies of the nature of neutrinos and the effect of their oscillations. Artificial neutrino beam

generated in the proton accelerator in Tokai is shot toward the 50-kT water Cherenkov detector, Super-Kamiomande, which is located about 1000 m underground in Kamioka mine and is 295 km away from Tokai. The Institute of Radioelectronics takes part in the design of SMRD (Side Muon Range Detector), which is the part of the near detector (ND280), located in Tokai, 280 m away from the target position, intended for measurements of the neutrino spectrum, contamination and interaction cross-sections before the oscillation.

4.2.2 Development grants

[Pro6] **Design and Manufacturing of a sub-THz Radiation Detector based on MOS Transistor** (Zaprojektowanie i wykonanie detektora promieniowania sub-THz działającego w oparciu o krzemowy tranzystor MOS).
Wojciech Gwarek , P. Kopyt;
Dec. 22, 2009 – Dec. 21, 2011

The aim of the project is to design the sub-THz radiation detector including low frequency SiC component such a MOSFET. The procedures will be performed by means of electro-thermal and measurement techniques.

[Pro7] **Design of High Power Microwave Devices with SiC and GaN Components** (Projektowanie mikrofalowych urządzeń dużej mocy z elementami SiC i GaN).
Wojciech Wojtasiak, D. Gryglewski, M. Lubiejewski;
Oct. 2, 2007 – Oct. 1, 2010

The aim of the project is to design the high-temperature high-power microwave devices including DC supply blocks with use of SiC MESFET, GaN HEMT and low frequency SiC components such as MOSFET, and rectifying Schottky diodes. The design procedures will be supported by multidimensional electro-thermal modeling and measurement techniques to determine frequency characteristics and thermal response of active elements. Within the framework of the project intended tasks are:

- high-temperature AC-DC and DC-DC converters with efficiency higher than 85%,
- high power microwave amplifiers of up to 100 W output power level for L and S-band,
- the measurement systems of temperature response of SiC and GaN devices.

The results of project will be put into practice in telecommunication companies and by the producers of military equipments. The project is the joint venture of Institute of Radioelectronics WUT and Electronic Department of Technical University of Koszalin.

[Pro8] **Multi-plane Capacitance Tomograph for Flow Speed Measurement** (Wielopłaszczyznowy tomograf pojemnościowy do pomiaru prędkości przepływu).
Roman Szabatin, P. Brzeski, W. Smolik, T. Olszewski, J. Mirkowski, A. Pląskowski, P. Czarnecki;
Oct. 11, 2007 – Apr. 10, 2010

Electrical tomography (ET) has found a significant application in the petrochemical industry and is used in the visualization and analysis of petroleum in mining instrumentation and refineries. The aim of the reported project was the development of the model of multi-plane process electrical capacitance tomograph (MPECT) and the appropriate software enabling the imaging of dynamic processes in industrial installations.

4.2.3 Research grants

[Pro9] **The Development of Electroacustic Method for Detection of Xylophagic Insects Destructive for Wooden Structures and Products** (Opracowanie elektroakustycznej metody wykrywania ksylofagicznych owadów niszczących drewniane konstrukcje i wyroby).
Adam Krajewski, Z. Kulka, P. Bobiński, P. Witomski, A. Oleksiewicz, M. Nowakowska;
Jul. 27, 2008 – Jul. 27, 2010

The primary objective of the project is to develop efficient methods for the registration of acoustic signals produced by the xylophagic (wood-feeding) insect larvae. The next objective is to develop and implement advanced data processing algorithms for recorded signals analysis. The results of the analysis should help to identify the presence of larvae in wooden structures and to estimate their numbers.

[Pro10] **A fMRI Study of the Patients Recovering from the Stroke** (Badania czynnościowe fMRI chorych usprawnianych po udarze mózgu)
Piotr Bogorodzki, E. Piątkowska-Janko;
Jul. 27, 2008 – Sept. 17, 2011

The aim of the project is to bulid and test a set of devices improving the accessibility of fMRI examinations from stroke disabled patients. This covers electronic gloves for finger tapping paradigm monitoring and pneumatic 'hand' which supports finger movements for muscle paresisi patients.

[Pro11] **Image Reconstruction in Electrical Tomography by Enhanced Nonlinear Optimization Algorithms** (Rekonstrukcja obrazów w tomografii elektrycznej za pomocą ulepszonych algorytmów optymalizacji nieliniowej).
Waldemar Smolik, D. Radomski, P. Czarnecki;
Apr. 4, 2010 – Oct. 6, 2011

Electrical capacitance tomography (ECT) is a non-invasive imaging technique that visualizes a cross-sectional permittivity distribution in a dielectric object by measuring the capacitances between electrodes surrounding this object. ECT has a potential to image some two-phase or multiphase processes, for example, gas/liquid or liquid/solid in pipelines or in industrial chemical reactors like a bubble column or an air lift. ECT has a great potential of application due to its speed, non-invasive nature and moderate cost. On the other hand, ECT is strongly limited, because of diagnostic accuracy. An improvement in image quality is required. In ECT measured capacitance values are nonlinear function of electric permittivity distribution. Nonlinear ill posed image reconstruction problem may be solved using steepest descent, Newton or Levenberg-Marquardt algorithms. The aim of the project is to enhance these algorithms and to study their performance on the simulated and real measurement data.

[Pro12] **Methods and Algorithms of Measurement Data Processing in Spectrophotometric Analysers of Food** (Metody i algorytmy przetwarzania danych pomiarowych w spektrometrycznych analizatorach żywności).
Roman Z. Morawski, A. Miękina, C. Niedziński, A. Podgórski, N. Obarski, G. Żukowska, A. Latała;
Mar. 11, 2010 – Mar. 01, 2013

Spectrophotometric analysers of food are on the rise, both in terms of the growing number of their applications and in terms of the growing number of their models available on the market. Today, they are applied not only for qualitative and quantitative identification food products and raw materials, but also for evaluation of the nutritional properties of food and beverages. Any spectrophotometric analyzer of food is composed of a spectrophotometric transducer, a source of optical radiation, an output interface and a digital signal processor. During last decade, many miniature spectrophotometric transducers have appeared on the market. Their availability and relatively low prices open the prospects for developing a new class of industrial and personal analyzers of food. The key problems to be solved now are related to the methods and algorithms of spectrophotometric data processing. The project is aimed at the development of the complex methodology for spectrophotometric data processing dedicated to NIR analyzers of food and beverages.

[Pro13] **Application of Multichannel Measurements of Uterine Bioelectrical Activity for Prediction of a Preterm Labour** (Wykorzystanie wielokanałowego pomiaru sygnału aktywności bioelektrycznej mięśnia macicy do wczesnego wykrycia zagrożenia porodem przedwczesnym).
Dariusz Radomski;
Aug. 4, 2010 – Aug. 4, 2013

The aim of the project is to eleborate a new measuring device which enables to measure bioelectrical activities of a pregnant uterus. Moreover, multidimensional signal analysis will be performed to find such model an EHG signal which allows predicting of a preterm labour.

[Pro14] **Design of Semiconductor T/R Module for X-band, as Part of the External Project: Advanced Radar Technologies in Military and Civilian Application** (Opracowanie projektu półprzewodnikowego modułu nadawczo-odbiorczego w paśmie X w ramach projektu zamawianego: Zaawansowane technologie radarowe w zastosowaniach wojskowych oraz cywilnych).
Tadeusz Morawski, D. Gryglewski, W. Wojtasiak, M. Lubiejewski;
Nov. 7, 2007 – Nov. 6, 2010
Commissioned Research Project

The main aim of the project is the realization of universal T/R modules for X-band providing control over such parameters as: pulse duration, pulse delay with respect to the triggering signal, tunable operation point for transistors in power amplifiers. T/R modules are applicable for radiolocation systems of both the older (e.g. with electronic beam steering) and the newer generation, in which experiments with the new shape of pulse will be possible, thanks to the SDR (software defined radio) idea. The most basic problem during the designing process of the device is related to the design of the high power amplifier, precisely (in the present case) with GaAs FET transistors, thermal delays of duration (very short) comparable with a radiolocation pulse. The project consists of several tasks, the main of which is to design and realize a universal T/R module. Other tasks concern: the optimization of receiving input circuits with respect to noise level and durability, making power supply and control block universal for SDR application. Completing these tasks is going to allow for the compilation of general methodology to construct modern devices for professional radiolocation.

[Pro15] **Digital Radio Broadcasting DRM – Project Tools and Methods, Test Emissions** (Radiofoniczne sieci cyfrowe, narzędzia i metody ich projektowania oraz emisje doświadczalne).
Jacek Jarkowski, J. Modelski, K. Kurek, T. Keller, A. Dusiński, E. Wielowieyska, J. Modzelewski, W. Kazubski, H. Chaciński;
Feb. 1, 2008 – Dec. 31, 2010
Commissioned Research Project

The aim of the project is the analysis of possibilities of realization of DRM (Digital Radio Mondiale) digital radio broadcasting in Poland on medium and short waves, with special attention to test emission. The analysis will consider technical aspects of realization of DRM test emission on medium and short waves: calculation of transmitter coverage, determination of transmitter locations for assumed coverage, necessary adaptation of existing transmitter objects for digital broadcasting. Realization of DRM test emission and design of cheap simple receivers is also anticipated by the project.

[Pro16] **Multi-band Transverter for 802.11 s Networks** (Wielopasmowy transwerter dla sieci mesh 802.11 s).
Wojciech Wojtasiak, D. Gryglewski;
Dec. 29, 2008 – Dec. 29, 2010
Commissioned Research Project

The aim of the projects is to develop a technology of transceiver modules in microwave bands: L,S,C and X. Those modules are supposed to have small size and weight as well as high efficiency to meet specific requirements for civil and military applications. In particular they need to comply with the NATO requirements for Polish military units. The deliverables of the project include a small, multiband, energy-economical transceiver module for self-configurable network of the mesh 802.11s type. The project is run in cooperation with Radiotechnika Marketing sp. z o.o.

[Pro17] **New Generation of Photonic Atennas for Radio over Fiber Transmission Systems** (Nowa generacja anten fotonicznych dla sieci transmisji radiowo-światłowodowej).
Józef Modelski, Y. Yashchyshyn, K. Kurek, T. Keller, M. Bury;
Apr. 8, 2010 – Apr. 7, 2012

The project involves a design, implementation and experimental study of photonic antennas of different types dedicated to work with e.g. WLAN 802.11a/b/g signals. In the project an optimal way to integrate optoelectronic components (such as laser, photodetector) with radiator would be determined. Furthermore, parameters of photonic antenna would be studied and new methods for their analysis would be developed. The study of photonic

antenna is difficult, because in the device two different interfaces: radio and optical, are directly merged.

[Pro18] **New Types of Smart Antennas with Digital Beamforming based on Electronically Reconfigurable Aperture** (Nowe rodzaje inteligentnych anten z cyfrowym kształtowaniem wiązki o rekonfigurowalnej elektronicznie aperturze).
Yevhen Yashchyshyn, K. Derzakowski, J. Marczewski, J. Modelski, D. Tomaszewski, M. Bury;
Apr. 8, 2010 - Apr. 7, 2013

Two main aspects of the project are as follows:

1. Comprehensive investigation, developing and realization of conventional antenna array with digital beamforming.
2. 2. Comprehensive investigation, developing and realization of new type of antenna with reconfigurable aperture realized by means of surface diodes S-PIN. Technological issues regarding S-PIN diode structure and arrangement are included in the research.

[Pro19] **Searching and Adaptation of Multimedia Data: Next Generation Services and Networks – Technical, Application and Market Aspects** (Wyszukiwanie i adaptacja danych multimedialnych w ramach projektu zamawianego pt. "Usługi i sieci teleinformatyczne następnej generacji – aspekty techniczne, aplikacyjne i rynkowe").
Andrzej Buchowicz, G. Galiński, K. Ignasiak, M. Jakubowski;
Mar. 12, 2008 – Dec. 31, 2010
Commissioned Research Project

The main aim of the project is the analysis of methods for compression, streaming, search and adaptation of multimedia data. Special attention will be paid to video transcoding techniques as well as multimedia data search and retrieval based on MPEG-7 descriptors. In particular, the novel scalable and multiview video coding standards, currently under development within MPEG, protocols for multimedia data streaming, as well as multimedia data descriptors conforming to the MPEG-7 and MPEG-2 standards will be utilized in the project.

4.2.4 Ph.D. grants

[Pro20] **Study of Digital Terrestrial Television Receiver Architectures for DVB-T2 Standard** (Badanie architektur odbiorników cyfrowej telewizji naziemnej standardu DVB-T2).
Józef Modelski, M. Dąbrowski;
Oct. 29, 2010 – Apr. 28, 2012

The aim of the project is to develop comparative criteria of digital terrestrial television receivers in DVB-T2 standard and pointing out the best receiver architecture with respect to those criteria. In this project it is understood that a "receiver" consists of the tuner, which converts input signals into intermediate frequency and filters unwanted signals and the demodulator, which performs digital signal processing including channel estimation and channel decoding. Research conducted within this project will help to propose a detailed architecture of a DVB-T2 receiver.

[Pro21] **Multiscale Methods of Data Representation and Modeling in Medical Imaging Sequences** (Wieloskalowe metody reprezentacji i opisu treści diagnostycznej w medycznych sekwencjach obrazowych).
Artur Przelaskowski, R. Jóźwiak;
Apr. 16, 2010 –Sept. 30, 2011

The project is related to usefulness verification of multiscale methods in medical imaging sequences representation and modeling. The main aim of the project is concentrated on subtle pathology content extraction by means of optimized nonlinear approximation schemes. New and improved computer aided detection schemes in selected application areas (i.e. mammography, ischemic stroke in CT, lung cancer in radiography, skin cancer in high frequency ultrasound) are expected as a final result.

[Pro22] **Low-and High-level Audio Descriptors in Sound Recognition for Databases** (Deskryptory niskiego i wysokiego poziomu w rozpoznawaniu dźwięku dla potrzeb baz danych).
Jan Żera, A. Świercz;
Jun. 9, 2008-Jun. 30. 2010

Low-level audio descriptors used in the MPEG-7 standard are based on statistical parameters that are only vaguely related to the mechanisms of hearing described in psychoacoustics. The aim of this project is to investigate, whether adding an auditory filter-bank model to the audio descriptor calculation scheme improves the overall algorithm effectiveness. Original and modified audio descriptors are evaluated using various kind of music samples.

4.3 Projects granted by the University

4.3.1 Statutory projects

[Pro23] **Design and Investigation of Electroacoustics Measuring Systems** (Projektowanie i badania systemów elektroakustycznych oraz systemów cyfrowego przetwarzania sygnałów fonicznych)
Zbigniew Kulka, P. Bobiński, E. Kotarbińska, A. Leszczyński, A. Młyńska, M. Tajchert, J. Żera;
May 22, 2009 – Nov. 30, 2010

The first aim of the work was to check the possibility of acoustic mapping of Warsaw Royal Castle's Ballroom using computer software. The results of measurements were used to correct the acoustic characteristics employed in modeling of interior decoration elements. The model verification was performed using samples generated by auralization. In the second part the violin synthesizer based on digital waveguide sound synthesis method is presented. The digital waveguide model of violin was implemented in assembler on ADSP-21364 processor. The results of the listening test show the usefulness of waveguide modeling method for sound synthesis. The aim of the third part of work was to design and realize an acoustic class D amplifier and to carry out tests of objective parameters and electroacoustic measurements in order to rate the quality of the produced sound.

[Pro24] **Development of Stationary and Distributed Measuring Systems Designing** (Rozwój metod projektowania stacjonarnych i rozproszonych systemów pomiarowych).
Wiesław Winiecki, P. Bilski, P. Czernik, R. Łukaszewski, K. Mroczek, J. Olszyna;
May 22, 2009 – Nov. 30, 2010

The project concerns the virtual instrumentation and distributed measuring systems. The results of the project include: the method of designing the real-time virtual instrumentation using ETS configuration and multi-core processors, analysis of the time efficiency assessment in the virtual measurement systems, algorithms and circuits for low power secured sensor networks with asymmetric computational resources, Large Number Library – the new LabView tool for secure measurement systems.

