



INSTITUTE OF RADIOELECTRONICS
WARSAW UNIVERSITY OF TECHNOLOGY
FACULTY OF ELECTRONICS AND INFORMATION TECHNOLOGY



ANNUAL REPORT

2006

Warsaw, January 2007

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From the Director

Welcome to the 2006 edition of our Annual Report!

The last few years have been very successful for the Institute practically in all the fields of its activity – the staff advancement and promotion, research projects as well as in teaching and building of the laboratory infrastructure. 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.

The Institute of Radioelectronics can pride itself on over 35 years of its existence and tradition which dates back to the early years of the previous century. Currently, the Institute of Radioelectronics is the biggest of all the six institutes at the Faculty of Electronics and Information Technologies. It employs 68 scientific and didactic workers, therein 15 Professors (9 with the state title), 45 Assistant Professors as well as 24 members of technical and administrative staff. There are almost 50 Ph.D. students under the guardianship of the Institute.

Last year may be recognized as the one which concludes a certain phase of transformation into the direction of the international market. For the first time, the value of the research and development works, realized within the framework of the EU projects, has considerably exceeded the value of the domestic works. Secondly, a great deal of research teams have found themselves among the world leaders in their disciplines. Thirdly, the Institute boasted a lot of major publications on various areas.

The past year was marked with the impressive number of international projects and co-operations. What is particularly pleasing, is the fact of realization of as many as five STREP projects (*specific targeted research projects*) as well as a few others, such as networks of excellence. The largest is CODMUCA (*Core Subsystem for Delivery of MultiBand Data in CATV Networks*), in which the Institute plays a leading role. Moreover, the Institute has, for many years, been taking pride in a successful cooperation with one of the most world-famous physics laboratories – CERN. We have also managed to sign contracts for the realization of research projects with the world's leading companies, e.g. Mitsubishi, Whirlpool.

Our Institute has also been a co-organizer of a few important conferences. The particularly far-reaching and successful one is MIKON – International Conference on Microwaves, Radar and Wireless Communications. The number of its foreign participants has been steadily increasing over the years and the Conference has already gained the status of a well-known and leading event in Central Europe. Last year the Conference was held in Cracow, with 278 papers from 37 countries. Special weight should also be given to other conferences, such as PROCTOM and COMPASS-CERN.

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 mention electromagnetic simulation, 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 current and 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 nine successful Ph.D. dissertations defenses and many which are currently in their finishing phases as well as one habilitation. It is the Institute's long lasting tradition that annually a good deal

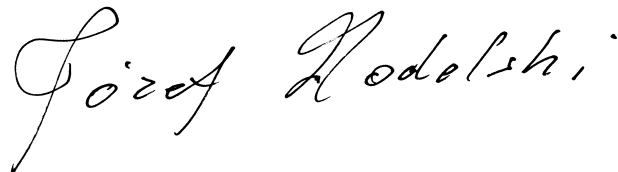
of Ph.D. dissertations is produced, nevertheless, this year ought to be rated as exceptionally successful in this matter. Moreover, most of these works are characterized by their strictly applicable contents. Such a trend gives a fair promise that next years will prove to be even more productive. Furthermore, a great deal of scientific notabilities have emerged from among our young assistant professors, who engage themselves in carrying out of various European projects. What is also worth mentioning, is the fact that several members of our young staff have received special awards for the best Ph.D. dissertations or for the outstanding papers.

The second element which, beside our splendid staff, contributed to our attainments is our laboratory base. There are over 20 laboratories, which constitute very good grounds for education of the future specialists as well as the realization of domestic and international projects. Most of them are equipped with the state-of-the-art apparatus. The unique on a national scale are: acoustic anechoic chamber, mobile radiocommunication laboratory (with PicoNode system), antenna anechoic chamber (with equipment up to 50 GHz) or tomography laboratory (with MRI, CT and impedance tomographs).

More detailed information on the history, tradition and the current picture of the Institute can be found in the newly published *35 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.

Last but not least, we would also like to express tremendous 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, January 2007

A handwritten signature in black ink, reading "Józef Modelski". The script is cursive and elegant, with a prominent initial 'J'.

Professor Józef Modelski

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This Annual Report summarizes the research activities of the Institute in 2006, as well as the teaching activities of the academic year 2005/2006

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

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Secretariat

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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

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Senior academic staff

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

Piotr Bobiński, Ph.D., Assistant Professor
 Ewa Kotarbińska, Ph.D., Assistant Professor (0.5)
 Andrzej Leszczyński, Ph.D., Assistant Professor (0.5)
 Krzysztof Mroczek, Ph.D., Assistant Professor
 Maria Tajchert, Ph.D., Assistant Professor

Junior academic staff

Piotr Bilski, Ph.D., Assistant, to Feb. 2006
 Aleksandra Młyńska, M.Sc., Assistant (0.5)

Technical staff

Tomasz Daniluk, M.Sc., Development Engineer (0.5)
 Robert Łukaszewski, M.Sc., Senior R&D Eng. (0.5),
 Piotr Nykiel, M.Sc., Development Engineer (0.5), from
 May 2006

Ph.D. students

Aleksandra Młyńska, M.Sc., from Oct. 2004
 Marcin Stolarski, M.Sc., from Oct. 2004
 Aneta Świercz, M.Sc., from Oct. 2002
 Marcin Tyimiński, M.Sc., from Feb. 2006

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:

- digital audio;
- design and measurements of electroacoustic transducers;
- investigation and modeling of acoustic field distribution;
- noise control and active noise reduction;
- psychoacoustics;
- 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:

- software environment for computer-aided design of measuring systems;
- virtual instrumentation, plug-in boards for data acquisition, IEEE-488 equipment;
- modern information technologies e.g. LabVIEW, Java, XML and modern communication technologies e.g. the Internet, GSM, Bluetooth in distributed control and

- measuring systems;
- distributed measuring systems.

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

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 Małgorzata Celuch, Ph.D., Assistant Professor
 Daniel Gryglewski, 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
 Krzysztof Robaczyński, M.Sc., Senior Lecturer (0.5)

Ph.D. students

Weronika Kijewska, M.Sc., from Feb. 2006
 Artur Moryc, M.Sc., from Mar. 2002
 Dawid Rosołowski, M.Sc., from Oct. 2005
 Bartłomiej Salski, M.Sc., from Feb. 2006
 Mateusz Żukociński, M.Sc., from Feb. 2006

Technical staff

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

Retired:

Krzysztof Kowalski, Ph.D.

The Microwave and Radiolocation Engineering Division conducts scientific and applied research in the area of electromagnetic field theory, microwave theory and techniques, measurement techniques for very high frequency range as well as computer-aided design, data acquisition and data processing. Specific research topics in 2006 included:

- design of high-frequency systems for radar techniques and radiocommunications (oscillators, synthesizers, modulators, amplifiers, high-power noise sources, transmitter/receiver modules);
- methods of synthesis and computer-aided design of passive and active microwave circuits (couplers, summatoms and dividers, switches, transistor circuits);
- analysis and design of multi-element planar in-phase radar antenna arrays intended to work at high power level;
- methods for measurements of electric and magnetic properties of materials at microwave frequencies;
- development of numerical methods and implementation of computer programme for full-wave analysis and design of two- and three-dimensional microwave circuits (filters, periodic guiding structures, matching cir-

- cuits, structures incorporating dispersive and anisotropic media, antennae);
- methods of coupled electromagnetic-thermodynamic simulations,
- design of microwave heating applicators;
- radio-frequency identification and wireless sensing;
- development of non-linear programming and artificial intelligence methods, and their application in the automated design of microwave circuits

1.3.3 Nuclear and Medical Electronics Division

Head of Division

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Senior academic staff

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 Janusz Marzec, D.Sc., Professor
 Artur Przelaskowski, D.Sc., Associate Professor
 Piotr Bogorodzki, Ph.D., Assistant Professor
 Piotr Brzeski, Ph.D., Assistant Professor
 Grzegorz Domański, Ph.D., Assistant Professor
 Marian Kazubek, Ph.D., Assistant Professor
 Bogumił Konarzewski, Ph.D., Assistant Professor
 Lechisław Padée, Ph.D., Senior Lecturer (0.33)
 Ewa Piątkowska-Janko, Ph.D., Assistant Professor
 Dariusz Radomski, Ph.D., Assistant Professor
 Waldemar Smolik, Ph.D., Assistant Professor
 Roman Szabatin, Ph.D., Assistant Professor
 Tomasz Jamrógiewicz, M.Sc., Senior Lecturer
 Tomasz Olszewski, M.Sc., Senior Lecturer

Technical staff

Mateusz Orzechowski, M.Sc., Development Eng. (0.5)
 Andrzej Wasilewski, Worker
 Joanna Witkowska, Senior Technician
 Tomasz Wolak, M.Sc., Development Eng. (0.5)

Ph.D. students

Piotr Boniński, M.Sc., from Mar. 2002
 Michał Dziewiecki, M.Sc., from Oct. 2005
 Rafał Józwiak, M.Sc., from Oct. 2006
 Cezary Mróz, M.Sc., from Oct. 2005
 Adam Padée, M.Sc., from Mar. 2002
 Wojciech Padée, M.Sc., from Oct. 2004
 Lech Raczyński, M.Sc., from Oct. 2006
 Tymon Rubel, M.Sc., from Oct. 2003
 Piotr Stefanoff, M.Sc., from Oct. 2006
 Robert Sulej, M.Sc., from Mar. 2002
 Artur Trybuła, M.Sc., from Oct. 2002
 Krzysztof Woźniak, M.Sc., from Oct. 2006
 Anna Wróblewska, M.Sc., from Oct. 2002
 Marcin Ziembicki, M.Sc., from Mar. 2004

Retired:

Waldemar Scharf, Ph.D.

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;
- 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, high resolution electrocardiography and electroencephalography;
- medical applications of isotope techniques;
- telemedicine;
- biomedical accelerators;
- design of apparatus and software for high energy physics experiments;
- mathematical modeling of physiological and disease processes.

Areas of recent studies include:

- advanced application of MRI and CT imaging systems, covering: dynamic tomographic studies, a new methodology and instrumentation developments for functional MRI, image analysis methods for fMRI;
- multimodal imaging of topographic, tomographic and functional studies in medicine;
- electrical instability of heart study, high resolution ECG systems for electrical instability research;
- telecardiology, teleradiology, teleinformation medical systems;
- application of multiscale transforms for data processing;
- image data compression, content-based indexing and retrieval; semantic descriptors;
- computer-aided diagnosis systems (mammography, CT, US);
- visualization and analysis of dynamic exams (contrast US and CT, bronchoscopy);
- 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;
- methodology of study design and biostatistical models application for clinical data analysis; application of predictive models in algorithms of medical diagnosis;
- algorithms for the data analysis in genomics and proteomics;
- development of detectors and front-end electronics for high energy physics experiments; applications of "soft-computing" methods (neural networks, genetic al-

gorithms, etc.) for data processing and optimization of the experimental setup in high energy physics experiments.

1.3.4 Radiocommunications Division

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 Tomasz Buczkowski, Ph.D., Assistant Professor
 Jacek Cichocki, Ph.D., Assistant Professor
 Krzysztof Czerwiński, Ph.D., Assistant Professor
 Krzysztof Derzakowski, Ph.D., Assistant Professor
 Wojciech Kazubski, Ph.D., Assistant Professor
 Tomasz Keller, Ph.D., Assistant Professor
 Jerzy Kołakowski, Ph.D., Assistant Professor
 Tomasz Kosiło, Ph.D., Assistant Professor
 Krzysztof Kurek, Ph.D., Assistant Professor
 Stanisław Maszczyk, 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
 Zbigniew Walczak, Ph.D., Assistant Professor
 Henryk Chaciński, M.Sc., Senior Lecturer

Ph.D. students

Paweł Bajurko, M.Sc., from Oct. 2004
 Grzegorz Bernatek, M.Sc., from Oct. 2004
 Kamil Bryłka, M.Sc., from Oct. 2006
 Marek Bury, M.Sc., from Oct. 2004
 Marcin Dąbrowski, M.Sc., from Oct. 2006
 Andrzej Dominik, M.Sc., from Oct. 2004
 Damian Kolmas, M.Sc., from Oct. 2004
 Sebastian Kozłowski, M.Sc., from Oct. 2004
 Arkadiusz Kurek, M.Sc., from Oct. 2002
 Sławomir Rzeszowski, M.Sc., from Oct. 2005
 Rafał Szumny, M.Sc., from Oct. 2002
 Małgorzata Śliwińska, M.Sc., from Feb. 2006
 Arkadiusz Trojanowski, M.Sc., from Oct. 2002
 Konrad Wojdan, M.Sc., from Oct. 2005
 Paweł Ziętek, M.Sc., from Oct. 2006

Technical staff

Anna Czarnecka, M.Sc., Senior R&D Engineer (0.6)
 Jacek Jarkowski, Ph.D., Senior R&D Eng., from Oct. 2006
 Marek Marcinkowski, Senior Foreman
 Stanisław Żmudzin, M.Sc., Senior R&D Engineer (0.25)

Retired:

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

Waldemar Kielek, D.Sc.

The research and teaching activities of the Radiocommunications Division are related to radiocommunication systems and networks, antennas, signal processing and measurement techniques. Research is focused on digital radio transmission and radio system design using advanced CAD methods, particularly cellular and short range systems, radio transmitting and receiving, as well as some aspects of electromagnetic compatibility. Current research topics include:

- radiocommunication systems and networks – cellular networks (3G and beyond 3G), short range systems, ultra-wideband systems (UWB), methods and systems for radio positioning, systems for road safety, radio frequency identity devices (RFID), ad-hoc networks, satellite systems and broadband access networks,
- antennas and radio waves propagation – electrodynamic modeling and design of different types of microwave and mm-wave antennas, including electronically controlled beam steering and electronically reconfigurable antennas, as well as automatic near-field measurements of antennas characteristics and the modeling of propagation channel;
- radiocommunication measurements – spectrum monitoring methods and systems; automation of radiocommunication devices measurements;
- radio frequency power devices – class D, DE, E and C resonant power amplifiers, linear wide-band short-wave amplifiers, high-power amplitude modulators, high-efficiency power supplies, low-noise amplifiers, microwave filters and phase shifters;
- 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;
- advanced numerical methods – circuits and systems design and optimization;
- environmental and biological problems – the influence of radio communication systems on a human health and environment as well as on electronic equipment, protection zones planning;
- fault diagnosis in analog systems.