[Pro25] **Methods of Modelling and Design of High Frequency Systems** (Metody modelowania i projektowania układów wielkiej częstotliwości).
Wojciech Gwarek, T. Morawski, S. Rosłoniec, M. Celuch, D. Gryglewski, P. Kopyt, P. Miazga, M. Sypniewski, A. Więckowski, W. Wojtasiak, J. Zborowska, K. Robaczyński, D. Rosołowski, B. Salski, M. Sołtysiak, P. Kończak, M. Olszewska M. Lubiejewski;
May 22, 2009 – Nov. 30, 2010

The project comprised two thematic parts: electromagnetic modelling for microwaves and optics on the one hand, and methods for the design of high power microwave systems on the other hand. Within the first part, electromagnetic modelling methods in the time domain were being developed, with a view to their applications in emerging technologies. The following problems were specifically addressed: coupling of electromagnetic and optical theories, photonic crystals, planar metamaterials, multi-pole dispersive materials, carbon composites, and microwave susceptors. Hybrid electromagnetic-thermal algorithms for microwave power industry were also pursued. Other efforts were related to automatic optimisation and acceleration of simulations by multithread and GPU programming techniques. Within the second part, methods for the design of microwave sources based on wide gap materials were being elaborated. Practical designs included RFID transmission systems and dual-reflector antennas for point-to-point transmission.

[Pro26] **Modern Techniques in Nuclear and Medical Electronics** (Nowoczesne techniki elektroniki jądrowej i medycznej).
Krzysztof Zaremba, P. Bogorodzki, P. Brzeski, G. Domański, T. Jamrógiewicz, M. Kazubek, B. Konarzewski, R. Kurjata, J. Marzec, T. Olszewski, E. Piątkowska-Janko, D. Radomski, B. Sawionek, W. Smolik, R. Szabatin, M. Ziembicki, S. Adaszewski, M. Dziewiecki, K. Kamińska, Ł. Kołaszewski, W. Obrębski, A. Trybuła, A. Smolnik, J. Saługa;
May 22, 2009 – Nov. 30, 2010

Quality assurance phantom for functional magnetic resonance imaging
The goal of this work was to develop the methodology for temporal stability evaluation of MRI scanners during functional magnetic resonance imaging (fMRI). The basic procedures were taken from BIRN (Biomedical Informatics Research Network [FBIRN]) originally developed for clinical scanners. Proposed methodology covers measurement protocol, human head phantom, MRI scanning sequence and image analysis procedure and software. The procedure was successfully verified on 4 polish sites and provided valuable information regarding quality of scanners examined. We compared these results with reference database containing measurement results gathered on sites cooperating with BIRN (10 scanners, 1.5T – 4T).
Analysis of cornea deformation during intraocular pressure measurement
The aim of the work was to make an analysis of cornea deformation during intraocular pressure measurement by means of optical technique. The computer program was prepared for simulation of cornea deformation. A device for light intensity measurement was elaborated.
Cardiac arrhythmia monitoring
The aim of the work was to choice ECG leads suitable for cardiac arrhythmia monitoring during regular daily activity and analysis of standards for ECG data transmission. The most commonly used leads are: lead II - a bipolar lead with electrodes on the right arm and left leg as above, CM5 lead - a bipolar lead with the electrodes placed on the manubrium and at the surface marking of the V5 position, CB5 lead - another bipolar lead which has one electrode positioned at V5 and the other over the right scapula.
Although technology has nowadays significantly increased the available capacity and transmission speed, data reduction is still desirable. The major goal and achievement obtained under the activities of Workpackage 2 within the SCP-ECG Project of the Preliminary AIM Programs of the European Community was specifications for compression of ECG data, and to define encoding of data in such a way that compressed ECGs can be transmitted and reanalyzed in systems of different manufacturers
Study of novel semiconductor photodetectors utilizing Geiger-mode avalanche multiplication effect (Multi Pixel Photon Counters)
Multi Pixel Photon Counters are novel semiconductor photodetectors, which utilize Geiger-mode avalanche multiplication. They have high gain and are capable of detecting single photons, similarly to photomultiplier with high first-dynode gain. Hence, they are often called 'silicon photomultipliers'. Among their advantages are insensitivity to external magnetic field, small dimensions and no need for high voltage power supply. The disadvantages with respect to photomultipliers are rather large dark current and sensitivity to temperature. The goal of the presented project was to create measurement equipment and subsequent measurements of the parameters of these type of detectors, such us gain, photon detection efficiency (relative), dark count rate, pixel-to-pixel crosstalk and afterpulsing
Mathematical modelling of selected physiological processes
The work was concentrated on a comparing analysis and evaluation of models qualities describing a glucose dynamic in a human organism. Moreover, the measuring and nonlinear analysis methods of an uterine bioelectrical signal was elaborated. A prototype of the two channels measuring device was executed.
Electrical tomography techniques applied in medicine and industry

In the current year, the works on Electrical Capacitance Tomography (ECT) have been focused on data processing of measured and simulated imaging of two-phase (gas-liquid) flow. The measured data was obtained from installation – "Air-Lift Reactor" which was built with cooperation of the Faculty of Chemical and Process Engineering

[Pro27] **An Analysis of Parameters of Slotted Waveguide Antenna for Reconfigurable Aperture Antenna Purposes** (Analiza parametrów anteny falowo-szczelinowej w zastosowaniach do anten o rekonfigurowalnej aperturze).
Yevhen Yashchyshyn, J. Modelski, K. Kurek, T. Keller, K. Derzakowski, M. Bury, P. Bajurko, S. Kozłowski;
May 22, 2009 – Nov. 30, 2010

The target of the project is to analyze and to optimize parameters of the slotted waveguide antenna. The investigated antenna will be implemented in reconfigurable aperture antenna systems. Characteristics of such antenna systems can be tuned by opening or closing selected slots. Surface PIN (S-PIN) diodes and MEMS devices are used for this purpose.

[Pro28] **Signals in Ultra-wideband Positioning Systems** (Sygnały w ultraszerokopasmowych systemach lokalizacyjnych).
Jacek Cichocki, J. Kołakowski, R. Michnowski, K. Radecki, W. Kiełek, S. Żmudzin, P. Makal, P. Ziętek;
May. 22, 2009 – Nov. 30, 2010

The project dealt with the impulse signals typically used in ultra-wideband positioning systems. It covered a survey of European Commission Decisions concerning UWB technology as well as ETSI standards and technical reports dealing with UWB equipment measurements. Within the project two methods for precise time of pulse arrival determination were investigated. The first one consisted in determination of values used for TDOA correction. The second method was based on AGC circuitry implementation. Both methods were experimentally tested. Obtained results and developed equipment provide a basis for further investigations, focused on methods for reception and processing of signals in ultra-wideband positioning systems.

[Pro29] **Improving Design Methods of Resonant Circuits in H.F. Power Amplifier** (Doskonalenie metod projektowania obwodów rezonansowych do wzmacniaczy mocy wielkiej częstotliwości).
Juliusz Modzelewski, H. Chaciński, W. Kazubski, M. Mikołajewski;
May 22, 2009 – Nov. 30 2010

Research concerns output circuits in Class AB, Class B and Class C resonant power amplifiers as well as output circuits in high-efficiency Class E amplifiers. In the project an improved design method for π1- circuits applied in output resonant circuits of Class AB, Class B and Class C power amplifiers has been proposed. Frequency responses for the input impedance and trans-impedance of π1- circuits vs. its loaded quality factor and resistance ratio have been analyzed. A minimum value of total loaded quality factor for which a π1- circuit can be built has been found. It has been shown that for low values of loaded quality factor (close to minimum value) attenuation of harmonics in π1- circuits is low (high value of the input impedance for harmonic signals). An improved method of computing values of reactive components in π1- circuits has also been proposed. The method takes into account the finite value of loaded quality factor of the coil. The method used so far assumed lossless capacitors and inductances used in the π1- circuit, and the circuit thus designed and built required time-consuming tuning. The second aim of the research was the optimum design of inductive coils in resonant circuits of industrial Class E power amplifiers operating in the frequency range 5-10 MHz. It has been shown that in this frequency range inductive coils with a ferrite core or a powder carbonyl core can work with low losses only if the amplitude of magnetic induction in the core is very low (below 10 mT). Under this condition it is possible to build inductive coils with a ferrite or powder core and obtain loaded quality factor exceeding 200 for the frequencies 5-10 MHz.

[Pro30] **Computer-aided Image Telediagnosis** (Wspomagana komputerowo telediagnostyka obrazowa).
Artur Przelaskowski, R. Jóźwiak, G. Ostrek, M. Jasionowska, A. Rutczyńska;
May 22, 2009 – Nov. 30, 2010

General purpose of this research was integrated, teleinformation system for radiological workstation with extended functionality for computer-aided diagnosis (CAD). This functionality allows for efficient diagnosis, taking advantage of interactive and intelligent tools with secure access to local and global image and knowledge databases. In particular realized tasks were related to:

- exploiting new fields of CAD usage – pulmonary embolism, interstitial lung diseases and improvement of previously elaborated CAD schemes, especially architectural distortion detection in mammography;
- steganography, watermarking and other security methods dedicated to telemedical applications;
- improvement of interactive tools with computer-aided image interpretation and reference image databases with selected and labeled pathology examples (mainly on the basis of mammography).

The result of the research was accomplished by reports, elaborated and implemented software, experimental results with medical consultations and four publications.

[Pro31] **Modern Radiocommunication Systems – Selected Problems** (Współczesne radiowe systemy mobline – wybrane problemy).
Tomasz Kosiło, S. Hahn, T. Buczkowski, K. Czerwiński, J. Jarkowski, W. Kazubski, K. Snopek;
May 22, 2009 – Nov. 30, 2010

This work covers theoretical and practical problems of modern radio mobile systems including some aspects of signal theory. The needs for new mobile data and multimedia services is growing. Mobile data and local mobile networks have today important position. New applications eg. for transportation or handicapped persons are intensively developed. Because of this it is necessary to develop new transmission algorithm, new methods of radio networks management, to solve problems of electromagnetic compatibility. In the frame of this contract we studied the following problems: methods of signals and systems description, study of mobile wireless systems properties and software radio, mobile systems for handicapped persons.

[Pro32] **Optimum Networks Designing** (Optymalne projektowanie sieci).
Jacek Wojciechowski, Z. Walczak, A. Dominik, M. Czajko;
May 22, 2009 – Nov. 30, 2010

Multi-criterial heuristics for the designing of large scale networks:
The original algorithm of simulated allocation (extension of the simulated annealing) was worked out. The algorithm has been applied to the designing two types of networks; networks built of gateways and sensors. The problem of gateway locations was formulated as an optimization problem. The results, compared with exact solutions confirmed accuracy of the method. Topological design of passive optical network in FTTx architecture. Broadband access network design problem was formulated as an optimization task.
Sampling distribution in modeling and analysis of the data from the Coulomb excitation experiments:
A new method for the surface shape investigation close to the function optimum has been worked out. It allows to reveal the sampling distribution of the genetic algorithm around the optimum. The study is based on both: probabilistic methods and graph theory. A more uniform genetic algorithm sampling close to the optimum, namely, the Minimum Distance Rule, has been proposed. The algorithm determines minimum distance between pairs of samples and removes samples from too dense areas. This in turn will allow for an efficient approximation of the surface shape close to the optimum. The research was originally initiated by physicists and the algorithm is useful in constructing models of tom nucleus

[Pro33] **Interpretation of Measurement Data - Methodology and Meta-metrological Aspects** (Interpretacja danych pomiarowych – metodyka i aspekty meta-metrologiczne).
Roman Z. Morawski, A. Miękina, A. Podgórski;
May 22, 2009 – Nov. 30, 2010

The primary objective of the project is related to the methodological, ethical and historical aspects of metrology, in particular of the design and implementation of algorithms for calibration of measurement channels and reconstruction of measurands (*i.e.* generalised quantities to be measured); the project is also aimed at upgrading the corresponding research infrastructure (both hardware and software). The results of the project include: a methodology for designing special digital filters dedicated to acoustic analysers, systematic review of ethical aspects of empirical research based on measurement, and historical reviews of important contributions to metrology. The results of the research accomplished have been partially presented in six publications.

[Pro34] **Audiovisual Network Hybrid Systems** (Audiowizualne sieciowe systemy hybrydowe).
Krystian Ignasiak, W. Skarbek, G. Galiński, A. Buchowicz, G. Pastuszak, S. Badura, M. Leszczyński, J. Naruniec, A. Nowakowski, M. Tomaszewski ;
May. 22, 2009 – Nov. 30, 2010

The work was focused on the development of elements of the new system for digital TV coding, first of all, audio and video compression circuits based on the MPEG-4 (H.264/ AVC i AAC) standard. Within the works, main function blocks of a software video coder for H.264/AVC were created based on the modularity concept. Getting fast hardware realizations of audio and video coding algorithms and their implementation in FPGA devices enable the verification of the algorithms in real-time conditions. An important part of the research was the development of the methodology of mapping sequential algorithms onto their hardware versions. It gives hints how to design efficient hardware architectures for audio-video codecs. The codecs implementation efforts tend to the creation of a system of network reconfigurable audio-video nodes, which will allow the demonstration of efficiency and usefulness of particular hardware-functional profiles in distributed real-time audiovisual systems.

4.3.2 Projects granted by the Rector

[Pro35] **Creation of Mobile Device for Noninvasive Blood Monitoring** (Stworzenie przenośnego urządzenia do bezinwazyjnego monitorowania krwi).
Ewa Piątkowska-Janko, P. Chmielewski, P. Kamiński, M. Pachocki, A. M. Laskowski, B. Radzik;
Apr. 14, 2010 – Dec. 31, 2010

The main goal of this project was to create a device which would be able to monitor the changes in blood.

[Pro36] **Capsule Board Electronics System for the Stratospheric Balloon Missions – the Second Part** (System elektroniki pokładowej kapsuły dla stratosferycznych misji balonowych – etap drugi).
Krzysztof Kurek, S. Szczygielski, T. Biały, P. Durlej, K. Gawda, A. Szewczyk, P. Chmielewski;
Apr. 16, 2010 – Dec. 31, 2010

The main aim of the project was to design an electronic platform for future balloon missions realized by Space Engineering Student Scientific Group. The platform consists of CW and FSK transceiver, microprocessor controller to data acquisition from payload, and additionally GPS module, allowing to find the capsule after its landing.

[Pro37] **The Dynamic Process Analysis in "Air-lift" Reactor by Capacitance Tomography** (Analiza procesów dynamicznych w reaktorze dwufazowym "air-lift" za pomocą elektrycznej tomografii pojemnościowej).
Roman Szabatin, W. Smolik, T. Olszewski, P. Machniewski, S. F. Filipowicz;
Apr. 15, 2010 - Mar. 31, 2011
University Research Program.

The aim of the reported project is the development of three models of multi-plane process electrical capacitance tomograph (MPECT) and the appropriate software enabling the imaging of dynamic processes in industrial installations. The models will be tailored to the needs of didactics and research works conducted by three Faculties at the Warsaw University of Technology. The authors of the project anticipate that the results of the realized project will be: implementation of the MPECT system for the analysis and control of technological processes (Faculty of Chemical and Process Engineering), development of the new major at the Faculty of Electronics and Information Technologies – Biomedical Engineering, advancement in the staff training in the field of modeling and numerical methods at the Electricity Department.

[Pro38] **Development of MR Technology : MR Spectroscopy – MRS 'in-vivo', Relaxometry T2, 3D Reconstruction of the Temporal Bone - Warsaw University of Technology Involvement in Bioimaging Research Center** (Rozwój metod diagnostycznych z wykorzystaniem techniki rezonansu magnetycznego w tym: spektroskopii MRS *in-vivo* relaksometrii T2 oraz rekonstrukcja geometrii 3D kości skroniowej - udział Politechniki Warszawskiej w pracach Naukowego Centrum Obrazowania Biomedycznego).
Piotr Bogorodzki, E. Piątkowska-Janko, B. Sawionek, T. Jamrógiewicz, Ł. Kołaszewski, W. Obrębski, K. Kamińska, S. Adaszewski;
Apr. 15, 2010 -Dec. 31, 2010

The main goal of the project is related to the advanced application of Magnetic Resonance Imaging (MRI) for early stages of diseases diagnostics. The project will be located in Bioimaging Research Center a shared with Warsaw University of Technology research facility. The specific research goals for year 2010 cover the following problems: an optimization of MRI acquisition parameters for T1 and T2 relaxonometry, software development of relaxonometry mapping with region of interest analysis and automatic reporting.
Additionally, a 3D reconstruction methodology will be evaluated on CT, micro-CT, and MRI images. A number of commercial software packages (ScanIP/ScanFE f-my Simpleware) will be tested if quality of produced segmented volumes will be adequate to clinical needs, and if these can support radiological diagnosis process.