1.3.5 Television Division

Head of Division

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 Andrzej Miękina, Ph.D., Assistant Professor
 Grzegorz Pastuszak, Ph.D., Assistant Professor, from Dec. 2006
 Andrzej Podgórski, Ph.D., Assistant Professor
 Marek Rusin, Ph.D., Assistant Professor (0.5)
 Tomasz Krzymień, M.Sc., Senior Lecturer

Ph.D. students

Stanisław Badura, M.Sc., from Oct. 2004
 Agata Latała, M.Sc., from Oct. 2006
 Mariusz Leszczyński, M.Sc., from Oct. 2005
 Jacek Naruniec, M.Sc., from Oct. 2006
 Artur Nowakowski, M.Sc., from Feb. 2006
 Michał Tomaszewski, M.Sc., from Mar. 2004

Technical staff

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

Television Division conducts scientific and applied research in multimedia technologies. The Division is also experienced in e-learning standards and platforms with a special emphasis on multimedia tools for collaborative e-learning using media streaming and searching techniques. The Division 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 2006 included:

- video and audio compression;
- intelligent multimedia systems;
- networked audiovisual systems for immersive environments;
- 3D object modeling;
- image processing, analysis and recognition;
- multimedia database indexing;
- object tracking and recognition;
- hardware architectures for video compression technologies;
- digital and interactive TV in the Internet;
- selected topics in the design of cable television networks.

The Digital Processing of Measurement Signal Group (R. Z. Morawski, Prof. D.Sc., A. Miękina, Ph.D. and A. Podgórski, Ph.D.) since Dec. 28 2006 has been incorporated into the Television Division. The research activities of the Group are related to the field of measurement science and technology. They are focused on improving the quality of measurements by means of digital signal processing. The current research topics include:

- the general-purpose algorithms for reconstruction of measurands and for calibration of measuring channels;
- the spectrophotometric analyzers for applications in industrial and environmental monitoring;
- the portable sound-and-vibration analyzers for applications in technical diagnostics and in the environmental monitoring.

1.4 Evening Studies and Continuing Education

1.4.1 M.Sc. Evening Studies and Continuing Education

Head

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Secretariat

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1.4.2 Engineering Evening Studies on Radiocommunications

Head

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

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[Pub20], [Pub101], [Pub102], [Pub103], [Pub104],
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[Edu29], [Edu33], [Edu76];
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[Edu16], [Edu103], [Edu119];
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[Edu19], [Edu62], [Edu129], [Edu135];
[Pro1], [Pro25], [Pro47];
[MSc62];
[Pub115], [Pub118], [Pub119], [Pub133].

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[Edu12], [Edu46], [Edu94], [Edu111], [Edu112], [Edu120],
[Edu125], [Edu128], [Edu132], [Edu150];
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[Msc53], [BSc28], [BSc45], [BSc77];
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[Edu25], [Edu71], [Edu85], [Edu121], [Edu131], [Edu148],
[Edu149];
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[Pub30], [Pub94], [Pub127], [Pub128], [Pub129], [Pub138],
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[Edu24], [Edu52];
[Pro1], [Pro2], [Pro4], [Pro7], [Pro16], [Pro22], [Pro32],
[Pro42], [Pro50], [Pro51];
[PhD6];
[Pub25], [Pub67], [Pub82], [Pub83], [Pub87], [Pub99],
[Pub122], [Pub123], [Pub129], [Pub138], [Pub139],
[Pub140], [Pub177], [Pub179], [Pub180], [Pub191],
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M.Sc. (95'), Ph.D. ('02); measurement and instrumentation, programmable logic devices, System-on-a-Programmable-Chip (SoPC); **Assistant Professor**, Electroacoustics Division;

[Edu9], [Edu27];

[Pro11], [Pro30];

[MSc17], [MSc60];

[Pub27], [Pub28], [Pub33].

Tomasz Olszewski

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

[Edu9], [Edu106];

[Pro27];

[Pub147], [Pub169].

Lechisław Padée

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M.Sc. ('70), Ph.D. ('80); nuclear and medical electronics; **Senior Lecturer** (0.33), Nuclear and Medical Electronics Division;

[Edu37], [Edu61];

[Pro27].

Grzegorz Pastuszak

room: 451; phone: +482347840
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M.Sc. ('01), Ph.D. ('06); integrated circuit design, multimedia systems, video processing; **Assistant Professor**, Television Division;

[Pro2], [Pro20], [Pro31];

[Pub53], [Pub151], [Pub152], [Pub153].

Zdzisław Pawłowski

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M.Sc. ('59), Ph.D. ('64), D.Sc. ('87), Prof. Title ('90); nuclear and medical electronics; **Tenured Professor**, Nuclear and Medical Electronics Division;

Member of the Warsaw Scientific Society ('95-); Member of Medical Physics and Radiology Committee, Polish Academy of Sciences ('99-);

[Edu3], [Edu18], [Edu25];

[Pro10], [Pro15], [Pro27], [Pro35];

[MSc51], [MSc54], [BSc60];

[Pub130], [Pub184], [Pub218], [Pub223].

Ewa Piątkowska – Janko

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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 with Biomedical and Nuclear Engineering Student Scientific Group ('06-), and Beskid Mountain Guides Student Circle (-99');

[Edu72];

[Pro8], [Pro9], [Pro17], [Pro27], [Pro35], [Pro39], [Pro41], [Pro48];

[MSc20], [MSc37], [BSc15], [BSc25], [BSc46];

[Pub36], [Pub44], [Pub64], [Pub148], [Pub172], [Pub196],

[Pub197], [Pub198], [Pub199], [Pub200], [Pub201],

[Pub202], [Pub203], [Pub210], [Pub211].

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M.Sc. ('75), Ph.D. ('83); measurement and instrumentation; **Assistant Professor**, Television Division;
[Edu11], [Edu34], [Edu41], [Edu73];
[Pro12], [Pro26];
[MSc56];
[Pub73], [Pub154], [Pub155].

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M.Sc. ('90), Ph.D. ('95), D.Sc. ('04); signal & image processing, data compression, computer-aided diagnosis in medicine, telemedicine, imaging informatics; **Associate Professor**, Nuclear and Medical Electronics Division; Member of the International Scientific Board of Advances in International Telemedicine and e-Health (06-); Individual award of the Minister of Science and Higher Education ('06);
[Edu67], [Edu70];
[Pro18], [Pro27];
[MSc19], [BSc12], [BSc44];
[Pub1], [Pub15], [Pub35], [Pub37], [Pub38], [Pub51], [Pub55], [Pub56], [Pub57], [Pub65], [Pub72], [Pub77], [Pub78], [Pub79], [Pub111], [Pub157], [Pub158], [Pub159], [Pub209].

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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 Program Committee of the National Symposium 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-);
[Edu59], [Edu101], [Edu115], [Edu126];
[Pro25];
[BSc65];

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M.Sc. ('96), Ph.D. ('01), Ph.D. ('06); mathematical modeling of physiological and disease processes, biostatistical methods, experiments design methods; **Assistant Professor**, Nuclear and Medical Electronics Division; Rector's Deputy for Disabled Persons at WUT ('05-); Member of the Organization Committee of IBITEL 2006;
[Pro14];
[Pub16], [Pub19], [Pub58], [Pub204], [Pub205].

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[Edu89];
[Pro33], [Pro45].

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[Edu13], [Edu63];
[PhD9];
[Pub4].

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[Edu14], [Edu53];
[Pub218].

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[Edu80], [Edu82];
[Pro2], [Pro6], [Pro20], [Pro31], [Pro43], [Pro44];
[PhD3], [PhD7], [MSc31], [MSc33], [MSc34], [BSc6], [BSc31], [BSc50];
[Pub43], [Pub52], [Pub53], [Pub59], [Pub69], [Pub70], [Pub71], [Pub81], [Pub82], [Pub97], [Pub98], [Pub105], [Pub125], [Pub131], [Pub143], [Pub144], [Pub145], [Pub163], [Pub164], [Pub165], [Pub166], [Pub167], [Pub182], [Pub218], [Pub233], [Pub234].

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M.Sc. ('91), Ph.D. ('97); biomedical engineering, computer engineering; **Assistant Professor**, Nuclear and Medical Electronics Division;
[Edu43], [Edu57], [Edu66], [Edu102];
[Pro27];
[MSc28], [BSc22], [BSc30];
[Pub147], [Pub168], [Pub169].

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[Edu55], [Edu115];

[Pro28], [Pro38];
[MSc29], [BSc69], [BSc70], [BSc76];
[Pub170], [Pub171].

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[Edu45];
[Pro33];
[Pub86].

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[Edu84];
[Pro27];
[BSc8], [BSc27], [BSc32];
[Pub146], [Pub147], [Pub169].

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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-); Team award of the Rector ('06);
[Edu58], [Edu148], [Edu149];
[Pro24], [Pro40];
[Msc4], [BSc3], [BSc42], [BSc48], [BSc64];
[Pub39].

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M.Sc. ('98), Ph.D. ('02); radio networks, heuristics methods, radiocommunications; **Assistant Professor**, Radiocommunications Division;
[Edu68], [Edu69];
[Pro1], [Pro29], [Pro49];
[MSc48];
[Pub61], [Pub90], [Pub91], [Pub93], [Pub119], [Pub185], [Pub186].

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M.Sc. ('70), Ph.D. ('80); microwaves, computer engineering, measurements; **Assistant Professor**, Microwave and Radiolocation Engineering Division;
[Edu45];
[Pro33].

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M.Sc. ('75), Ph.D. ('86), D.Sc. ('03); measurement and instrumentation; **Professor**, Electroacoustics Division; Vice-Dean for Scientific Affairs ('05-); Member of the Measuring Systems Section of the Metrology and Instrumentation Committee, Polish Academy of Sciences ('99-); President of the Polish Society for Measurement, Automatic Control and Robotics POLSPAR ('04-); Deputy-chairman of the Measurement Committee of POLSPAR ('01-'06); Member of the Scientific and Programme Committee of the National Conferences: SP ('01-), KM ('06-), MKM ('06-), National Conference on Dynamic Measurements ('05-) and International Conference IEEE IMTC ('04-), IEEE IDAACS ('01-); Reviewer of the IEEE Transactions on Instrumentation and Measurement ('03-); Member of the WUT Science Council ('06-); Associate Editor of "International Scientific Journal of Computing" ('06-);
[Edu36], [Edu56], [Edu75], [Edu93];
[Pro11], [Pro19], [Pro30];
[MSc14], [MSc47], [MSc52], [MSc59];
[Pub5], [Pub17], [Pub29], [Pub31], [Pub32], [Pub62], [Pub75], [Pub132], [Pub175].

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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; **Professor with Title**, Radiocommunications Division; Member of the Circuit Theory and Signal Processing Section of the Electronics and Telecommunication Committee of the Polish Academy of Sciences ('97-); Chairman of the Conference "Information Technology in Business" ('06). Member of the Scientific Committees of: International Conference on Signals and Electronics Systems ('97-), Conference on Evolutionary Algorithms and Global Optimization ('97-); Reviewer of Int. J. Knowledge Management Studies; Member of the Council of the Research and Promotion Center for Power Electronics ('97-), and of the Research Center for Automation and Information Technology ('00-); 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-);
[Edu22], [Edu55], [Edu59], [Edu69], [Edu79], [Edu121], [Edu131];
[Pro21], [Pro29], [Pro36], [Pro49];
[PhD1], [MSc27];
[Pub18], [Pub74], [Pub92], [Pub93], [Pub181], [Pub183], [Pub186], [Pub234], [Pub235].

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[Edu38], [Edu118];
[Pro5], [Pro13], [Pro33], [Pro37];

[BSc1], [BSc38], [BSc40], [BSc51];
[Pub103], [Pub135], [Pub142], [Pub188], [Pub189].

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Member of the Organizing Committee of the International Conference TCSET ('98-); Reviewer of the *IEEE Transactions on MTT* ('04-), and *IEEE Microwave and Wireless Components Letters* ('04-);

[Edu4], [Edu31], [Edu64], [Edu133];

[Pro4], [Pro7], [Pro16], [Pro32];

[MSc12];

[Pub66], [Pub67], [Pub83], [Pub87], [Pub94], [Pub95],
[Pub99], [Pub108], [Pub109], [Pub122], [Pub123],
[Pub129], [Pub138], [Pub140], [Pub177], [Pub180]
[Pub191], [Pub192], [Pub193].

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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 Council Committee on Faculty Organization ('05-); 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-); Co-chairman of the COMPASS Collaboration Meeting ('06-), Member of the Scientific Committee of the XI Symposium AES "New Trends in Audio and Video" ('06-), V Symposium on Medical Physics and III Internal Symposium on Medical Physics ('06), National Symposium on Biomedical Engineering and Telemedicine "IBITEL" ('06-), National Conference "Function and Structure – Functional Brain Imaging" ('06), Head of the Area of Concentration Biomedical Engineering ('06-) and Electronics and Information Technology in Medicine ('06-).

[Edu21], [Edu50], [Edu65];

[Pro10], [Pro15], [Pro23], [Pro27], [Pro35];

[MSc44], [BSc18], [BSc33], [BSc56];

[Pub9], [Pub10], [Pub130], [Pub150], [Pub176], [Pub184],
[Pub218], [Pub231], [Pub232].

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

Team award of the Rector ('06);

[Edu38];

[Pro13], [Pro33];

[Pub20], [Pub101], [Pub102], [Pub104].

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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-);

[Edu1], [Edu7];

[Pro24];

[Pub34], [Pub60].

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Aleksandra Młyńska, M.Sc., Assistant (0.5)

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

Ph.D. Student

(tutor)

Stanisław Badura, M.Sc.*	(W. Skarbek)
Paweł Bajurko, M.Sc.	(Y. Yashchyshyn)
Grzegorz Bernatek, M.Sc.*	(J. Wojciechowski)
Piotr Boniński, M.Sc.*	(A. Przelaskowski)
Kamil Bryłka, M.Sc.*	(J. Modelski)
Marek Bury, M.Sc.	(T. Morawski)
Marcin Dąbrowski, M.Sc.*	(Y. Yashchyshyn)
Andrzej Dominik, M.Sc.	(J. Wojciechowski)
Michał Dziewiecki, M.Sc.	(J. Marzec)
Rafał Józwiak, M.Sc.	(A. Przelaskowski)
Weronika Kijewska, M.Sc.	(W. Gwarek)
Damian Kolmas, M.Sc.*	(J. Modelski)
Sebastian Kozłowski, M.Sc.	(T. Morawski)
Arkadiusz Kurek, M.Sc.*	(J. Modelski)
Agata Latała, M.Sc.*	(R. Z. Morawski)
Mariusz Leszczyński, M.Sc.*	(W. Skarbek)
Aleksandra Młyńska, M.Sc.	(Z. Kulka)
Artur Moryc, M.Sc.	(W. Gwarek) to Nov. 11
Cezary Mróz, M.Sc.*	(A. Przelaskowski)
Jacek Naruniec, M.Sc.*	(W. Skarbek)
Artur Nowakowski, M.Sc.*	(W. Skarbek)
Adam Padée, M.Sc.*	(K. Zaremba)
Wojciech Padée, M.Sc.	(K. Zaremba)
Lech Raczyński, M.Sc.	(K. Zaremba)
Dawid Rosołowski, M.Sc.	(T. Morawski)
Tymon Rubel, M.Sc.	(K. Zaremba)
Sławomir Rzeszowski, M.Sc.*	(J. Wojciechowski)
Bartłomiej Salski, M.Sc.	(W. Gwarek)
Piotr Stefanoff, M.Sc.*	(A. Przelaskowski)
Marcin Stolarski, M.Sc.*	(W. Winiecki)
Robert Sulej, M.Sc.*	(K. Zaremba)
Rafał Szumny, M.Sc.*	(J. Modelski)