[Pro39] **Microwave Synthesis form Mixture of Powders with the Different Absorption of Electromagnetic Waves** (Mikrofalowa synteza z mieszanin proszków o różnej zdolności do absorpcji fal elektromagetycznych).
Wojciech Gwarek, P. Kopyt
Apr. 16, 2009 - Mar. 31, 2010
University Research Program.

This project is carried out at three faculties of the University – The Faculty of Materials Science and Engineering, The Faculty of Power and Aeronautical Engineering, Faculty of Electronics and Information Technology (Institute of Radioelectronics, Division of Microwave and Radiolocation Engineering). The main goal of this project was to design the new microwave applicator using during the diamond – SiC synthesis.

[Pro40] **Frequency-Spatial Methods for Detection of Face Fiducial Points** (Przestrzenno-częstotliwościowe metody detekcji punktów charakterystycznych twarzy).
Władysław Skarbek, J. Naruniec;
Ph.D grant
Jun. 29, 2009 – Oct. 31, 2010

The aim of the project is the development of an entry system based on the biometric information. Highest emphasis is put on the face analysis procedure, including face detection and recognition. The system is equipped with high-definition camera that delivers images of resolution and quality facilitating reliable analysis of facial features.

[Pro41] **Analysis and Design of Steerable Microwave Antennas** (Analiza i projektowanie sterowanych anten mikrofalowych).
Yevhen Yashchyshyn, P. Bajurko;
May 21, 2010 - Oct. 31, 2011

The target of the project is to complete laboratory equipment of reconfigurable antenna measurement system. The system allows investigation of the transient states of the antennas comprising switched or tunable elements. Project funds are going to be spent on system components, namely two highly accurate digital pulse delay generators and a microwave pulse generator.

[Pro42] **Imaging Disease Markers – Warsaw University of Technology Involvement in Bioimaging Research Cente**r (Markery obrazowe procesów chorobowych – udział Politechniki Warszawskiej w pracach Naukowego Centrum Obrazowania Biomedycznego).
Piotr Bogorodzki, H. Skarżyński, K. Kochanek, T. Wolak, E. Piątkowska-Janko, M. Kazubek, T. Jamrógiewicz, Ł. Kołaszewski, W. Obrębski, K. Kamińska, S. Adaszewski;
Jun. 04, 2009 - Mar. 31, 2010

The main aim of this project was to develop a MRI compatible audio system with the capabilities of measuring subject specific hearing levels, providing high level acoustic exposures. Proposed system consist of piezoelectric Sound Delivery System (SDS), subject response pads, stimulation software called AudioStim. AudioStim would be extended version of our fMRI stimulating software with sound calibration procedures and two basic auditory tests: traditional tonal audiometry, Biomedical Informatics Research Network BIRN auditory tests.

4.4 Other projects

[Pro43] **Development of Software for Video Scene Analysis Technologies** (Opracowanie oprogramowania dla technologii analizy scen wideo).
Władysław Skarbek, K. Wnukowicz;
Jan. 15, 2010 – Mar. 31, 2010
Funded by Mitsubishi Electric R&D Centre Europe, UK.

The aim of the project was to continue the development of software for video navigation which could be implemented in products such as BD recorders and TV solutions. The work included maintenance of the previously developed software, and the development of new functionality to improve performance of the software and user interface for video navigation. Another goal of the project was to provide software and cross-validation support in the development of MPEG-7 Video Signature Technology.

[Pro44] **Analysis of Global Technical Solutions in the Context of Changes in Television Broadcasting System from Analog to Digital with an Indication of Future Direction and Scope of Necessary Parameters for Solutions STB (Set Top Box) for Polish Cable TV Operator Network** (Przegląd światowych rozwiązań technicznych w kontekście zmiany systemu nadawania programu telewizyjnego z analogowego na cyfrowy wraz ze wskazaniem kierunków rozwoju i zakresu niezbędnych parametrów dla rozwiązań STB (set top box) dla polskich sieci operatorów telewizji kablowej).

Andrzej Buchowicz, J. Modelski, M. Dąbrowski;
Apr. 02, 2010 – May 31, 2010
Funded by Polish Chamber of Electronic Communications (Polska Izba Komunikacji Elektronicznej).

The analysis of the existing technical solutions for the cable television network (CATV) was the main goal of the project. The objective was to speed up the conversion from the analog to the digital transmission system. The specification for the universal set top box deployed in the Polish CATV networks was the scope of the project.

[Pro45] **Design and Implementation of an Additional Protection and Control System for Mobile Neutron Radiography System** (Opracowanie i wykonanie dodatkowych elektronicznych układów zabezpieczających kontrolnych do zestawu mobilnej radiografii neuronowej).
Krzysztof Zaremba, G. Domański, M. Dziewiecki, B. Konarzewski, R. Kurjata, J. Marzec, M. Ziembicki
May 28, 2010 – Jun. 18, 2010
Funded by Andrzej Soltan Institute for Nuclear Studies (Instytut Problemów Jądrowych im. Andrzeja Sołtana).

In order to achieve high reliability of a mobile neutron radiography system, developed at the Andrzej Soltan Institute for Nuclear Studies, a special control system has been built. It provides power supply voltage check and verification of connections , as well as remote turn-on and turn-off capability and full control of high voltage supply for photomultiplier tubes. With the new circuitry, the whole detector is fully controlled by data cquisition computer and can be operated remotely. The communication between the computer and the control circuits is provided by unused connections of data acquisition cards, used for PMT readout. New devices were integrated with exsting electronics to keep the whole system compact and easy to put together at final localization.

[Pro46] **Analysis of the Construction of Passenger Airport Terminal on the Operation of the Secondary Surveillance Radar Operated by Polish Air Navigation Services Agency** (Wykonanie analizy w zakresie wpływu budowy terminala pasażerskiego na wskazania radaru wtórnego będącego w zarządzaniu Polskiej Agencji Żeglugi Powietrznej).
Wojciech Wojtasiak, D. Gryglewski;
Jun. 15, 2010 – Aug. 30, 2010
Funded by Gdańsk Airport Ltd. (Port Lotniczy Gdańsk, Spółka Akcyjna).

The aim of the project was to predict the influence of the planned building of the passengers terminal on the existing air-traffic control facilities.

[Pro47] **Developing Digital Version of a Musical Instrument** (Opracowanie wersji cyfrowej instrumentu muzycznego).
Zbigniew Kulka
Jun. 17, 2010 – Sept. 30, 2010
Funded by MEGA Stanisław Maciołek

The aim of the project was to develop a digital version of an electronic musical instrument - audio sample player. Each of the instrument's key plays one sample (full multi-sampling) in a combination with layering (multi-layering) up to 16 layers (parallel channels). Recorded samples are formed in the files of 61 samples (1 voice/layer), stored on SD card, mixed, processed and played back with a program running on FPGA with SD card controller, audio codec chip, general I/O pins, Flash, SDRAM and SRAM memory peripherals.

4.5 Other activities

4.5.1 Reviews of the EU Projects

Reviews of Projects within the Frame of the EU Structural Funds (Recenzje projektów europejskich).
Piotr Bogorodzki, Małgorzata Celuch, **Jacek Wojciechowski**

4.5.2 Expertise for the Polish Chamber of Electronic Communication

Digitalization of Cable Networks (Cyfryzacja sieci kablowych).
Józef Modelski

4.5.3 Partnership

CC-Link

Since 12 May 2005 the Institute of Radioelectronics has been a formal member of the CC-Link Partner Association – the world-wide organization of industrial and research institutions working on the development and applications of CC-Link (Control & Communication Link) – a field network system that processes both the control and information data at high speed, to provide efficient integrated factory and process automation. The collaboration with the Association is realized by the Division of Nuclear and Medical Electronics.

4.5.4 Scientific networks

Polish Network of Neutrino Physics (Polska Sieć Neutrinowa)

In 2006, the Faculty of Electronics and Information Technology joined the Polish Network of Neutrino Physics. The network compreses several institutes and laboratories working in the field of development of experimental neutrino physics. The Faculty is represented in the network by the Division of Nuclear and Medical Electronics, which has a long-term experience in collaboration with high energy physics (NMC, SMC, COMPASS) and neutrino physics (ICARUS, T2K) experiments.

Polish Network of Particle Astrophysics (Polska Sieć Astrofizyki Cząstek)

In 2006 the Faculty of Electronics and Information Technology joined the Polish Network of Particle Astrophysics. The main goal of the organization is to create a frame for the research collaboration of several institutes and laboratories in the field of development of advanced experimental methods for particle astrophysics. The Faculty is represented in the network by two research groups: from the Institute of Electronics Systems and from Institute of Radioelectronics – namely from the Division of Nuclear and Medical Electronics.

4.5.5 Student research groups

Space Engineering Student Scientific Group
Krzysztof Kurek – tutor.

Space Engineering Student Scientific Group – SKIK (in Polish Studenckie Koło Inżynierii Kosmicznej) was formed in 2004. Members of SKIK participate in different international and internal educational space projects. Main of them are: project of ESEO (European Student Earth Orbiter) micro-satellite supported by European Space Agency ESA and realized by students from European Universities. Students from Warsaw University of Technology (WUT) are responsible for realization of on-board data handling OBDH subsystem, mechanical configuration of the satellite and operation of the satellite after launch;

- project of PW-Sat pico-satellite, first Polish satellite built by students of WUT, mainly members of Student Space Association and SKIK. The satellite will be launched in 2009 and it will test a new method of de-orbitation using unfoldable solar sail.

Biomedical and Nuclear Engineering Student Scientific Group
Ewa Piątkowska-Janko – tutor.

Biomedical and Nuclear Engineering Student Scientific Group (in Polish Studenckie Koło Inżynierii Biomedycznej i Jądrowej Biomedyczni) was formed in Dec. 2005 by a group of students from Biomedical Engineering. In 2010 it was fifteen members. In 2010 their realized project: Non-invasive blood monitor – measurement of glucose in blood (the Rector grant). Other projects: Hand-held gammacamera, portable spectrum analyzer of radiation, electrical capacitance tomography. In cooperation with Student Scientific Group of Cybernetics they realized project: Biofeedback/Neurofeedback. In 2010 they participated in Second National Conference on Biomedical Engineering – Education at AGH University of Science and Technology, Cracow, in June 2010 and in local conference of students scientific groups from the Faculty of Electronics and Information Technology WUT in October 2010 (five posters and four papers published in conference materials).

Innovative Information Technologies Student Scientific Group
Przemysław Miazga – tutor.

The scope of interest of the Students' Circle for Innovative Informatics Technologies was to design a web-service which allow for remote access to the linear/nonlinear optimization package (solver) Cplex form ILOG Ltd. The service consist of a client application with ASP interface and a server link. All parts have been designed with NET technology (VS.NET 2003) on 64 bit platform. This project has been worked out by the students from Innovative Information Technologies Circle (the Rector grant).

Technique in Medicine Student Scientific Group
Artur Przelaskowski – tutor.

Technique in Medicine Student Scientific Group – SKNTechMed (in Polish Studenckie Koło Naukowe Techniki w Medycynie) was formed in December 2008. The aim of this scientific group is to unite two different spheres: technique and medicine, that cannot perform duties separately. Though it is the first year, the members of SKNTechMed have a lot of ideas for the start:

- series of open lectures for students led by interesting people from the world of science;
- promotion of Biomedical Engineering among students;
- trips for students to places related with biomedical engineering;
- partnership with the Student Scientific Groups from the Medical University of Warsaw.

5 TITLES AND DEGREES AWARDED

5.1 Ph.D. Degrees

[PhD1] Piotr Dyderski: *"Metody zabezpieczania urządzeń radiolokacyjnych przed destrukcyjnym wpływem silnych sygnałów elektromagnetycznych"* (Methods of protecting radar systems against destructive influence of high-level signals), Prof. **S. Rosłoniec** (supervisor), Warsaw, May 18, 2010.

[PhD2] Sebastian Kozłowski: *"Analiza i badanie systemów MIMO wykorzystujących adaptacyjne szyki antenowe"* (Analysis and investigation of MIMO systems utilizing adaptive array antennas), Prof. **J. Modelski** (supervisor), Warsaw, Dec. 21, 2010.

[PhD3] Jacek Naruniec: *"Metody częstotliwościowo-przestrzenne w detekcji i śledzeniu charakterystycznych punktów twarzy"* (Frequency-spatial methods for detection of face fiducial points), Prof. **W. Skarbek** (supervisor), Warsaw, Oct. 19, 2010.

[PhD4] Tymon Rubel: *"Wybrane metody analizy w proteomice"* (Selected methods of analysis in proteomics), Prof. **K. Zaremba** (supervisor), Warsaw, Feb. 9, 2010.

[PhD5] Bartłomiej Salski: *"Application of semi-analytical algorithms in the finite-difference time-domain modelling of electromagnetic radiation and scattering problems"*, Prof. **W. Gwarek** (supervisor), Warsaw, Jun. 8, 2010.

[PhD6] Marcin Stolarski: *"Rozproszony system komunikacji satelitarnej wykorzystujący stacje małej mocy"* (Distributed satellite communication system using the low power stations), Prof. **J. Modelski** (supervisor), Warsaw, Mar. 30, 2010.

5.2 M.Sc. Degrees

[MSc1] Karol Borawski: *"Urządzenie do pomiaru tła promieniowania naturalnego"* (The tool to measure radiation rate), Prof. **K. Zaremba** (supervisor), (4).

[MSc2] Paweł Chmielewski: *"System wideo do zastosowań w rezonansie magnetycznym" (Video system for use in magnetic resonance imaging),* Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5).

[MSc3] Piotr Demidowicz: *"Biofeedback EEG: Akwizycja sygnału EEG – część analogowa"* (ECG biofeedback: Signal acquisition – the analog part), Assist. Prof. **G. Domański** (supervisor), (5).

[MSc4] Maciej Dudziński: *"Wpływ środowiska pomiarowego na parametry anten"* (The influence of the measurement area on antenna parameters), Senior Lecturer **H. Chaciński** (supervisor), (4).

[MSc5] Tomasz Dziurko: *"Akcyjne i komponentowe podejście do tworzenia warstwy prezentacji w aplikacjach internetowych w języku Java na przykładzie bibliotek Struts 2 i Wicket"* (Action-based approach to the presentation layer creation in Java web applications illustrated using Struts 2 and Wicket libraries), Prof. **W. Skarbek** (supervisor), (5).

[MSc6] Łukasz Garbacz: *"Opracowanie układu syntezera częstotliwości na pasmo 5,55-5,65 GHz"* (PLL frequency synthesizer for 5.55 GHz – 5.65 GHz), Assist. Prof. **R. Michnowski** (supervisor), (5).

[MSc7] Grzegorz Goworek: *"Stymulator wymuszonego ruchu palców dłoni do badań czynnościowych w rezonansie magnetycznym"* (Phneumatic finger movement simulator for diagnosis of stroke patients in functional magnetic resonance imaging), Assist. Prof. **P. Bogorodzki** (supervisor), (5).

[MSc8] Paweł Grycel: *"Projekt stacjonarnego radiowego systemu dostępowego punkt - wiele punktów w paśmie 28 GHz"* (The design of point-to-multipoint fixed system in 28 GHz frequency band), Assist. Prof. **K. Kurek** (supervisor), (5).

[MSc9] Marcin Jakubowski: *"Mobilny monitor EKG zespołu QRS w czasie rzeczywistym"* (Mobile ECG monitor with QRS detection in real-time), Assist. Prof. **M. Kazubek** (supervisor), (4,5).

[MSc10] Michał Kajczuk: *"The tetra radio coverege planning occuracy in high urban areas"* Docent **T. Kosiło** (supervisor), (5), studies in English.