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Aneta Świercz, M.Sc.* (J. Żera)
Michał Tomaszewski, M.Sc.* (W Skarbek)
Arkadiusz Trojanowski, M.Sc. (J. Wojciechowski)
Artur Trybuła, M.Sc. * (J. Marzec)
Marcin Tymiąński, M.Sc. (W. Winiecki)
Konrad Wojdan, M.Sc.* (W. Winiecki)
Krzysztof Woźniak, M.Sc.* (K. Zaremba)
Anna Wróblewska, M.Sc. (A. Przelaskowski)
Paweł Ziętek, M.Sc.* (J. Modelski)
Marcin Ziembicki, M.Sc. (J. Marzec)
Mateusz Żukociński, M.Sc. (W. Gwarek) to Oct. 1

* - without scholarship

2.4 Technical and administrative staff

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Aneta Bielska, Secretary, to May 2006

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Beata Zielińska, Secretary to Jun. 2006

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3 TEACHING ACTIVITIES (academic year 2005/2006)

3.1 Regular studies – Areas of Concentrations:

Radiocommunications and Multimedia Technologies

Head

Wojciech Gwarek, Prof. D.Sc., Professor with Title
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Biomedical Engineering

Head

Krzysztof Zaremba, D.Sc., Professor
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3.1.1 Basic Courses

- | | | | |
|---------|--|---------|--|
| [Edu1] | <i>Acoustics for Music</i> (Akustyka muzyczna – AM); 2h/week; J. Żera. | [Edu14] | <i>Basics of Television</i> (Podstawy telewizji – POTE); 3h/week; M. Rusin. |
| [Edu2] | <i>Acoustic Protection of Environment</i> (Akustyczna ochrona środowiska – AOS); 3h/week; E. Kotarbińska. | [Edu15] | <i>Broadcasting Systems</i> (Systemy radiofoniczne – SYR); 3h/week; H. Chacirski. |
| [Edu3] | <i>Analysis of Measurement Data in Medicine</i> (Analiza danych pomiarowych w medycynie – ADP); 3h/week; Z. Pawłowski. | [Edu16] | <i>Computer Systems</i> (Systemy komputerowe – SYKO); 3h/week; T. Jamrógiewicz. |
| [Edu4] | <i>Antennae and Radiowave Propagation</i> (Anteny i propagacja fal – AIPF); 3h/week; Y. Yashchshyn. | [Edu17] | <i>Construction of High Quality Audio Equipment</i> (Konstrukcja urządzeń audio wysokiej jakości – KUA); 2h/week; P. Nykiel. |
| [Edu5] | <i>Basic Radio-frequency Circuits</i> (Podstawowe układy radioelektroniczne – PURAD); 3h/week; J. Modzelewski, W. Kazubski. | [Edu18] | <i>Detection of Nuclear and Biomedical Signals</i> (Detekcja sygnałów biomedycznych i jądrowych – DSBJ); 4h/week; Z. Pawłowski. |
| [Edu6] | <i>Basics of Electroacoustics</i> (Podstawy elektroakustyki – PEL); 3h/week; A. Leszczyński. | [Edu19] | <i>Digital Cellular Systems</i> (Cyfrowe systemy komórkowe – CSK); 3h/week; J. Kołakowski. |
| [Edu7] | <i>Basics of Hearing and Sound Perception</i> (Podstawy słyszenia i percepcja dźwięku – PSPD); 2h/week; J. Żera. | [Edu20] | <i>Digital Circuits – EDC1</i> ; 2h/week; elective; P. Miazga (English-medium studies). |
| [Edu8] | <i>Basics of Medical Imaging Technique</i> (Podstawy technik obrazowania w medycynie – PTOM); 4h/week; P. Brzeski. | [Edu21] | <i>Digital Circuits – Lab.</i> (Układy logiczne; laboratorium – ULOGE); 2h/week; lab.; semester 4; B. Konarzewski, K. Zaremba, G. Domański. |
| [Edu9] | <i>Basics of Microelectronics – Lab.</i> (Podstawy Mikroelektroniki – PMK); 2h/week; T. Olszewski, K. Mroczek. | [Edu22] | <i>Digital Communications A – EDICO</i> ; 4h/week; J. Wojciechowski (English-medium studies) |
| [Edu10] | <i>Basics of Microprocessor Technique</i> (Podstawy techniki mikroprocesorowej – TMIK); 4h/week; K. Czerwiński, B. Konarzewski, K. Derzakowski, T. Krzymień. | [Edu23] | <i>Digital and Interactive Television</i> (Telewizja cyfrowa i interaktywna – TCI); 4h/week; elective; A. Buchowicz. |
| [Edu11] | <i>Basics of Programming M</i> (Podstawy programowania – PRM); 4h/week; A. Podgórski. | [Edu24] | <i>Diploma Seminar for Graduate Students</i> (Seminarium dyplomowe magisterskie – SDM1); 2h/week; J. Modelski. |
| [Edu12] | <i>Basics of Radiocommunications</i> (Podstawy radiokomunikacji – PR); 2h/week; T. Kosito. | [Edu25] | <i>Diploma Seminar for Graduate Students</i> (Seminarium dyplomowe magisterskie – SDM2); 2h/week; Z. Pawłowski, Z. Kulka. |
| [Edu13] | <i>Basics of Radiolocation and Navigation</i> (Podstawy radiolokacji i radionawigacji – PRIR); 3h/week; S. Rostonec. | [Edu26] | <i>Diploma Seminar for Undergraduate Students</i> (Seminarium dyplomowe inżynierskie – SDI); 2h/week; P. Brzeski, T. Morawski. |
| | | [Edu27] | <i>Digital Systems</i> (Układy cyfrowe – UCYF); 1h/week; K. Mroczek. |
| | | [Edu28] | <i>Event Driven Programming</i> (Programowanie zdarzeniowe – PZDT); 3h/week; K. Ignasiak. |
| | | [Edu29] | <i>Fields and Waves</i> (Pola i fale – POFAT); 3h/week; T. Morawski, W. Gwarek. |
| | | [Edu30] | <i>Fields, Waves and Antennae – EFWA</i> ; 4h/week; elective; M. Celuch (English-medium studies). |
| | | [Edu31] | <i>Influence of Electromagnetic Waves on Living Organisms</i> (Oddziaływanie fal elektromagnetycznych na organizmy żywe – OFE); 2h/week; Y. Yashchshyn, T. Buczkowski. |
| | | [Edu32] | <i>Information Techniques in Medical Image Diagnostics</i> (Techniki informacyjne w medycznej diagnostyce obrazowej – TIM); 4h/week; P. Bogorodzki. |