[MSc11] Paweł Kciuk: *"System do akwizycji i analizy sygnału EKG wysokiej rozdzielczości"* (System for acquisition and analysis of high resolution ECG signal), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5), studies in English.

[MSc12] Kamil Kliczbor: *"System akwizycji danych do radiografii cyfrowej z łączem USB"* (Data acquisition system for digital radiography with USB connection), Assist. Prof. **G. Domański** (supervisor), (5).

[MSc13] Przemysław Korpas: *"System sterowania generatorami mikrofalowymi dużej mocy 2,45 GHz"* (Control system for high power solid state microwave generators, 2.45 GHz band), Assist. Prof. **D. Gryglewski** (supervisor), (5).

[MSc14] Adam Kozień: *"BANET: A real-time telemetry system for mobile applications",* Senior Lecturer **T. Jamrógiewicz** (supervisor), (5).

[MSc15] Marcin Krzewski: *"Bezprzewodowa rękawica żyroskopowa do badań czynnościowych w rezonansie magnetycznym"* (A wireless gyroscope glove for functional magnetic resonance imaging), Assist. Prof. **P. Bogorodzki** (supervisor), (4,5).

[MSc16] Michał Kubicki: *"Modelowanie toru nadawczo-odbiorczego DVB-T w programie SIMULINK"* (Modelling the transmitter-receiver of DVB-T sig-

nal in SIMULINK environment), Assist. Prof. **K. Kurek** (supervisor), (4,5).

[MSc17] Anna Liszewska: *"Analiza i porównanie metod używanych do separacji sygnałów elektrycznej aktywności serca matki i płodu"* (Methods for maternal and fetal ECG signals separation-analysis and comparison), Assist. Prof. **B. Konarzewski** (supervisor), (5).

[MSc18] Rafał Liszewski: *"Program do statystycznej analizy badań EKG wysokiej rozdzielczości"* (Application for statistical analyzing results of high-resolution ECG), Assist. Prof. **B. Konarzewski** (supervisor), (5).

[MSc19] Jan Łubowicz: *"Analiza wybranych modeli stosowanych do regulacji dawkowania insuliny"* (The analysis of selected models applied to control insulin's dosage), Assist. Prof. **D. Radomski** (supervisor), (5).

[MSc20] Bartosz Majewski: *"Sprzętowa realizacja elementów kodera i dekodera kanałowego dla standardu radiofonii cyfrowej DRM"* (Hardware elements design for channel encoder and decoder in digital audio broadcasting DRM standard), Assist. Prof. **K. Kurek** (supervisor), (5).

[MSc21] Filip Marszelewski: *"Odbiornik DRM"* (DRM receiver), Senior Lecturer **H. Chaciński** (supervisor), (4,5).

[MSc22] Radosław Matyszczyk: *"Optimization of the process of hyperpolarization of helium-3"*, Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5).

[MSc23] Karol Mazurek: *"Modernizacja oprogramowania do odbioru sygnału EKG"* (Design and implementation of software for electrocardiography system), Prof. **J. Marzec** (supervisor), (4).

[MSc24] Jakub Mergiel: *"RICE - system zdalnej interakcji czasu rzeczywistego: usprawnienia warstwy komunikacyjnej"* (RICE - remote interaction via common equipment), Prof. **W. Skarbek** (supervisor), (5).

[MSc25] Adam Niziński: *"System monitoringu aktywności ruchowej człowieka z transmisją bezprzewodową Zig Bee"* (Human physical activity monitoring system with wireless Zigbee transmission), Assist. Prof. **R. Kurjata** (supervisor), (5).

[MSc26] Jakub Nowakowski: *"Odtwarzacz CD"* (CD player), Senior Lecturer **H. Chaciński** (supervisor), (5).

[MSc27] Katarzyna Ochnik: *"Wielokanałowy telemetryczny system do pomiaru sygnału EKG"* (Multichannel telemetric system for ECG measurement), Assist. Prof. **G. Domański** (supervisor), (5).

[MSc28] Marzena Olszewska: *"Projekt anteny dwureflektorowej pracującej w paśmie 5,2-5,8 GHz"* (Design of a dual reflector antenna working in frequency band 5.2-5.8 GHz), Prof. **W. Gwarek** (supervisor), (5).

[MSc29] Robert Partyka: *"Wzorzec częstotliwości stabilizowany sygnałem systemu satelitarnego GPS"* (Frequency standard stabilized by GPS signal), Assist. Prof. **W. Kazubski** (supervisor), (5).

[MSc30] Piotr Płoński: *"Probabilistyczna interpretacja sztucznych sieci neuronowych"* (Probabilistic interpretation of artificial neural networks), Prof. **K. Zaremba** (supervisor), (5).

[MSc31] Mikołaj Podbielski: *"Kodowanie sekwencji wielowidokowych"* (Multi-view video coding), Assist. Prof. **G. Galiński** (supervisor), (5).

[MSc32] Łukasz Pskit: *"Analiza protokołu routingu DSR przy pomocy SWANS (scalable wireless ad hoc network simulator)"* (Analysis of DSR routing protocol using SWANS (scalable wireless ad hoc network simulator)), Assist. Prof. **Z. Walczak** (supervisor), (4,5).

[MSc33] Nguyen Minh Quoc: *"Oprogramowanie do obsługi pulsoksymetru"* (Software for the oxymeter), Assist. Prof. **T. Buczkowski** (supervisor), (5).

[MSc34] Karol Rogowski: *"Badanie skuteczności wkładek przeciwhałasowych z wykorzystaniem systemu pomiarowego Veri PRO"* (Test for the effectiveness of earplugs with a VeriPRO measurement system), Assist. Prof. **E. Kotarbińska** (supervisor), (5).

[MSc35] Marcin Rolewicz: *"Problem wyświetlania rozległych terenów"* (Problem of projection the immense areas), Prof. **W. Skarbek** (supervisor), (5).

[MSc36] Katarzyna Rusinowska: *"Elektroniczny tomograf pojemnościowy"* (Electrical capacitance tomograph), Docent **R. Szabatin** (supervisor), (5).

[MSc37] Andrzej Rychter: *"Biofeedback EEG: część cyfrowa oraz oprogramowanie"* (Biofeedback EEG: digital board and software), Assist. Prof. **G. Domański** (supervisor), (5).

[MSc38] Nabil Salih: *"Comparison of neural network methods for determination of oil mixture based on NIR spectral data"*, Assist. Prof. **A. Miękina** (supervisor), (3,5) studies in English.

[MSc39] Jarosław Saługa: *"Wpływ zakłóceń na stabilność krótko- i długoczasową skanera MR"* (The influence of noise on short-time and long-time stability of MR scanner), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5).

[MSc40] Piotr Sitarz: *"Stanowisko do generacji i pomiaru sygnałów łącza radiowego systemu UMTS"* (The system for generating and measuring air-interface UMTS signals), Docent **J. Cichocki** (supervisor), (5).

[MSc41] Marcin Słowikowski: *"Usługa sieciowa z binarnym protokołem zdalnego dostępu do obiektu"* (Web services with binary remote access protocol), Assist. Prof. **K. Ignasiak** (supervisor), (5).

[MSc42] Maciej Stefaniak: *"Wzmacniacz niskoszumowy w technologii hybrydowej na pasmo X"* (Low noise amplifier in hybrid technology for X band), Assist. Prof. **D. Gryglewski** (supervisor), (5).

[MSc43] Grzegorz Stolarski: *"Metody zmniejszania zakłóceń i ograniczeń w pulsoksymetrii"* (Methods reducing distortions and restrictions in pulse oximetry), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5).

[MSc44] Marcin Sulej: *"Zastosowanie kart elektronicznych z technologią Java Card w systemie ERP firmy Outcom"* (Implementation of electronic cards with Java Card technology in the ERP system of the company Outcom), Prof. **J. Wojciechowski** (supervisor), (5).

[MSc45] Tomasz Symonides: *"Implementacja sprzętowa filtrów w standardzie kompresji video H.264/AVC"* (Hardware implementation of filter modules for H.264/AVC codec), Assist. Prof. **G. Pastuszak** supervisor), (4.5).

[MSc46] Piotr Szewczyk: *"Inteligentny rozproszony system detekcji upadków"* (Inteligent, distributed man-down detection system), Assist. Prof. **T. Buczkowski** (supervisor), (5).

[MSc47] Karol Taylor: *"Synteza wizyjna na podstawie analizy sygnału mowy"* (Speech-driven face animation), Assist. Prof. **A. Janicki** (supervisor), (5).

[MSc48] Agnieszka Tokarska - Majchrzak: *"Zastosowanie sekwencyjnego testu Walda w procedurach adaptacyjnych w psychoakustyce"* (Application of Walda sequential test in psychoacoustical adaptive procedure), Assoc. Prof. **J. Żera** supervisor, (5).

[MSc49] Anna Urzędowska: *"Badanie techniki RoF w systemach WLAN"* (Experimental study of RoF technique in WLAN systems), Prof. **Y. Yashchyschyn** (supervisor), (5).

[MSc50] Dominik Walczak: *"Metody refaktoryzacji portali internetowych w technologii Web 2.0"* (Refactoring methods of Internet portals in web 2.0 technology), Assist. Prof. **K. Ignasiak** (supervisor), (4).

[MSc51] Konrad Werys: *"Metody obliczania odkształceń mięśnia sercowego na podstawie znakowanych obrazów rezonansu magnetycznego"* (Cardiac strain measurement using tagged magnetic resonance imaging), Assist. Prof. **P. Bogorodzki** supervisor), (4,5).

[MSc52] Roman Woźniak: *"Platforma Google Android na przykładzie aplikacji integrującej system GPS i serwisy zewnętrzne – wyszukiwarka połączeń komunikacji miejskiej"* (Google Android platform on the example of an application integrating a GPS system and external service - public transport connections search engine), Assist. Prof. **K. Ignasiak** (supervisor), (5).

[MSc53] Marcin Zapolski: *"Analiza oraz implementacja rodziny standardów ISO/IEEE 11073 dotyczących komunikacji pomiędzy urządzeniami medycznymi"* (Analysis and implementation of ISO/IEEE 11073 family of standards dealing with medical device communications), Assist. Prof. **T. Buczkowski** (supervisor), (5).

[MSc54] Marcin Zaremba: *"Urządzenie do monitorowania stanu układu krążenia z zapisem na dysku przenośnym typu mass storage USB"* (Portable device for monitoring of the cardiovascular system state with the mass storage device), Assist. Prof. **G. Domański** (supervisor), (5).

[MSc55] Łukasz Zawadzki: *"Projekt dystrybucji wizji i dźwięku w studiu telewizyjnym w standardzie high definition"* (Design for distribution video and audio in a television studio in high definition standard), Assist. Prof. **T. Keller** (supervisor), (4).

[MSc56] Piotr Lech Zawistowski: *"Metodyka zarządzania projektami tworzenia oprogramowania systemów pomiarowo-sterujących"* (Project management methodology for control-measuring systems development), Assist. Prof. **R. Łukaszewski** (supervisor), (5).

[MSc57] Łukasz Zygarlicki: *"Projekt algorytmu pogłosowego i jego implementacja z wykorzystaniem procesora sygnałowego ADSP-21065L"* (Project of reverb algorithm and its implementation on ADSP-21065L digital signal processor), Prof. **Z. Kulka** (supervisor), (5).

5.3 M.Sc. Evening Studies on Radiocommunications – M.Sc. Degrees

[MSc58] Filip Achramowicz: *"Badanie wpływu metod zasilania na parametry anteny szczelinowej"* (Slot antennas feeding analysis), Assist. Prof. **K. Derzakowski** (supervisor), (3,5).

[MSc59] Krzysztof Białas: *"Bezpieczeństwo sieci Wi-Fi"* (Wi-Fi networks security), Assist. Prof. **R. Kossowski** (supervisor), (5).

[MSc60] Piotr Dymarski: *"Inteligentne instalacje w budynkach. Programowanie parametryczne w LCN-PRO3"* (Intelligent installations in buildings. Parametric programming in LCN-PRO3), Assoc. Prof. **S. Kula** (supervisor), (5).

[MSc61] Jan Ludwicki: *"Zastosowanie technik cyfrowego przetwarzania sygnałów w odbiorze radiowym"* (Application of digital signal processing techniques in radio signals receiving), Assist. Prof. **W. Kazubski** (supervisor), (4,5).

[MSc62] Bartosz Mamczyc: *"Badanie wpływu kształtu szczeliny na parametry anteny szczelinowej" (*Slot antenna shape analysis), Assist. Prof. **K. Derzakowski** (supervisor), (4).

[MSc63] Jarosław Marski: *"Urządzenie nadawczo-odbiorcze na pasmo 868 MHz z modulacją FSK do systemu informacji dla osób niewidomych"* (Transceiver at 868 MHz with FSK modulation for the system of information for the blind), Assist. Prof. K. Radecki (supervisor), (5).

[MSc64] Robert Miecznikowski: *"Generator mocy 150W/6.78 MHz z rezonansowym wzmacniaczem klasy E"* (Power generator 150W/6.78 MHz with resonant class E amplifier), Assist. Prof. **M. Mikołajewski** (supervisor), (4.5).

[MSc65] Wojciech Olszewski: *"Predykcja szeregów czasowych reprezentujących kolejowe dane energetyczne"* (Prediction of time series represented by railway energy data), Assist. Prof. **R. Nowak** (supervisor), (5).

[MSc66] Marcin Pietrzak: *"Rezonansowy wzmacniacz mocy klasy F z kluczowaniem tranzystora"* (Class-F tuned power amplifier with switch-mode transistor operation), Assist. Prof. **J. Modzelewski** (supervisor), (5).

[MSc67] Wojciech Szmajdowicz: *"Pomiary propagacji fal krótkich"* (Measurements of propagation of VHF radio waves), Assist. Prof. **W. Kazubski** (supervisor), (4).

5.4 B.Sc. Degrees

[BSc1] Piotr Andrzejewski: *"Minigammakamera handheld do wspomagania operacji onkologicznych"* (Minigammacamera hand-held for oncological purposes), Docent **R. Szabatin** (supervisor), (5).

[BSc2] Arkadiusz Bednarzak: *"System zdalnego sterowania pomiaru skażeń promeniotwórczych przy wykorzystaniu wielokanałowego analizatora amplitudy Tukan 8k"* (Remote control for radioactive contamination measurement system using multichannel pulse height analyzer Tukan 8k), Prof. **J. Marzec** (supervisor), (5).

[BSc3] Arkadiusz Bedner: *"Bezprzewodowe urządzenie do stymulacji słuchowych w funkcjonalnym rezonansie magnetycznym"* (Wireless device for auditory stimulations in functional magnetic resonance imaging), Assist. Prof. **E. Piątkowska-Janko** supervisor), (4,5).

[BSc4] Konrad Bielecki: *"Opracowanie nowej wersji pakietu ECTsim do modelowania w tomografii pojemnościowej z wykorzystaniem programowania obiektowego w środowisku MATLAB"* (The elaboration of the new version of ECTsim package for modelling in electrical capacitance tomography based on object oriented programming in MATLAB), Assist. Prof. **W. Smolik** (supervisor), (5).

[BSc5] Andrzej Bielski: *"Demodulator na pasmo ISM 5,8 GHz dla systemu transmisji danych wykorzystującego technikę RFID"* (Demodulator for data transmission system using RFID technique operating in the 5.8 GHz band), Assist. Prof. **P. Kopyt** (supervisor), (5).

[BSc6] Jacek Borkowski: *"Badanie możliwości otrzymania asymetrycznego dzielnika mocy na bazie "magicznego" T"* (Testing possibility of acheving asymmetric power splitter based on magic T), Prof. **K. Zaremba** (supervisor), (5).

[BSc7] Leszek Busłowski: *"Program do modelowania funkcji MTF sensorów luminescencyjnych – zjawiska związane z rozchodzeniem się światła"* (The software for modelling the MTF function of phosphors – the phenomena connected to light diffusion), Assist. Prof. **B. Konarzewski** (supervisor), (4,5).

[BSc8] Krzysztof Chojnowski: *"Predykcja czasu retencji w wysokosprawnej chromatografii cieczowej z wykorzystaniem sztucznych sieci neuronowych"* (Prediction of retention time in high performance liquid chromatography using artificial neural network), Prof. **K. Zaremba** (supervisor), (5).

[BSc9] Sebastian Ciechanowski: *"Pozycjonowanie wirtualnych źródeł dźwięku"* (Virtual sound sources positioning), Assist. Prof. **M. Tajchert** (supervisor), (4).

[BSc10] Marcin Darmetko: *"Implementacja bloków kodera sprzętowego i dekodera Viterbiego w języku VHDL"* (Convolutional coder and Viterbi decoder – implementation using VHDL language), Assist. Prof. **T. Keller** (supervisor), (5).

[BSc11] Mariusz Dmochowski: *"Próbkujący przetwornik analogowo-cyfrowy w zastosowaniach spektrometrycznych"* (Sampling analog-digital converter in spectrometric applications), Prof. **Z. Kulka** (supervisor), (4,5).

[BSc12] Katarzyna Dukielska: *"Mikrofon cyfrowy"* (Digital microphone), Prof. **Z. Kulka** (supervisor), (4,5).

[BSc13] Maciej Fijałkowski: *"Transmisja danych za pośrednictwem źródeł światła"* (Data transmission utilizing artificial lighting), Assist. Prof. **T. Buczkowski** (supervisor), (4,5).

[BSc14] Paweł Gielmuda: *"Projekt narzędzia do symulacji zasięgów dla systemów radiowych działających na częstotliwościach mikrofalowych"* (Software utillity for coverge simulation of microwave radio system), Assist. Prof. **T. Keller** (supervisor), (5).

[BSc15] Michał Gosztold: *"Interferometr mikrofalowy dla systemu radionawigacyjnego wspomagającego lądowanie samolotów (TLS)"* (L-band microwave interferometer for transponder landing system), Prof. **S. Rosłoniec** (supervisor), (5).

[BSc16] Konrad Grabowski: *"Graficzny interfejs systemu śledzenia wzroku dla osób niepełnosprawnych"* (Eye-tracking graphic user interface for handicapped persons), Assist. Prof. **T. Buczkowski** (supervisor), (4,5).

[BSc17] Piotr Grządziel: *"Mikroprocesorowy densytometr laboratoryjny"* (Laboratory microprocessor densitometer), Assist. Prof. **G. Domański** (supervisor), (4,5).

[BSc18] Mateusz Gutowski: *"Dispersive analysis of photonic crystals"*, Assist. Prof. **M. Celuch** (supervisor), (4), studies in English.

[BSc19] Grzegorz Gwardys: *"Implementacja programowa serwera RTSP"* (RTSP server applica-

tion), Assist. Prof. **A. Buchowicz** (supervisor), (4).

[BSc20] Krzysztof Jankowski: *"Interfejs programowy kodeka MVC"* (Programme interface to the MVC codec), Assist. Prof. **G. Galiński** (supervisor), (5).

[BSc21] Michał Jarosz: *"System do pomiarów wielkich częstotliwości metodą partubacyjną w prototypie akceleratora Linac"* (The bead-pull RF measurement system for the Linac 4 prototype), Prof. **K. Zaremba** (supervisor), (5).

[BSc22] Łukasz Jasiński: *"Odtwarzacz plików multimedialnych"* (Multimedia player), Assist. Prof. **A. Buchowicz** (supervisor), (4,5).

[BSc23] Mateusz Karski: *"Active directory as universal directory service"*, Assist. Prof. **A. Krystosik** (supervisor), (5), studies in English.

[BSc24] Mariusz Klimek: *"Rozproszony system do odczytu kodów kreskowych"* (Distributed system for reading bar codes), Assist. Prof. **K. Ignasiak** (supervisor), (5).

[BSc25] Piotr Klonowski: "*System antenowy na pasmo S dla systemu łączności mini-satelity"* (Antenna system functioning on S-band for communication with mini-satellite), Assist. Prof. **K. Kurek** (supervisor), (4,5).

[BSc26] Łukasz Korczak: *"Telemetryczny aparat do pomiaru cisnienia tętniczego krwi z wykorzystaniem sieci bezprzewodowych ZigBee"* (Telemetric system for measurement blood pressure with ZigBee wireless mesh), Senior Lecturer **T. Jamrógiewicz** (supervisor), (4,5).

[BSc27] Wojciech Kożuch: *"Wielokanałowe światłowodowe sytemy radio-over-fiber"* (WDM-phase modulator millimeter wave radio-over-fiber systems), Assist. Prof. **J. Turkiewicz** (supervisor), (4,5).

[BSc28] Andrzej Krawczyk: *"System notowań giełdowych"* (System of exchange quatations), Assist. Prof. **K. Ignasiak** (supervisor), (4,5).

[BSc29] Grzegorz Krzyżanowski: *"Łącze satelitarne na pasmo ultrakrótkie działające w systemie APRS"* (UHF-radio link in APRS system), Assist. Prof. **W. Kazubski** (supervisor), (5).

[BSc30] Beata Kuc: *"Opracowanie oraz badanie anteny UKF na pasmo 88-108 MHz"* (Design and investigation of VHF antenna for 88-108 MHz), Prof. **Y. Yashchyshyn** (supervisor), (5).

[BSc31] Tomasz Leśniak: *"Projekt planarnego, synfazowego szyku antenowego wykonanego w technice NLP"* (Design of planar in phase microstrip antenna array), Prof. **W. Gwarek** (supervisor), (4,5).

[BSc32] Grzegorz Liss: *"System zbierania i obróbki danych pomiarowych do badania propagacji w zakresie VHF"* (Collection and processing system of measurement data for VHF propagation research), Assist. Prof. **W. Kazubski** (supervisor), (4,5).

[BSc33] Krzysztof Liszewski: "*Analiza porównawcza regulatora PID oraz regulatorów wykorzystujących model procesu do sterowania temperaturą procesu przemysłowego"* (Comparative analysis of a PID and model based controllers for temperature control of an industrial process), Prof. **W. Winiecki** (supervisor), (5).

[BSc34] Radosław Malesa: *"Autonomiczny przetwornik analogowo-cyfrowy do pomiaru sygnałów biomedycznych"* (Autonomic analog-digital converter for measuring bioelectrical signals), Assist. Prof. **B. Konarzewski** supervisor), (3,5).

[BSc35] Radosław Marcinkowski: *"Wielokanałowy analizator amplitudy z interfejsem USB 2.0"* (Pulse height analyzer with USB 2.0 interface), Senior Lecturer **T. Jamrógiewicz** (supervisor), (5).

[BSc36] Piotr Marszał: *"Układ nadawczy radiowysokościomierza lotniczego pracującego z falą ciągłą zmodulowaną częstotliwościowo"* (Transmitter of a Frequency Modulated Radio Altimeter Operating in Continuous Wave Mode), Prof. **S. Rosłoniec** (supervisor), (5).

[BSc37] Michał Maruszak: *"Oprogramowanie oparte na systemie GPS dla platformy Windows Mobile™ wspomagające poruszanie się pieszych słabowidzących i niewidomych"* (Software based on GPS technology for Windows Mobile™ platform supporting the movement of both partially sighted and blind pedestrians), Assist. Prof. **W. Smolik** (supervisor), (5).

[BSc38] Karol Mazurek: *"Modernizacja oprogramowania do odbioru sygnału EKG"* (Design and implementation of software for elecrocardiography system), Prof. **J. Marzec** (supervisor), (4).

[BSc39] Wojciech Mazurek: *"Pomiary mikrofonów w polu fal odbitych wykorzystujące metodę MLS"* (Microphone measurements in free sound field using Maximum-Length Sequence Technique), Assist. Prof. **P. Bobiński** (supervisor), (4).

[BSc40] Rafał Mieszkowski: *"Aplikacja wspomagająca optymalizację usługi 1xEV-DO w systemie CDMA 2000"* (1xEV-DO CDMA 2000 optimalization tool), Docent **T. Kosiło** (supervisor), (5).

[BSc41] Arnold Mioduszewski: *"Perceptual analysis of chosen digital audio signal watermarking techniques",* Assist. Prof. **K. Snopek** (supervisor), (4).

[BSc42] Marcin Miśkiewicz: *"Symulator sieci UMTS z optymalizatorem mocy transformacji"* (UMTS network simulator with power transmission optimizer), Prof. **J. Wojciechowski** (supervisor), (4,5).

[BSc43] Piotr Tomasz Myszkowski: *"Zastosowanie elektrycznej tomografii pojemnościowej do wyznaczania rozkładu przestrzennego prędkości przepływu"* (Application of electrical capacitance tomography for estimation of flow velo-

city spatial distribution), Assist. Prof. **W. Smolik** (supervisor), (5).

[BSc44] Agnieszka Nieciecka: *"Projekt elementów głowicy elektronowego akceleratora śródoperacyjnego na podstawie symulacji metodami Monte Carlo"* (The project of introoperative electron accelerator head elements on the basis of Monte Carlo method simulation), Prof. **K. Zaremba** (supervisor), (5).

[BSc45] Dominika Nielipińska: *"Projekt anteny szczelinowo-falowodowej na pasmo 60 GHz"* (A 60 GHz waveguide slot antenna), Prof. **Y. Yashchyschyn** (supervisor), (5).

[BSc46] Artur Nosowski: *"Wzmacniacz nadajnika sygnału DRM"* (Amplifier of the DRM signal transmitter), Senior Lecturer **H. Chaciński** (supervisor), (5).

[BSc47] Sebastian Opałczyński: *"System telemedycyny "E-stetoskop"* (Telemedicine "E-stetoscop" system), Senior Lecturer **T. Jamrógiewicz** (supervisor), (5).

[BSc48] Grzegorz Orciuch: *"Sterowanie urządzeniami przez interfejs Bluetooth"* (Controlling devices through Bluetooth wireless link), Assist. Prof. **K. Ignasiak** (supervisor), (5).

[BSc49] Krzysztof Ostrowski: *"Układ sterownika do ultraszerokopasmowego systemu lokalizacyjnego"* (Implementation of ultrawideband localization system digital controller), Assist. Prof. **J. Kołakowski** (supervisor), (5).

[BSc50] Damian Pawłow: *"Program do symulacji propagacji czasowej fotonów światła metodą Monte Carlo"* (An application based on the Monte Carlo method for simulating light propagation in physical objects), Assist. Prof. **G. Domański** (supervisor), (5).

[BSc51] Tran Viet Phuong: *"Matlab implementation of OFDM transceiver",* Assist. Prof. **J. Misiurewicz** (supervisor), (4), studies in English.

[BSc52] Mateusz Pittner: *"Oprogramowanie do automatycznej klasyfikacji obszarów mózgu za pomocą PCA w funkcjonalnym rezonansie magnetycznym"* (Software for automatic classification of brain regions using PCA in functional magnetic resonance), Assist. Prof. **P. Bogorodzki** (supervisor), (4).

[BSc53] Michał Placha: *"Układ identyfikujący typ bramki antykradzieżowej"* (Device which can identify the type of anti-theft transmitter), Assist. Prof. **T. Buczkowski** (supervisor), (4).

[BSc54] Mateusz Płóciennik: *"Korekcja jednorodności obrazów scyntygraficznych "non-line"* (On-line uniformity correction of scintigraphy image), Docent **R. Szabatin** (supervisor), (4,5).

[BSc55] Przemysław Probola: *"Elektroniczny detektor lawinowy na częstotliwości 457 kHz"* (Avalanche beacon receiver for frequency band 457 kHz), Assist. Prof. **P. Kopyt** (supervisor), (4).

[BSc56] Andrzej Prokopowicz: *"Projekt i realizacja bezprzewodowego czujnika pomiarowego opartego na standardzie ZigBee"* (Project and realization of a wireless measurement transducer basing on ZigBee standard), Assist. Prof. **K. Mroczek** (supervisor), (5).

[BSc57] Tomasz Przedpełski: *"Implementacja sprzętowa interfejsu wizyjnego"* (Video interface hardware implementation), Assist. Prof. **G. Pastuszak** (supervisor), (4,5).

[BSc58] Maciej Ratyński: *"Cyfrowy interfejs audio do procesora sygnałowego SHARC ADSP-21364"* (Digital audio interface for SHARC ADSP-21364 digital sound processor), Assist. Prof. **P. Bobiński** (supervisor), (5).

[BSc59] Piotr Sapieżyński: *"Zaawansowane urządzenie rejestrujące dane do zastosowań w aparatach słuchowych"* (Advanced data-logging device for hearing aids applications), Assist. Prof. **P. Bobiński** (supervisor), (5).

[BSc60] Krzysztof Siejkowski: *"Projektowanie i implementacja cyfrowych odpowiedników filtrów analogowych w standardzie VST"* (The design and implementation of the digital representation of analog filters in the VST standard), Assist. Prof. **P. Bobiński** (supervisor), (5).

[BSc61] Maciej Stankiewicz: *"Wielokanałowy analizator amplitudy impulsów z interfejsem bezprzewodowym"* (Multichannel pulse amplitude analyzer using wireless interface), Senior Lecturer **T. Jamrógiewicz** (supervisor), (5).

[BSc62] Paweł Stankowski: *"Ocena zagrożenia słuchu u użytkowników odtwarzaczy osobistych"* (Estimation of damage risk from personal music players), Assoc. Prof. **J. Żera** (supervisor), (5).

[BSc63] Maciej Artur Studziński: *"Telemetryczny system do kontroli tętna podczas wysiłku fizycznego"* (Telemetric system for pulse control during physical exercise), Senior Lecturer **T. Jamrógiewicz** (supervisor), (5).

[BSc64] Tomasz Szczerba: *"Symulacja komputerowa toru transmisji danych w systemie UMTS"* (Computer simulation of data transmission link in the UMTS system), Assist. Prof. **K. Radecki** (supervisor), (4,5).

[BSc65] Kamil Szwaba: *"Znakowany rezonans magnetyczny i algorytm HARP. Podstawy teoretyczne i symulacje"* (Tagged magnetic resonance and HARP algorithm. Theoretical basis and simulations), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5).

[BSc66] Jerzy Świniarski: *"Analiza właściwości i praca nad dynamiką wiązki akceleratora Linac 4"* (Parameter analysis and beam dynamics of Linac 4), Prof. **K. Zaremba** (supervisor), (5).

[BSc67] Maciej Trochimiuk: *"Sprzętowa implementacja kontrolera pamięci DDR2 dla potrzeb kompresji danych wizyjnych"* (Hardware implementation of DDR2 memory controller for video compression

applications), Assist. Prof. **G. Pastuszak** (supervisor), (5).

[BSc68] Daniel Trofimiuk: *"System rejestracji wideo"* (Video recording system), Assist. Prof. **G. Galiński** (supervisor), (4,5).

[BSc69] Mariusz Trupinda: *"Redukcja przestrzennej rozdzielczości wideo"* (Video spatial resolution reduction), Assist. Prof. **A. Buchowicz** (supervisor), (5).

[BSc70] Mateusz Tulibacki: *"Projekt mobilnego systemu zdalnej lokalizacji pojazdów"* (Vehicle remote localization system), Assist. Prof. **T. Keller** (supervisor), (5).

[BSc71] Paweł Wasiluk: *"Analizator widma FFT z modułem symulacji sygnałów testowych"* (FFT spectrum analyzer with test signal simulation module), Docent **J. Cichocki** (supervisor), (5).

[BSc72] Paweł Janusz Wąsowski: *"Opracowanie algorytmu wyznaczającego lokalizację obiektu z wykorzystaniem techniki TDOA"* (Development of a TDOA based algorithm for object position determination), Assist. Prof. **J. Kołakowski** (supervisor), (5).

[BSc73] Jakub Wiszowaty: *"Energooszczędna lotnicza sieć czujnikowa na potrzeby komunikacji pokładowej oparta na standardzie ZigBee"* (Energy-efficient wireless sensor network for onboard communication based on ZigBee standard), Assist. Prof. **P. Kopyt** (supervisor), (5).

[BSc74] Krzysztof Witkowski: *"Antena retransmisyjna typu VAN ATTA"* (Retro directive VAN ATTA antenna array), Prof. **S. Rosłoniec** (supervisor), (3.5).

[BSc75] Michał Włodarczyk: *"Pomiary charakterystyk przenoszenia słuchawek z zastosowaniem różnych sprzęgaczy akustycznych"* (Measurements of earphones' frequency responses with a use of various acoustic couples), Assoc. Prof. **J. Żera** (supervisor), (5).