TEACHING ACTIVITIES (academic year 2005/2006)

- [Edu33] *Introduction to Electronics, Informatics and Telecommunications* (Wstęp do elektroniki, informatyki i telekomunikacji – WEIT); 1h/week; W. Gwarek.
- [Edu34] *Introduction to Numerical Methods* (Wstęp do metod numerycznych – WDMNM); 3h/week; R. Z. Morawski, A. Miękina, A. Podgórski.
- [Edu35] *Laboratory of Study Audio Techniques* (Laboratorium dźwiękowej techniki studyjnej – LDTS); 1h/week; R. Korycki.
- [Edu36] *Measurement Systems* (Systemy pomiarowe – SPOM); 2h/week; W. Winiecki.
- [Edu37] *Medical Electronic Instrumentation* (Elektroniczna aparatura medyczna – EAME); 4h/week; L. Padée.
- [Edu38] *Microwave Technique* (Technika mikrofalowa – TMO); 4h/week; J. Zborowska, W. Wojtasiak.
- [Edu39] *Multimedia Standards and Algorithms* (Algorytmy i standardy multimedialne – ASM); 3h/week; G. Galiński.
- [Edu40] *Multi-service and Multimedia Networks – EMSMN*; 4h/week; T. Keller (English-medium studies).
- [Edu41] *Numerical Methods – ENUME*; 4h/week; semester 4; R. Z. Morawski, A. Miękina, A. Podgórski. (English-medium studies).
- [Edu42] *Numerical Methods for Athens*, 40h during one week; participants of the EU students' exchange programme ATHENS; R. Z. Morawski, A. Miękina.
- [Edu43] *Object-oriented Programming M* (Programowanie obiektowe M – PROBI); 4h/week; semester 2; W. Smolik.
- [Edu44] *Object-oriented Programming of Distributed and Multimedia Applications in Java* (Java – obiektowe programowanie aplikacji rozproszonych i multimedialnych – OPA); 3h/week; K. Ignasiak.
- [Edu45] *Operating Systems* (Systemy operacyjne – SOE); 1h/week; M. Sypniewski, A. Więckowski.
- [Edu46] *Radiocommunication Systems* (Systemy radiokomunikacyjne – SRKO); 3h/week; semester 5; T. Kosiło.
- [Edu47] *Radioelectronics Measurements* (Miernictwo radioelektroniczne – MR); 3h/week; J. Cichocki.
- [Edu48] *Radio Networks and Systems* (Systemy i sieci radiowe – SISR); 3h/week; T. Keller.
- [Edu49] *Radiological Apparatus in Diagnostics* (Aparatura radiologiczna w diagnostyce – ARDM); 2h/week; G. Domański.
- [Edu50] *Radiology and Nucleonics* (Radiologia z nukleoniką – RN); 3h/week; K. Zaremba.
- [Edu51] *Radio Transmitting Technique and its Applications* (Technika nadawania radiowego i jej aplikacje – TNR); 4h/week; J. Modzelewski.
- [Edu52] *Satellite Communications* (Łączność satelitarna – ŁS); 3h/week; J. Modelski, K. Kurek.
- [Edu53] *Selected Problems of Modern Television* (Wybrane zagadnienia współczesnej telewizji – WZWT); 2h/week; M. Rusin
- [Edu54] *Signal Processors in Audio Techniques* (Procesory sygnałowe w technice audio – PSTA); 3h/week; P. Bobiński.
- [Edu55] *Signals and Systems* (Sygnały i Systemy – SYST); 4h/week; J. Wojciechowski, K. Snopek.
- [Edu56] *Software for Measuring Systems* (Oprogramowanie systemów pomiarowych – OSP); 4h/week; W. Winiecki, P. Bobiński.
- [Edu57] *Software for Medical Systems* (Oprogramowanie systemów medycznych – OSM); 3h/week; W. Smolik.
- [Edu58] *Recording and Forming of Sound* (Odbiór i kształtowanie dźwięku – OKD); 3h/week; M. Tajchert.
- [Edu59] *Signals and Modulations* (Sygnały i modulacje – SYGM); 3h/week; J. Wojciechowski, K. Radecki.
- [Edu60] *Technique of a Radio Signals Receiving* (Technika odbioru radiowego – TOR); 3h/week; W. Kazubski.
- [Edu61] *Ultrasonography Instrumentation* (Aparatura ultrasonograficzna – AUS); 3h/week; L. Padée.
- [Edu62] *UMTS System (System UMTS – UMTS)*; 3h/week; J. Kołakowski, J. Cichocki, S. Maszczyk.

3.1.2 Advanced courses

- [Edu63] *Analysis and Synthesis of Microwave Circuits* (Analiza i synteza układów mikrofalowych – ASUM); 3h/week; S. Rosłonec.
- [Edu64] *Antennae Theory and Design* (Teoria i projektowanie anten – TPA); 4h/week; Y. Yashchyshyn.
- [Edu65] *Artificial Neural Networks in Medicine* (Sztuczne sieci neuronowe w medycynie – SESN); 3h/week; K. Zaremba.
- [Edu66] *Computed Tomography* (Tomografia komputerowa – TOM); 4h/week; W. Smolik.
- [Edu67] *Computer Aided Medical Image Diagnostics* (Komputerowe wspomaganie obrazowej diagnostyki medycznej – KWOD); 3h/week; A. Przelaskowski.
- [Edu68] *Contemporary Heuristic Techniques - ECOHT*; 4h/week; Z. Walczak (English-medium studies).
- [Edu69] *Contemporary Heuristic Techniques* (Współczesne techniki heurystyczne – WMH); 4h/week; Z. Walczak, J. Wojciechowski.
- [Edu70] *Data Compression* (Kompresja danych – KODA); 3h/week; A. Przelaskowski.

TEACHING ACTIVITIES (academic year 2005/2006)