[BSc76] Marcin Wolski: *"Diplekser mikrofalowy z rezonatorami dielektrycznymi na częstotliwości ok. 10 GHz"* (Diplexer with dielectric resonator working in proximity of 10 GHz band), Assist. Prof. **K. Derzakowski** (supervisor), (4.5).

[BSc77] Michał Zyskowski: *"Implementacja sprzętowa dekwantyzera oraz odwrotnej transformaty całkowitoliczbowej standardu H.264/AVC"* (Hardware design of dequantization and inverse transform for H.264/AVC decoder), Assist. Prof. **G. Pastuszak** (supervisor), (4.5).

5.5 B.Sc. Evening Studies on Radiocommunications – B.Sc. Degrees

[BSc78] Albert Białkowski: *"Wzmacniacz mocy sygnału UKF-FM o niskim poziomie składowych niepożądanych"* (VHF-FM power amplifier with low level of spurious emissions), Assist. Prof. **J. Modzelewski** (supervisor), (5).

[BSc79] Jarosław Czuba: *"Badanie właściwości kart dźwiękowych do zastosowań studyjnych"* (Researching sound cards properties for their application in studios), Prof. **Z. Kulka** (supervisor), (4).

[BSc80] Piotr Kalinowski: *"Analiza i opracowanie interfejsu do sterowania urządzeń energetycznych przez moduł ethernetowy / WI-FI"* (Analysis and study interface to manage energy devices throught wireless ethernet / WI-FI), Assist. Prof. **K. Czerwiński** (supervisor), (5).

[BSc81] Andrzej Krawczyk: *"Wzmacniacz mikrofalowy o zwiększonej odporności na intermodulacje"* (Microwave amplifier with increased resistance to intermodulation), Assist. Prof. **J. Piotrowski** (supervisor), (5).

[BSc82] Wiesław Oleksa: *"Zarządzanie i rekonfigurowanie urządzeń i sieci SDH "* (Management and reconfiguration of SDH equipment and network), Docent **S. Kula** (supervisor), (4,5).

[BSc83] Marcin Orlikowski: *"Sieciowa przeciwbieżna przetwornica napięcia stałego"* (DMC flyback DC/DC converter), Assist. Prof. **M. Mikołajewski** (supervisor), (5).

[BSc84] Aleksandra Spik: *"Projekt i realizacja modelu światłowodowego czujnika drgań"* (Project and implementation of the vibration optical fibre sensor model), Assist. Prof. **L. Lewandowski** (supervisor), (5).

[BSc85] Łukasz Szymaniuk: *"Wzmacniacz rezonansowy klasy E bez zewnętrznej pojemności równoległej"* (High power class-E tuned amplifier without external shunt capacitor), Assist. Prof. **J. Modzelewski** (supervisor), (5).

[BSc86] Mateusz Woźniak: *"Odbiornik satelitarny pracujący w paśmie 137-138 MHz"* (Satellite receiver at 137-138 MHz band), Assist. Prof. **W. Kazubski** supervisor), (4,5).

[BSc87] Bartosz Zimnicki: *"Odbiornik satelitarny pracujący w pasmie 137-138 MHz"* (Satellite receiver at 137-138 MHz band), Asst. Prof. **W. Kazubski** (supervisor), (3,5).

[BSc88] Igor Żelazowski: *"Programowy symulator wielodrogowego kanału radiowego"* (The multipath radio channel software simulator), Assist. Prof. **K. Kurek** (supervisor), (5).

6 PUBLICATIONS

6.1 Scientific and technical books, chapters in books

[Pub1] P. Czarnecki, W. Smolik, R. Szabatin: “Electrical Capacitance Tomography System Architecture” in: D. Sankowski, J. Sikora (Eds.): *Electrical Capacitance Tomography*, *Wydawnictwo Książkowe Instytutu Elektrotechniki* (2010), 306 pp.

[Pub2] S. L. Hahn: “Hilbert Transforms” in: A. D. Poularikas (Ed.): “Transforms and Applications”, chapter 7, third edition, *CRC Press*, ISBN: 978-1-4200-6652-4 (2010), pp. 7-2 – 7-61.

[Pub3] M. Jasionowska, A. Przelaskowski, A. Rutczyńska, A. Wróblewska: “A Two-step Method for Detection of Architectural Distortions in Mammograms” in: E. Piętka et al. (Eds.): *Information Technologies in Biomedicine*, *Advances in Soft Computing*, *Springer-Verlag*, vol. 69 (2010), pp. 73-84.

[Pub4] R. Łukaszewski, P. Stefaniak: „Aplikacja wspomagająca analizę sieci CDMA” (CDMA Network Analysis Tool), in: *Informatyczne aspekty analizy danych*, *Wyd. SGGW,* (2010), Warsaw, pp. 43-53.

[Pub5] J. Modelski, R. Romaniuk: “Elektronika i telekomunikacja w Polsce i na świecie – przegląd problematyki” (Electronics and Telecommunications in Poland and over the World – Problems Overview), in: *Analiza stanu i kierunki rozwoju elektroniki i telekomunikacji*, J. Modelski (Ed.), *Oficyna Wydawnicza PW* (2010), ISBN: 978-83-7207-867-4, pp. 7-46.

[Pub6] C. Niedziński, R. Z. Morawski: "Bayesowska metoda estymacji stężeń na podstawie danych spektrofotometrycznych" (A Bayesian Method for Estimation of Concentrations on the basis of Spectrometric Data), in: *Problemy metrologii elektronicznej i fotonicznej* (Problems of Electronic and Photonic Metrology) (ed. J. Mroczka), *Oficyna Wydawnicza Politechniki Wrocławskiej*, (Wrocław 2010), pp. 55–106.

[Pub7] G. Ostrek, A. Przelaskowski, A. Duplaga, A. Rutczyńska: “Perception Enhancement of Bronchoscopic Video”, in: E. Piętka et al. (Eds.): *Information Technologies in Biomedicine*, *Advances in Soft Computing*, *Springer-Verlag*, vol. 69 (2010), pp. 599-610.

[Pub8] A. Przelaskowski, R. Jóźwiak: “Three Stage Method Assisting Endobronchial Tumor Mass Recognition in Bronchoscopy Images”, in: E. Piętka et al. (Eds.): *Information Technologies in Biomedicine*, *Advances in Soft Computing*, *Springer-Verlag*, vol. 69 (2010), pp. 559-570.

[Pub9] A. Rutczyńska, A. Przelaskowski, M. Jasionowska, G. Ostrek: “The Method of Brain Structure Extraction for CT-based Stroke Detection”, in: E. Piętka et al. (Eds.): *Information Technologies in Biomedicine*, *Advances in Soft Computing*, *Springer-Verlag*, vol. 69 (2010), pp. 133-144.

6.2 Scientific and technical papers in journals

6.2.1 JCR-ISI list journals (IF>0)

[Pub10] M. Alekseev, V. Yu. Alexakhin, (…), J. Marzec, A. Padèe, R. Sulej, K. Zaremba, M. Ziembicki: “The Spin-dependent Structure Function of the Proton g^{p}_{1} and a Test of the Bjorken Sum Rule”, *Physics Letters B*, vol. 690 (2010), pp. 466-472.

[Pub11] M. Alekseev, V. Yu. Alexakhin, (…), J. Marzec, A. Padèe, R. Sulej, K. Zaremba, M. Ziembicki: “Quark Helicity Distributions from Longitudinal Spin Asymmetries in Muon-Proton and Muon-Deuteron Scattering”, *Physics Letters B*, vol. 693 (2010), pp. 227-235.

[Pub12] M. Alekseev, V. Yu. Alexakhin, (…), J. Marzec, A. Padèe, R. Sulej, K. Zaremba, M. Ziembicki: “Measurement of the Collins and Sivers Asymmetries on Transversely Polarised Protons”, *Physics Letters B*, vol. 692 (2010), pp. 240-246.

[Pub13] M. Alekseev, V. Yu. Alexakhin, (…), J. Marzec, A. Padèe, R. Sulej, K. Zaremba, M. Ziembicki: “Observation of a $J^{PC} = 1^{-+}$ Exotic Resonance in Diffractive Dissociation of 190 GeV/cπ^- into $\pi^- \pi^- \pi^+$” , *Physical Review Letters* , vol. 104 (2010), 7. pp.

[Pub14] P.Bilski, W. Winiecki: “Multi-core Implementation of the Symmetric Cryptography Algorithms in the Measurement System”, *Measurement*, vol. 43, pp. 1049-1060.

[Pub15] A. Izmaylov, (…), M. Dziewiecki, R. Kurjata, J. Marzec, R. Sulej, K. Zaremba, M. Ziembicki: “Scintillator Counter with WLS Fiber/MPPC Readout for the Side Muon Range Detector (SMRD) of the T2K Experiment”, *Nuclear Instruments and Methods in Physics Research A*, vol. 623 (2010), pp. 382-384.

[Pub16] M. Jasionowska, A. Przelaskowski, R. Jóźwiak: “Characteristics of Architectural Distortions in Mammograms: Extraction of Texture Orientation with Gabor Filters”, part I, *Lecture Notes in Computer Science 6374, Springer* (2010), pp. 420-430.

[Pub17] J. Krupka, W. Gwarek, J. G. Hartnett: "Experimental Studies of Planar Metamaterials with a Tunable Cylindrical TE01n Mode Cavity", *Journal of Applied Physics*, vol. 107, issue 12 (2010), pp. 124101-1-124101-8.

[Pub18] J. Krupka, W. Gwarek, N. Kwietniewski, J. G. Hartnett: “Measurements of Planar Metal-Dielectric Structures Using Split-Post Dielectric Resonators”, *IEEE Trans. Microwave Theory Tech.,* vol. 58, no. 12 (2010), pp. 3511-3518.

[Pub19] M. Lewandowska, E. Piątkowska-Janko, P. Bogorodzki, T. Wolak, E. Szeląg: "Changes in fMRI BOLD Response to Increasing and Decreasing Task Difficulty During Auditory Perception of Temporal Order", *Neurobiology of Learning and Memory*, vol. 94, issue 3, pp. 382-391, doi: 10.1016/j.nim.2010.08.005.

[Pub20] J. Modzelewski: "Obwody typu π1 o małej dobroci wypadkowej w rezonansowych wzmacniaczach mocy" (Π1 Resonant Circuits with Low Loaded Quality Factor in Tuned Power Amplifiers), *Przegląd Elektrotechniczny*, vol. LXXXVI, no. 11a (2010), pp. 200-203.

[Pub21] P. Piela, T. Michałowski, R. Miltko, K. W. Szewczyk, R. Sikora: "Can a Fermentation Gas Mainly Produced by Rumen *Isotrichidae* Ciliates be a Potential Source of Biohydrogen and a Fuel for a Chemical Fuel Cell?", *Journal of Microbiology and Biotechnology*, vol. 7, no. 20 (2010), pp. 1092-1100.

[Pub22] A. Przelaskowski: "The Role of Sparse Data Representation in Semantic Image Understanding", part I, *Lecture Notes in Computer Science 6374*, *Springer* (2010), pp. 69-80.

[Pub23] W. Rosłoniec: „Digital Processing of Radar Sigals Using Industrial Computers with Vector AltiVec Units", *Journal of the Frankin Institute*, vol. 347 (2010), pp. 1452-1467.

[Pub24] A. Rudziński: "Oszacowanie dopuszczalnej nieliniowości trzeciego rzędu wzmacniacza sygnału OFDM" (Estimation of Acceptable Third Order Nonlinearity of OFDM Signal Amplifier), *Przegląd Elektrotech.* no. 4 (2010) pp. 323-326.

[Pub25] B. Salski, M. Celuch, W. Gwarek: "FDTD for Nanoscale and Optical Problems", *IEEE Microwave Magazine*, vol. 11, no. 2 (2010), pp. 50-59.

[Pub26] W. T. Smolik: "Forward Problem Solver for Image Reconstruction by Nonlinear Optimization in Electrical Capacitance Tomography", *Flow Measurement and Instrumentation*, vol. 21, issue 1 (2010), pp. 70-77.

[Pub27] W. Święszkowski, W. T. Smolik, N. Danz, E. Forester, J. P. Kaiser, A. Bruinink, K. J. Kurzydłowski: "Micro Sensor for Cell Force Measurement", *Sensor Letters*, vol. 8, no. 5 (2010), pp. 1-6.

[Pub28] M. Ziembicki, (…), R. Sulej, M. Dziewiecki, R. Kurjata, J. Marzec, K. Zaremba: "The SMRD Subdetector at the T2K Near Detector Station", *Acta Physica Polonica B*, vol. 41, no. 7 (2010), pp. 1579–1584.

[Pub29] Y. Yashchyshyn, J. Marczewski, D. Tomaszewski: "Investigation of the S-PIN Diodes for Silicon Monolithic Antennas with Reconfigurable Aperture", *IEEE Transactions on Microwave Theory and Techniques*, vol. 58, no. 5 (2010), pp. 1100-1106.

6.2.2 MSHE list journals

[Pub30] P. R. Bajurko, Y. Yashchyshyn: "Antena do transmisji sygnału DVB z samolotu bezzałogowego przeznaczonego do celów zdalnego monitorowania" (The DVB Antenna for Unmanned Plane Destined for Remote Monitoring), *Przegląd Telekomunikacyjny - Wiadomości Telekomunikacyjne*, vol. LXXIX, no. 6 (2010), pp. 604-607.

[Pub31] P. Bajurko, Y. Yashchyshyn: "Anteny rekonfigurowalne i metody ich pomiaru" (Reconfigurable Antennas and Applicable Measurement Methods), *Przegląd Telekomunikacyjny i Wiadomości Telekomunikacyjne*, vol. LXXIX, no. 12, pp. 1712-1715.

[Pub32] K. Bielecki, W. Smolik, R. Szabatin: "Oprogramowanie ECTsim do modelowania w elektrycznej tomografii pojemnościowej" (ECT sim Software for Modelling in Electrical Capacitance Tomography), *Przegląd Telekomunikacyjny - Wiadomości Telekomunikacyjne* (2010), vol. LXXIX, no. 12, pp. 1755-1758.

[Pub33] P. Bilski, W. Winiecki: "Analiza możliwości wykorzystania obliczeń kwantowych do realizacji bezpiecznego systemu pomiarowego" (Analysis of Designing the Quantum Computing-based Secure Measurement System), *PAK*, no. 11, vol. 56, pp. 1336-1338.

[Pub34] P. Bobiński, B. Bielawski, P. Nykiel: "Implementacja synchronicznego konwertera częstotliwości próbkowania z wykorzystaniem modularnego systemu przetwarzania sygnałów fonicznych" (Implementation of Synchronous Sample Rate Converter Using Modular Audio Processing System), *Elektronika-Konstrukcje-Technologie-Zastosowania,* no. 3 (2010), pp. 14-17.

[Pub35] P. Bobiński, M. Ratyński: "Cyfrowy interfejs audio do procesora sygnałowego SHARC ADSP-21364" (Digital Audio Interface for SHARC ADSP-21354), *Przegląd Telekomunikacyjny - Wiadomości Telekomunikacyjne* (2010), vol. LXXIX, no. 12, pp. 1741-1743.

[Pub36] J. Bogucki, J. Jarkowski, E. Wielowieyska: "Czynniki wpływające na bilans energetyczny łączy radiowych w zakresie fal milimetrowych" (Factors Influencing on Energetic Balance of Radio Links in the Range of Millimeter Waves), *Przegląd Telekomunikacyjny - Wiadomości Telekomunikacyjne*, vol. LXXIX, no. 6 (2010), pp. 629-632.

[Pub37] K. Bryłka, K. Kurek, T. Keller: "Porównanie urządzeń pracujących w oparciu o standard WIMAX/802.16-2004" (Comparison of Devices Working in WIMAX/802.16-2004 Standard), *Przegląd Telekomunikacyjny - Wiadomości Telekomunikacyjne*, vol. LXXIX, no. 6 (2010), pp. 328-331.

[Pub38] A. Buchowicz, G. Galiński: “Wpływ podziału ramek na plastry na efektywność strumieniowania danych wideo MPEG-4 AVC/H.264” (The Dependency between the Frames Slicing and the Effectiveness of Streaming MPEG-4 AVC/H.264 Video), *Przegląd Telekomunikacyjny - Wiadomości Telekomunikacyjne*, vol. LXXIX, no. 6 (2010), pp. 600-603.

[Pub39] A. Buchowicz, G. Galiński: “Strumieniowanie danych wideo kodowanych w standardzie MPEG+4 AVC-H.264” (Streaming of the MPEG+4 AVC-H.264 Video), *Przegląd Telekomunikacyjny - Wiadomości Telekomunikacyjne* (2010), vol. LXXIX, no. 12, pp. 1727-1731.

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[Pub197] I. Szatkowska, L. Gawrys, A. Pilaciński, E. Piątkowska-Janko, P. Bogorodzki, T. Wolak, M. Falkiewicz, A. Friedman, L. Królicki, L. Kaczmarek: "Neural Substrates of Cognitive Dysfunction in Parkinson's Disease", *Proc. 6th Annual Meeting of the Organization for Human Brain Mapping* (Barcelona, Spain, Jun. 5-11, 2010), poster.

6.5.1 Other publications

[Pub198] P. Andrzejewski, M. Płóciennik: "Gammakamera *Hand-Held* dla wspomagania operacji onkologicznych" (*Hand-Held* Gammacamera Supporting Oncological Surgery) in: A. Jakubiak (Ed.): *Prace Studenckich Kół Naukowych WEiTI PW, Oficyna Wydawnicza PW,* ISBN:978-83-7207-922-0 (2010), pp. 165-177.

[Pub199] R. Czarnecki, A. Dulka, P. Dymarski, R. Grucza, J. Guterman, W. Haka, M. Józefiak, G. Kantowicz, S. Kula, Z. Kulka, (…), T. Morawski, (..), R. Szumny, M. Witucki: "10 lat Fundacji Wspierania Rozwoju Radiokomunikacji i Technik Multimedialnych – Refleksje" (10 Years of Foundation for the Development of Radiocommunication and Multimedia Technologies), *Wyd. Fundacji Wspierania Rozwoju Radiokomunikacji i Technik Multimedialnych PW,* (2010), 50 pp.

[Pub200] B. Radzik, M. Pachocki: "Tomograf pojemnościowy IREna" (IREna Capacitance Tomograph) in: A. Jakubiak (Ed.): *Prace Studenckich Kół Naukowych WEiTI PW, Oficyna Wydawnicza PW,* ISBN: 978-83-7207-922-0 (2010), pp. 199-208.

[Pub201] J. Modelski: "W poszukiwaniu polskiej Nokii" (Searching Polish Nokia), in: B. Węgliński (Ed.) *Zarządzanie własnością intelektualną*, *IP Management Poland,* ISBN: 978-83-931-897-79 (2010), pp. 31-32.

[Pub202] J. Modelski: "Świat już to wie" (The World Already Knows This), in: B. Węgliński (Ed.) *Zarządzanie własnością intelektualną*, *IP Management Poland,* ISBN: 978-83-931-897-79 (2010), pp. 174-175.

[Pub203] J. Modelski, K. Zaremba, Z. Pawłowski, J. Ebert, T. Morawski, T. Kosiło, M. Rusin, W. Skarbek, R. Z. Morawski, A. Leszczyński: "XL lat Instytutu Radioelektroniki, czyli czterdzieści lat minęło jak jeden dzień" (XL Years of the Institute of Radioelectronics), *Wyd. IR PW* (2010), 166. pp.

6.6 Books and special issues edited by the staff

[Pub204] J. Cichocki, K. Zaremba (Eds.): "XL lat Instytutu Radioelektroniki, czyli czterdzieści lat minęło jak jeden dzień" (XL Years of the Institute of Radioelectronics), *Wyd. IR PW* (2010), 166. pp.

[Pub205] A. Przelaskowski (Ed.): *Zeszyty Naukowe Informatyki - Wyższa Szkoła Przedsiębiorczości i Nauk Społecznych w Otwocku,* vol. 1, no. 1 (2010) ISBN-978-83-924187-0-2, 72 pp.

[Pub206] J. Wojciechowski (Guest Editor): *International Journal of Electronics and Telecommunications*, vol. 56, no. 3 (2010).

7 RESEARCH REPORTS

[Rep1] A. Buchowicz, J. Modelski, M. Dąbrowski: *"Przegląd światowych rozwiązań technicznych w kontekście zmiany systemu nadawania programu telewizyjnego z analogowego na cyfrowy wraz ze wskazaniem kierunków rozwoju i zakresu niezbędnych parametrów dla rozwiązań STB (set top box) dla polskich sieci operatorów telewizji kablowej"* (Analysis of Global Technical Solutions in the Context of Changes in Television Broadcasting System from Analog to Digital with an Indication of Future Direction and Scope of Necessary Parameters for Solutions STB (Set Top Box) for Polish Cable TV Operator Network), Final report for Polish Chamber of Electronic Communications (Polska Izba Komunikacji Elektronicznej), Warsaw, May 2010.

[Rep2] J. Cichocki, J. Kołakowski, R. Michnowski, K. Radecki, W. Kiełek, S. Żmudzin, P. Makal, P. Ziętek: *"Sygnały w ultraszerokopasmowych systemach lokalizacyjnych"* (Signals in Ultra-wideband Positioning Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Nov. 2010.

[Rep3] W. Gwarek, T. Morawski, S. Rosłoniec, M. Celuch, D. Gryglewski, M. Sypniewski, A. Więckowski, P. Kopyt, P. Miazga, W. Wojtasiak, J. Zborowska, K. Robaczyński, B. Salski, D. Rosołowski, M. Sołtysiak, M. Lubiejewski: *„Metody modelowania i projektowania układów wielkiej częstotliwości"* (Methods of Modelling and Designing for High Frequency Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep4] S. L. Hahn, K. M. Snopek: *„The unified theory of complex and hypercomplex analytic signals"*, Internal report no. 1, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep5] S. L. Hahn, K. M. Snopek: *„Various Approaches to the Theory of Complex and Hypercomplex Analytic Signals"*, Internal report no. 2, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep6] K. Ignasiak, W. Skarbek, G. Galiński, A. Buchowicz, G. Pastuszak, R. Sikora, M. Jakubowski, M. Jędryka, M. Leszczyński, J. Naruniec, A.Nowakowski, A. Abramowski, G. Brzuchalski, M. Roszkowski, R. Jóźwiak, G. Ostrek, M. Jasionowska, A. Rutczyńska: *„Audiowizualne sieciowe systemy hybrydowe"* (Audiovisual Network Hybrid Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep7] J. Jarkowski, K. Kurek, T. Keller, A. Dusiński E. Wielowieyska, J. Modzelewski, W. Kazubski, H. Chaciński: *„Radiofoniczne sieci cyfrowe, narzędzia i metody ich projektowania oraz emisje doświadczalne"* (Digital Radio Broadcasting – Project Tools and Methods, Test Emissions), Final raport for the Commissioned Research Project, Warsaw, Dec. 2010.

[Rep8] T. Kosiło, S. Hahn, T. Buczkowski, K. Czerwiński, K. Snopek: *"Współczesne radiowe systemy mobilne – wybrane problemy"* (Modern Mobile Broadcasting Systems – Selected Problems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep9] Z. Kulka, P. Bobiński, E. Kotarbińska, A. Leszczyński, A. Młyńska, M. Tajchert, J. Żera: *"Projektowanie i badania systemów elektroakustycznych oraz systemów cyfrowego przetwarzania sygnałów fonicznych"* (Design and Investigation of Electroacoustics Measuring Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep10] K. Kurek, S. Szczygielski, T. Biały, P. Durlej, K. Gawda, A. szewczyk, P. Chmielewski: *"System elektroniki pokładowej kapsuły dla stratosferycznych misji balonowych – etap drugi"* (Capsule Board Electronics System for the Stratospheric Balloon Missions – the Second Part), Final report for the Rector grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep11] J. Modzelewski, W. Kazubski, M. Mikołajewski, H. Chaciński: *"Doskonalenie metod projektowania obwodów rezonansowych do wzmacniaczy mocy wielkiej częstotliwości"* (Improving Design Methods of Resonant Circuits in H.F. Power Amplifier), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep12] R. Z. Morawski, A. Miękina, A. Podgórski: *"Interpretacja danych pomiarowych – metodyka i aspekty meta-metrologiczne"* (Interpretation of Measurement Data - Methodology and Meta-metrological Aspects), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep13] E. Piątkowska-Janko, P. Chmielewski, P. Kamiński, M. Pachocki, A. M. Laskowski, B. Radzik: *"Stworzenie przenośnego urządzenia do bezinwazyjnego monitorowania krwi"* (Creation of Mobile Device for Noninvasive Blood Monitoring), Final report for the Rector grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep14] W. Skarbek, K. Wnukowicz: *"Opracowanie oprogramowania dla technologii analizy scen wideo"* (Development of Software for Video Scene Analysis Technologies), Final report for Mitsubishi Electric R&D Centre Europe, UK, Warsaw, Mar. 2010.

[Rep15] R. Szabatin, P. Brzeski, W. Smolik, T. Olszewski, J. Mirkowski, A. Pląskowski, P. Czarnecki: *"Wielopłaszczyznowy tomograf pojemnościowy do pomiaru prędkości przepływu"* (Multi-plane Capacitance Tomograph for Flow Speed Measurement), Final report for development grant, Warsaw, Apr. 2010.

[Rep16] W. Winiecki, K. Mroczek, P. Bilski, R. Łukaszewski, T. Daniluk, J. Olszyna: *"Rozwój metod projektowania stacjonarnych i rozproszonych systemów pomiarowych"* (Development of Computer Stationary and Scattering Measuring Systems Designing), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep17] J. Wojciechowski, Z. Walczak, A. Dominik, M. Czajko: *"Optymalne projektowanie sieci"* (Optimum Networks Designing), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep18] W. Wojtasiak, D. Gryglewski: *"Wielopasmowy transwerter dla sieci mesh 802.11 s"* (Multi-band Transverter for 802.11 s Networks), Final report for Commissioned Research Project, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep19] W. Wojtasiak, D. Gryglewski: *"Wykonanie analizy w zakresie wpływu budowy terminala pasażerskiego na wskazania radaru wtórnego będącego w zarządzaniu Polskiej Agencji Żeglugi Powietrznej"* (Analysis of the Construction of Passenger Airport Terminal on the Operation of the Secondary Surveillance Radar Operated by Polish Air Navigation Services Agency), Final report for Gdańsk Airport Ltd. (Port Lotniczy Gdańsk, Spółka Akcyjna), Warsaw, Aug. 2010.

[Rep20] Y. Yashchyshyn, M. Dąbrowski, K. Bryłka, J. Modelski, K. Kurek, T. Keller, K. Derzakowski: *"Analiza parametrów anteny falowo-szczelinowej w zastosowaniach do anten o rekonfigurowalnej aperturze"* (Analysis of Wave-Slotted Antenna Parameters Applied to Antennas with Reconfigurated Aperture), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2010.

[Rep21] K. Zaremba, P. Bogorodzki, P. Brzeski, G. Domański, T. Jamrógiewicz, M. Kazubek, B. Konarzewski, J. Marzec, T. Olszewski, E. Piątkowska-Janko, D. Radomski, W. Smolik, R. Szabatin, R. Kurjata, A. Trybuła: *"Nowoczesne techniki elektroniki jądrowej i medycznej"* (Modern Techniques in Nuclear and Medical Electronics), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Nov. 2010.

[Rep22] K. Zaremba, M. Dziewiecki, M. Ziembicki: *"Opracowanie i wykonanie dodatkowych elektronicznych układów zabezpieczających kontrolnych do zestawu mobilnej radiografii neuronowej"* (Design and Implementation of an Additional Protection and Control System for Mobile Neutron Radiography System), Final report for Andrzej Soltan Institute for Nuclear Studies (Instytut Problemów Jądrowych im. Andrzeja Sołtana), Warsaw, Jun. 2010.

PATENTS

[Pat1] W. Gwarek, T. Ciamulski: *"Sposób przesyłania sygnałów elektrycznych w wieloprzewodowej linii transmisyjnej"* (The way of sending electrical signals in multi-conductor transmission line), Patent application P. 365915, Sept. 24, 2010.

[Pat2] S. Kozłowski: *"Sposób odbioru sygnału w systemie MIMO z multipleksacją przestrzenną za pomocą szyków antenowych"* (The method of receiving signal in spatial multiplexing MIMO system by means of array antennas), Patent application P. 393314, Dec. 16, 2010.

[Pat3] Y. Yashchyshyn, J. Modelski, M. Szafran, E. Bobryk: *"Antena skanująca"* (Scanning antenna), Polish patent, No. 206802, Sept. 30, 2010.

8 SCIENTIFIC EVENTS

8.1 International scientific events

[Con1] *International Conference on Modern Problems of Radio Engineering, Telecommunications and Computer Science* (Lviv-Slavske, Ukraine, Feb. 23-27, 2010), Y. Yashchyshyn (member of the Organizing Committee, invited speaker).

[Con2] *European Congress of Radiology: ECR 2010 Conference* (Vienna, Austria, Mar. 5-6, 2010), P. Bogorodzki (invited speaker).

[Con3] *IEEE EuCAP 2010 Conference* (Barcelona, Spain, Apr. 11-14, 2010), J. Modelski, Y. Yashchyshyn (speakers).

[Con4] *ACES 2010* (Tampere, Finland, Apr. 26-29, 2010), W. Gwarek (session chair, speaker).

[Con5] *ISMRM-ESMRB 2010 Conference* (Stockholm, Sweden, Apr. 30-May 7, 2010), E. Piątkowska-Janko (speaker).

[Con6] *2010 International Microwave Symposium on IEEE Microwave Theory and Techniques Society: IEEE MTT-S IMS* (Anaheim, USA, May 21-28, 2010), J. Modelski (member of the Technical Paper Review Committee, speaker), M. Celuch, W. Gwarek (speakers).

[Con7] *TEMPMEKO&ISHM 2010 Conference* (Portoroz, Slovenia, May 27 - Jun. 2, 2010), R. Z. Morawski (speaker).

[Con8] *16th Annual Meeting of the Organization for Human Brain Mapping* (Barcelona, Spain, Jun. 5-11, 2010), E. Piątkowska-Janko (speaker).

[Con9] *2nd International Conference: Information Technologies in Biomedicine* (Kamień Śląski, Poland, Jun. 8-9, 2010), R. Jóźwiak, G. Ostrek, A. Przelaskowski (speaker), invited speaker.

[Con10] *4thMicrowave & Radar Week 2010* (Vilnius, Lithuania, Jun. 14-16, 2010), J. Modelski (co-chair of Microwave & Radar Week), W. Gwarek (co-chair of Technical Program Committee), Y. Yashchyshyn (member of Technical Program Committee).

[Con11] *IAU International Conference "Ethics and Values in Higher Education"* (Vilnius, Lithuania, Jun. 24-26, 2010), R. Z. Morawski (speaker).

[Con12] *IEEE International Conference on Imaging Techniques 2010* (Tessaloniki, Greece, Jun. 30 - Jul. 4, 2010), W. Smolik (speaker).

[Con13] *2010 International Symposium on Electric Vehicles; II Conference of Polish Society for Ecological Vehicles (PTPE)* (Warsaw, Poland, Jul. 7-8, 2010), J. Modelski (member of the Programme Committee), T. Kosiło (speaker).

[Con14] *JCNS Workshop Modern Trends in Production and Applications of Polarized 3He* (Ismaning, Germany, Jul. 10-13, 2010), Ł. Kołaszewski, W. Obrębski (speaker).

[Con15] *SibirCon 2010, IEEE International Conference on Computational Technologies in Electrical and Electronics Engineering* (Irkutsk Listvyanka, Russia, July 11-15, 2010), J. Modelski (Honorary Chair, plenary speech).

[Con16] *IMEKO-TC7 Symposium* (London, UK, Aug. 31 - Sept. 6, 2010), R. Z. Morawski (speaker).

[Con17] *IEEE International Conference on Signals and Electronic Systems: ICSES 2010* (Gliwice, Poland, Sept. 7-10, 2010), D. Piętak (speaker).

[Con18] *CPEE 2010* (Lázně Kynžvart, Czech Republic, Sept. 12-17, 2010), P. Bilski (speaker).