- [Edu71] *Digital Audio Signal Processing* (Cyfrowe przetwarzanie sygnałów fonicznych – CPSP); 3h/week; Z. Kulka.
- [Edu72] *Digital Image Processing* (Cyfrowe przetwarzanie obrazów – CPOO); 2h/week; M. Kazubek, P. Brzeski, E. Piątkowska-Janko.
- [Edu73] *Digital Processing of Measurement Signals* (Cyfrowe przetwarzanie sygnałów pomiarowych – CPSP); 3h/week; R. Z. Morawski, A. Miękina, A. Podgórski.
- [Edu74] *Digital Transmission of Information* (Cyfrowa transmisja informacji – CTIN); 3h/week; T. Buczkowski.
- [Edu75] *Distributed Measurement Systems* (Rozproszone systemy pomiarowo-kontrolne – RSPK); 3h/week; W. Winiecki, R. Łukaszewski.
- [Edu76] *Electromagnetic Compatibility* (Kompatybilność elektromagnetyczna – KE); 2h/week; W. Gwarek.
- [Edu77] *Electromagnetic Field Theory* (Teoria pola elektromagnetycznego – TPE); 4h/week; T. Morawski, K. Derzakowski.
- [Edu78] *Evolutionary Algorithms – EEVAL*; 4h/week; P. Miazga (English-medium studies).
- [Edu79] *Graphs and Networks* (Grafy i sieci – GIS); 2h/week; elective; J. Wojciechowski.
- [Edu80] *Image and Audio Semantic Analysis* (Analiza semantyczna obrazu i dźwięku – ASOD); 3h/week; W. Skarbek.
- [Edu81] *Magnetic Resonance Imaging* (Tomografia rezonansu magnetycznego – TRM); 3h/week; P. Bogorodzki.
- [Edu82] *Multimedia Indexing* (Indeksowanie multimediów – INM); 4h/week; W. Skarbek.
- [Edu83] *Noise and Electromagnetic Interference in Electronics Devices* (Szumy i zakłócenia w aparaturze elektronicznej – SZAE); 2h/week; J. Marzec.
- [Edu84] *Nuclear Medicine Techniques* (Techniki medycyny nuklearnej – TMN); 4h/week; R. Szabat-in.
- [Edu85] *Acoustic Techniques* (Techniki dźwiękowe – TDRM); 30h/sem.; semester 7; Z. Kulka.
- [Edu86] *Antennae* (Anteny – ANM); 30h/sem.; semester 4; H. Chaciński.
- [Edu87] *Basics of Computer Techniques* (Podstawy techniki komputerowej – PKOM); 45h/sem.; semester 1; R. Kurjata.
- [Edu88] *Basics of Fiberglass Technique* (Podstawy techniki światłowodowej – PTSRM); 45h/sem.; semester 3; L. Lewandowski.
- [Edu89] *Basics of High-Frequency Techniques* (Podstawy techniki w.cz. – PTWM); 60h/sem.; semester 3; K. Robaczyński.
- [Edu90] *Basics of Logical Circuits and Microprocessor Technique* (Podstawy układów logicznych i techniki mikroprocesorowej – PULM); 60h/sem.; semester 4; K. Czerwiński, K. Derzakowski.
- [Edu91] *Basics of Satellite Communications* (Podstawy łączności satelitarnej – SATM); 15h/sem.; semester 4; K. Kurek.
- [Edu92] *Circuits and Signals* (Obwody i sygnały – OSRM); 45h/sem.; semester 2; K. Czerwiński.
- [Edu93] *Computer Control and Data Processing* (Komputerowe sterowanie i przetwarzanie danych – KSTM); 45h/sem.; semester 5; W. Winiecki.
- [Edu94] *Digital Signals Transmission* (Cyfrowa transmisja sygnałów – CTSM); 45h/sem.; semester 5; T. Kosiło.
- [Edu95] *Diploma Seminar* (Seminarium dyplomowe – SDM); 15h/sem.; semester 6; J. Ebert.
- [Edu96] *Diploma Seminar 2* (Seminarium dyplomowe 2 – SD2M); 15h/sem.; semester 7; J. Ebert.
- [Edu97] *Electronic Circuits* (Układy elektroniczne – UEM); 45h/sem.; semester 3; D. Gryglewski.
- [Edu98] *Fields and Waves* (Pola i fale – PFRM); 60h/sem.; semester 2; T. Morawski.
- [Edu99] *Imaging Techniques* (Techniki obrazowe – TORM); 30h/sem.; semester 7; M. Kazubek.
- [Edu100] *Internet Techniques* (Techniki internetowe – TINM); 30h/sem.; semester 7; K. Ignasiak.
- [Edu101] *Materials and Elements* (Materiały i elementy – MEM); 15h/sem.; semester 4; K. Radecki.
- [Edu102] *Multimedia Applications* (Aplikacje multimedialne – AMRM); 15h/sem.; semester 5; W. Smoliak.
- [Edu103] *Multimedia Computer Systems* (Multimedialne systemy komputerowe – MSKM); 30h/sem.; semester 4; T. Jamrógiewicz, G. Galiński.
- [Edu104] *Multimedia Techniques* (Techniki multimedialne – TMM); 15h/sem.; semester 6; K. Ignasiak.
- [Edu105] *Numerical Methods* (Metody numeryczne – MNRM); 30h/sem.; semester 3; A. Miękina.
- [Edu106] *Programmable Digital Devices* (Programowalne układy cyfrowe – PUCM); 30h/sem.; semester 5; T. Olszewski.
- [Edu107] *Programming* (Programowanie – PMRM); 30h/sem.; semester 3; R. Kurjata.
- [Edu108] *Project 1* (Projekt 1 – PJUM); 30h/sem.; semester 5; P. Brzeski.

- [Edu109] *Project 2* (Projekt 2 – PSRM); 60h/sem.; semester 6; P. Brzeski.
- [Edu110] *Propagation of Waves* (Propagacja fal – PFAM); 15h/sem.; semester 4; J. Jarkowski.
- [Edu111] *Radiocommunication Systems 1* (Systemy radiokomunikacyjne 1 – SRKM); 60h/sem.; semester 6; T. Kosiło.
- [Edu112] *Radiocommunication Systems 2* (Systemy radiokomunikacyjne 2 – SRK2M); 30h/sem.; semester 7; T. Kosiło.
- [Edu113] *Radiodiffusion Systems* (Systemy radiodyfuzyjne – SRDM); 60h/sem.; semester 6; A. Buchowicz, H. Chaciński.
- [Edu114] *Radioelectronics Measurements* (Miernictwo radioelektroniczne – MRM); 45h/sem.; semester 5; J. Cichocki.
- [Edu115] *Signals and Modulations* (Sygnały i modulacje – SMRM); 60h/sem.; semester 3; K. Snopek, K. Radecki.
- [Edu116] *Technique of Emission and Receiving* (Technika emisji i odbioru – TEM); 45h/sem.; semester 4; J. Modzelewski, W. Kazubski.
- [Edu117] *Transmitters and Receivers Measurements* (Pomiary nadajników i odbiorników – PNOM); 30h/sem.; semester 7; J. Cichocki.
- 3.2.2 M.Sc. Evening Studies on Radiocommunications**
- [Edu118] *Analysis and Synthesis of Microwave Units* (Analiza i synteza układów mikrofalowych – ASUMW); 60h/sem.; semester 2; W. Wojtasiak.
- [Edu119] *Computer Systems* (Systemy komputerowe – SMKW); 30h/sem.; semester 2; T. Jamrógiewicz.
- [Edu120] *Designing of Radiocommunication Systems* (Projektowanie systemów radiokomunikacyjnych – PSRW); 60h/sem.; semester 3; T. Kosiło.
- [Edu121] *Digital Signals Processing* (Cyfrowe przetwarzanie sygnałów – CPSW); 75h/sem.; semester 1; J. Wojciechowski, Z. Kulka.
- [Edu122] *Digital Transmission of Information* (Cyfrowa transmisja informacji – CTIW); 75h/sem.; semester 2; T. Buczkowski.
- [Edu123] *Diploma Seminar* (Seminarium dyplomowe – SDMW); 30h/sem.; semester 4; J. Ebert.
- [Edu124] *Programming in Java Language* (Programowanie w języku Java – PJJW); 45h/sem.; semester 1; K. Ignasiak.
- [Edu125] *Radiocommunication Systems Design* (Projektowanie systemów radiokomunikacyjnych – PSRW); 60h/sem.; semester 3; T. Kosiło.
- [Edu126] *Synchronization in Digital Radiocommunication Systems* (Synchronizacja w cyfrowych systemach radiokomunikacyjnych – SCRW); 30h/sem.; semester 3; K. Radecki, T. Buczkowski.
- 3.2.3 Post-diploma studies: "Radiocommunications"**
- [Edu127] *Antennae and Waves Propagation* (Anteny i propagacja fal – APF); 18h/year; J. Jarkowski.
- [Edu128] *Contemporary Radiocommunication Systems* (Współczesne systemy radiokomunikacyjne – WSR); T. Kosiło.
- [Edu129] *Digital Cellular Systems of 2nd Generation* (Cyfrowe systemy komórkowe II-giej generacji – CSK); J. Cichocki, J. Kołakowski.
- [Edu130] *Digital Radio-diffusion* (Radiodyfuzja cyfrowa – RC); 12h/year; H. Chaciński.
- [Edu131] *Digital Signal Processing* (Cyfrowe przetwarzanie sygnałów – CPS); 30h/year; J. Wojciechowski, Z. Kulka.
- [Edu132] *Digital Signal Transmission* (Cyfrowa transmisja sygnałów – CTS); 32h/year; T. Kosiło, H. Chaciński.
- [Edu133] *Radiocommunication Antennae* (Anteny radiokomunikacyjne – AR); 22h/year; Y. Yashchyshyn.
- [Edu134] *Seminar* (Seminarium – SEM); 8h/year; J. Jarkowski.
- [Edu135] *UMTS Systems* (Systemy UMTS); 26h/year; J. Cichocki, J. Kołakowski.
- 3.2.4 Studies on Audiological Techniques**
- Studies on Audiological Techniques offer a series of courses: 187h, twice a year.
- [Edu136] *Anatomy and Physiology of Hearing* (Anatomia i fizjologia słyszenia); 12h.
- [Edu137] *Audiometry* (Audiometria); 32h.
- [Edu138] *Aural Rehabilitation* (Rehabilitacja); 7h.
- [Edu139] *Basics of Acoustics* (Podstawy akustyki); 20h.
- [Edu140] *Earmold Technics* (Wkładki douszne); 8h.
- [Edu141] *Ear Pathology* (Patologia ucha); 9h.
- [Edu142] *Elements of Psychology* (Elementy psychologii); 6h.
- [Edu143] *Gesture Language* (Język gestów); 8h.
- [Edu144] *Hearing Aid Fitting* (Dobór aparatów słuchowych); 41h.
- [Edu145] *Hearing Aid Measurements* (Miernictwo aparatów słuchowych); 14h.
- [Edu146] *Hearing Aid Technology and Elements of Electronics* (Technika aparatów słuchowych i elementy elektroniki); 30h.