[Con19] *9th International Symposium on EMC Joint with 20th International Wroclaw Symposium on EMC* (Wrocław, Poland, Sept. 13-17, 2010), J. Kołakowski (speaker).

[Con20] *The 13th European Microwave Week 2010* (Paris, France, Sept. 26-Oct. 1, 2010), J. Modelski (chair of EuWiT), J. Kołakowski, Y. Yashchyshyn (speakers).

[Con21] *ICT 2010* (Brussels, Belgium, Sept. 26-29, 2010), A. Przelaskowski (speaker).

[Con22] *X*th *International Scientific Conference: TST 2010* (Katowice, Poland, Oct. 20, 2010), J. Modelski (speaker).

[Con23] *37*th *International Conference and Exhibition: PIKE 2010* (Sopot, Poland, Oct. 17-19, 2010), A. Buchowicz (speaker).

[Con24] *HistelCon 2010, The 2nd IEEE Conference on the History of Telecommunications* (Madrid, Spain, Nov. 3-5, 2010) J. Modelski (plenary speech).

[Con25] *EnergyCon 2010, IEEE International Energy Conference & Exhibition,* (Manama, Bahrain Dec. 18-21, 2010), J. Modelski (Honorary Chair, opening address).

8.2 National scientific events

[Con26] *XXXIX Zjazd Polskiego Lekarskiego Towarzystwa Radiologicznego* (XXXIXth Congress of the Polish Radiology Doctors Society), (Szczecin, Poland, May 28-29, 2010), S. Adaszewski, P. Bogorodzki, K. Kamińska, B. Sawionek (speakers).

[Con27] *XVI Krajowa Konferencja: Biocybernetyka i Inżynieria Biomedyczna* (XVIth National Confe rence on Biocybernetics and Biomedical Engineering) (Warsaw, Poland, Apr. 26-29, 2010), M. Jasionowska, A. Rutczyńska, G. Ostrek (speakers).

[Con28] *II Ogólnopolska Konferencja: Inżynieria Biomedyczna – Edukacja (OKIBEdu)* (IInd National Conference: Biomedical Engineering and Education), (Cracow, Poland, May 27-28, 2010), K. Zaremba (speaker).

[Con29] *Konferencja Naukowa "Tendencje rozwoju metrologii i aparatury naukowej"* (Scientific Conference Tendencies of Development the Metrology and Scientific Devices), (Koszalin, Poland, May 27, 2010), W. Winiecki (speaker).

[Con30] *IX Krajowa Konferencja Elektroniki: KKE* (IXth National Conference on Electronics) (Darłówko Wschodnie, Poland, May 30-Jun. 2, 2010), T. Morawski, J. Wojciechowski (members of the Scientific Committee), J. Modzelewski (speaker).

[Con31] *Krajowa Konferencja Radiokomunikacji, Radiofonii i Telewizji: KKRRiT 2010* (National Conference on Radiocommunications and Broadcasting), (Cracow, Poland, Jun. 16-18, 2010), J. Modelski, A. Buchowicz, T. Buczkowski, H. Chaciński, J. Cichocki, Y. Yashchyshyn J. Jarkowski, K. Kurek, B. Majewski, P. Klonowski, W. Kazubski, K. Radecki (members of the Programme Committee), P. Ziętek, P. Makal, A. Urzędowska (speakers).

[Con32] *VIII Konferencja Naukowa SP'2010: Systemy pomiarowe w badaniach naukowych i w przemyśle* (VIIIth Scientific Conference: Measurement Systems in the Scientific Researches and in Industry) (Łagów, Poland, Jun. 21-23, 2010), W. Winiecki, R. Łukaszewski, P. Bilski, P. Czernik, J. Olszyna, P. Zawistowski (speakers).

[Con33] *V Kongres Metrologii* (Vth Congress of Metrology) (Łodź, Poland, Sept. 7-8, 2010), W. Winiecki (participant), R. Z. Morawski (invited speaker).

[Con34] *XII Zjazd Polskiego Towarzystwa Medycyny Nuklearnej*, (XIIth Meeting of the Polish Society of Nuclear Medicine) (Wrocław, Poland, Sept. 8-11, 2010), R. Szabatin (speaker).

[Con35] *Konferencja Doktorantów I Młodych Naukowców* (PhD Students' and Young Scientists Conference) (Warsaw, Poland, Sept. 13-16, 2010), P. Makal (member of the Organizing Committee), P. Ziętek (speaker).

[Con36] *IX Zjazd Polskiego Towarzystwa Neurofizjologii Klinicznej* (Proc. IXth Seminar of the Polish Society of Clinical Neurophysiology) (Cracow, Poland, Oct. 14-16, 2010), E. Piątkowska-Janko, P. Bogorodzki, T. Wolak (speakers).

[Con37] *XII Sympozjum: Nowości w Technice Audio i Wideo* (XIIth Symposium: New Trends in Audio and Video) (Szczecin, Poland, Oct. 14-16, 2010), Z. Kulka, P. Bobiński, M. Lewandowski (speakers).

[Con38] *VI Sympozjum Naukowe Techniki Przetwarzania Obrazu: TPO 2010* (VIth Symposium on Image Processing Technology) (Serock, Poland, Nov. 18-20, 2010), A. Nowakowski (speaker).

[Con39] *Konferencja: Usługi i sieci teleinformatyczne następnej generacji - aspekty techniczne, aplikacyjne i rynkowe* (Next Generation Services and Networks – Technical, Application and Market Aspects) (Warsaw, Poland, Nov. 23-24, 2010), J. Jarkowski, K. Kurek, W. Kazubski (speakers).

[Con40] *XI Seminarium: Radiokomunikacja i Techniki Multimedialne* (XIth Seminar: Radiocommunications and Multimedia Technologies) (Warsaw, Poland, Dec. 8, 2010), A. Białkowski, A. Kozień, B. Kuc, M. Jakubowski, B. Majewski, M. Olszewska, M. Pietrzak, D. Rosołowski, A. Świercz, A. Urzędowska (speakers).

9 AWARDS AND DISTINCTIONS

State Medals

Józef Modelski, Prof. D.Sc.

Srebrny Medal Senatu RP (Silver Medal granted by the Senat of the Republic of Poland).

Jacek Wojciechowski, Prof. D.Sc.

Medal Komisji Edukacji Narodowej (Medal of National Education Commiittee).

Karol Radecki, Ph.D.

Medal Złoty za Długoletnią Służbę (Golden Medal for Long-lasting Service).

Award by General Staff of the Polish Armed Forces

Józef Modelski, Prof. D.Sc.,
Stanisław Rosłoniec, Prof. D.Sc.

Medal Złoty za Zasługi dla Obronności Kraju (Golden Medal for Contribution to Defences of Country).

Award by Association of Polish Electrical Engineers (SEP)

Józef Modelski, Prof. D.Sc.

Medal im. Prof. J. Groszkowskiego (Prof. J. Groszkowski Medal)

Prof. B. Hołdys Competition Award

Rafał Korycki, M.Sc.

Individual award granted by Polish Criminalistic Association for the outstanding achievements in crime detection.

Awards of the Rector

Tadeusz Morawski, Prof. D.Sc.

Individual I^0 award for the outstanding scientific and didactic achievements.

Marek Bury, Ph.D.

Individual II^0 award for Ph.D. Thesis

Roman Z. Morawski, Prof. D.Sc.,

Individual III^0 award for the outstanding organizational achievements.

Krzysztof Zaremba, Prof. D.Sc.,

Individual award for the didactic achievements.

Wojciech Gwarek, Prof. D.Sc.
Małgorzata Celuch, Ph.D.,
Paweł Kopyt, Ph.D.,
Bartłomiej Salski, M.Sc.

Team scientific I^0 award for 29 publications from JCR-ISI list.

Jerzy Krupka, Prof. D.Sc.,
Roman Z. Morawski, Prof. D.Sc.,
Andrzej Miękina, Ph.D.,
Leszek Opalski, Prof. D.Sc.

Team scientific I^0 award for the academic book: *"Introduction to numerical methods for the students of electronics and information technology"*

Roman Z. Morawski, Prof. D.Sc.,
Andrzej Pacut, Prof. D.Sc.,
Roman Podraza, Docent

Team didactic II^0 award for the introduction of two-level studies in English: "Electrical and Computer Engineering".

Award of the Warsaw University of Technology

Zdzisław Pawłowski, Prof. D.Sc.

Warsaw University of Technology, Person of Merit (Zasłużony dla Politechniki Warszawskiej).

Awards granted for the conference papers and posters

Anna Urzędowska, M.Sc.

For winning 2nd place in best paper Competition in Young Scientists Group at *National Conference on Radiocommunications and Broadcasting* (Krajowa Konferencja Radiokomunikacji, Radiofonii i Telewizji: KKRRiT 2010) (Cracow, Poland, Jun. 16-18, 2010).

Artur Nowakowski, M.Sc.

For winning 3rd place in best paper Competition granted by Foundation for the Development of Radiocommunication and Multimedia Technologies at *VIth Symposium on Image Processing Technology* (VI Sympozjum Naukowe Techniki Przetwarzania Obrazu: TPO 2010) (Serock, Poland, Nov. 18-20, 2010).

Award in the Ph.D. competition granted by Foundation for the Development of Radiocommunication and Multimedia Technologies

Marek Bury, Ph.D.

IIIrd award

Scholarships granted by Foundation for the Development of Radiocommunications and Multimedia Technologies

For preparing Ph.D. Thesis
Mariusz Jakubowski,
Dawid Rosołowski,
Aneta Świercz.

For preparing M.Sc. thesis
Michał Gasztold,
Marcin Klocek,
Bartosz Majewski,
Marzena Olszewska,
Marcin Pietrzak,
Anna Urzędowska,
Grzegorz Wilczewski.

For preparing B.Sc. Thesis
Albert Białkowski,
Beata Kuc,
Kamil Sorokocz,
Aleksandra Spik.

For preparing course book
Artur Przelaskowski, Prof. D.Sc.

10 STATISTICAL DATA (for Dec. 31st of each year)

SPECIFICATION	2006	2007	2008	2009	2010
academic staff [posts]					
total	61,08	60,5	64,5	63,25	62,08
tenured professors	2,75	4	5	5	4,5
professors	9	7	7	8	8
associate professor	2,5	2,5	1,5	0,5	0,5
assistant professors	41,5	39,5	40,75	39	38,75
docents	-	2	4	4	4,33
senior lecturers	4,83	4,5	4,5	4,5	4
assistants	0	1	1,75	2,25	6,65
Ph.D. Students [persons]					
total	44	34	43	36	39
regular, the third level studies	20	13	23	23	23
without scholarship	24	21	20	13	16
technical and administrative staff [posts]					
total	20,06	18,1	18,25	18,9	18,4
senior R&D associates				2,4	2,9
R&D associates	11,6	8,6	8,25	4,75	4,75
administrative associates	6	6,5	7	9	9
librarian	1	1	1	0,75	0,75
service workers	2	2	2	2	2
temporary staff (Proteus project)				4,8	12,5
library resources					
books (volumes)	15501	15530	15785	15924	16055
books (titles)	8459	8488	8662	8774	8888
journals (subscriptions)	126	126	126	126	83
teaching activities					
basic courses	62	62	61	63	67
advanced courses	22	22	25	25	27
other courses	66	60	57	58	73
international course projects	1	4	1	2	2
research projects					
total	51	52	48	48	47
International	10	8	9	9	4
granted by Ministry	13	15	16	15	19
granted by the University	17	17	18	18	20
other	11	12	5	9	4
research projects budget **PLN:**	5 020 000	4 833 000	5 712 877	6 853232	6 555168
Euro:	323 000	495 000	211 000		
titles and degrees awarded					
D.Sc. degree	1	-	-	-	-
Ph.D. degree	9	5	4	6	6
M.Sc. degree (regular studies + evening studies)	64+3	63+3	75+2	67+8	57+10
M.Sc. degree (studies in English)	1	1	-	-	2
B.Sc. degree (regular studies + evening studies)	68+10	55+16	47+10	65+7	77+11
B.Sc. degree (studies in English)	3	4	5	5	3
B.Sc. degree (distant learning)	2	1	1	2	-
publications					
total	235	229	194	197	206
sci.-tech. books and chapters in books	5	1	12	12	9
sci.-tech. papers in journals – total	61	82	92	100	94
JCR-ICI list (IF>0)	13	32	39	21	20
MSHE list	16	32	49	72	67
in other journals	32	18	4	7	7
sci.-tech. papers in conference proceedings	149	131	69	58	74
other publications	22	15	21	27	29
research reports	35	38	27	26	22
conferences attended by the staff	50	56	52	60	40

EXPLANATORY NOTE ON POLISH ACADEMIC AND PROFESIONAL TITLES, DEGREES AND POSTS

According to Polish law, the following terms are used for academic and professional titles, degrees and posts held by staff members at the Institute of Radioelectronics.

The academic title of ***profesor (prof.)***, is conferred by the president of the Republic of Poland upon a motion of the Central Commission for Academic Degrees and Title.
This title may be awarded to a person who:
- has obtained a degree of *doktor habilitowany*;
- has scientific achievements, which fall far beyond the requirements for the candidates applying for the degree of doktor habilitowany;
- has remarkable didactic achievements, among other things, within the scope of training of academic staff.

Academic degrees awarded by the organizational unit entitled to confer such degrees, it means the respective Faculty Council or another organizational unit of a higher education institution or another scientific institution.

- ***doktor (dr)***, translated here as **Ph.D.**, is conferred to a person who:
  - holds the professional title of *magister* or *magister inżynier*;
  - has successfully passed doctorate examinations covering the scope defined by faculty board; and
  - has submitted and successfully defended a doctoral thesis assessed favorably by two reviewers.

The doctoral dissertation, prepared under the supervision of a tutor, should provide an original solution of a scientific problem and present general theoretical knowledge of the candidate in a given discipline of science, as well as should confirm the candidate's skill to conduct scientific work independently

- ***doktor habilitowany (dr hab.)***, translated here as **D.Sc.**, is conferred to a person who:
  - holds the academic degree of *doktor*;
  - has remarkable scientific achievements;
  - has submitted a habilitation dissertation which contributes significantly to the development of a given scientific discipline;
  - has received favorable assessment of his/her dissertation from four reviewers;
  - has passed a habilitation examination; and
  - has delivered a favorably assessed habilitation lecture.

The dissertation may constitute a work completed by candidate after he/she was awarded the degree of *doktor*. This work should be also published as a whole or in its fundamental part.
The *doktor habilitowany* degree authorize the holder to promote doctoral theses.

Research and teaching posts:

- ***asystent*** – *magister* professional title is required;
- ***adiunkt*** – *doktor* degree is required;
- ***profesor nadzwyczajny*** – *doktor habilitowany* degree is required;
- ***profesor zwyczajny*** – *profesor* title is required.

Teaching posts:

- ***wykładowca***, translated here as **Lecturer**;
- ***starszy wykładowca***, translated here as **Senior Lecturer**,
- ***docent*** – *doktor* degree is required;

Professional titles:

- ***inżynier (inż.)***, translated here as **B.Sc.**, are awarded to the graduates of higher vocational studies in the technical fields of study when the technical subjects constitute not less than 50% of the total of didactic activities included in the timetable for this fields of study;
- ***magister (mgr)***, translated here as **M.Sc.**, are awarded to the graduates of master-level courses in such fields of studies as: natural sciences, mathematics etc.;
- ***magister (mgr)***, translated here as **M.A.**, are awarded to the graduates of master-level courses in the arts and humanities fields of studies.
- ***magister inżynier (mgr inż.)***, translated here as **M.Sc.**, are awarded to the graduates of master-level courses in the technical fields of studies.

The following English titles have been adopted here for Polish academic posts:

- **Assistant –** the holder of the *magister inżynier* professional title in the post of *asystent*;
- **Assistant Professor** – the holder of *doktor* degree in the post of *adiunkt*;
- **Docent** – the holder of *doktor* degree in the post of *docent*;
- **Associate Professor** – the holder of *doktor habilitowany* degree in the post of *adiunkt*;
- **Professor** – the holder of *doktor habilitowany* degree in the post of *profesor nadzwyczajny*;
- **Tenured Professor** – the holder of a *profesor* academic title in the post of *profesor zwyczajny*.