[Edu147] *Sign Language* (Język znaków); 6h.

3.2.5 B.Sc. Level e-learning Special Courses

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

[Edu148] Basics of Sound Technique (Podstawy techniki dźwiękowej); 30h/semester; Z. Kulka, A. Leszczyński, M. Tajchert.

[Edu149] Systems and Devices of Sound Technique (Urządzenia i systemy techniki dźwiękowej); 30h/semester; Z. Kulka, A. Leszczyński, M. Tajchert.

3.3 International co-operation

[Edu150] **SOCRATES Program: Higher Education**
T. Kosiło, T. Buczkowski
1999 – 2006

Within the framework of SOCRATES Institutional Contract two bilateral programs were realized: first – between the Institute of Radioelectronics of the Warsaw University of Technology and Katholieke Hogeschool Sint-Lieven, Gent, Belgium; second – between the Institute of Radioelectronics of the Warsaw University of Technology and Instituto Superior Tecnico, Universidade Tecnica de Lisboa, Lisbon, Portugal. In both cases, Student Mobility actions were realized within the framework of Electronics and Telecommunication Engineering (Socrates code 06.05). The aim of the program is to realize a student project at the partner University. The Student Mobility program was as follows: Poland – Portugal; two students for 6 months (Michał Jakub Kościelak, Piotr Furtak). In the Institute of Radioelectronics, two students from Belgium – Ludo Stichelmeyer and Steven de Craene have realized the B.Sc. project in the Nuclear and Medical Electronics Division (de Barco/Bachelor-prijs award from Katholieke Hogeschool Sint-Lieven, Gent, Belgium).

4 RESEARCH ACTIVITIES

4.1 International projects

- [Pro1] **Co-operative Systems for Road Safety "Smart Vehicles on Smart Road"**.
Tomasz Kosiło, J. Modelski, J. Kofakowski, S. Maszczyk, Z. Walczak;
 Jan. 1, 2006 – Dec. 31, 2009
SAFESPOT, EU Integrated Project (Partially funded by MSHE)

The key aspect of the project is to expand the time horizon for acquiring information relevant for safe driving, as well as to improve the precision, the reliability and the quality of the driver information, and to introduce new information sources. The time horizon of the SAFESPOT applications will allow an extension of the "Safety margin", namely the time in which a potential accident is detected before it can occur, from the range of "milliseconds" up to "seconds". This extension, called "green area" will reduce the risk of the accident to happen as more time will be given to drivers to realize that there is a potential danger, and to undertake the appropriate manoeuvres.

- [Pro2] **Core Subsystem for Delivery of Multi-band Data in CaTV**.
Andrzej Buchowicz, T. Keller, J. Modelski, W. Skarbek, G. Galiński, K. Ignasiak, M. Morgoś, S. Badura, G. Pastuszek, M. Leszczyński, M. Tomaszewski, M. Piasecki, S. Wydra, M. Bury, A. Rudziński, D. Rosołowski;
 Jan. 1, 2006 – Dec. 31, 2007
CODMUCA, EU Specific Targeted Research Project (Partially funded by MSHE)

The CODMUCA project will accelerate the development of the technology needed to bridge the gap from 40MBs to a gigabit delivery on Hybrid Fibre Coax (HFC) networks. It will allow broadband convergence of data, voice and video delivery on one protocol and access mechanism based on standard Internet Protocols (IP). CODMUCA will accomplish its goal by researching multiple-channel bonding methods to create virtual MultiBand data "pipes" that will carry very high-speed data streams to and from the consumer. Within CODMUCA IRE WUT team cooperates with eight European partners representing different areas of the industry (leading equipment producers, integrators and HFC operators).

- [Pro3] **Wireless Data Collecting**.
Wojciech Gwarek, P. Kopyt, P. Węgrzyniak, M. Krok;
 Jan. 1, 2005 – Dec. 31, 2007
WISE, EU Specific Targeted Research Project (Partially funded by MSHE);

Integrated Wireless Sensing (WISE) is a European Specific Targeted Research Project in the area of Aeronautics & Space. The project is coordinated by Dassault Aviation and engages 11 partners from 7 European countries. Our Institute is involved in Work Package 3 connected with the transmission of the sensor signals through the air medium. In particular, we design the high frequency part of a system for reception of information from sensors placed on moving parts of aircraft wings.

- [Pro4] **Reconfigurable Systems for Mobile Local Communication and Positioning**.
Józef Modelski, K. Kurek, Y. Yashchyshyn, R. Szumny, S. Kozłowski, P. Bajurko, A. Cichecki, P. Służewski;
 Jan. 1, 2006 – Jan. 31, 2009
RESOLUTION, EU Specific Targeted Research Project (Partially funded by MSHE)

The aim of RESOLUTION is developing a wireless 3D local positioning system with high accuracy and real time ability. The system is intended to work in an environment with strong multipath effects and fading, and will be implemented in advanced CMOS technology. Institute of Radioelectronics is responsible for Work Package 3 (antennas and propagation) that considers modelling of the indoor multipath propagation channel and design of smart antenna arrays for the system.

- [Pro5] **Integrating and Strengthening of the European Research Area**.
Jacek Jarkowski, W. Wojtasiak, D. Gryglewski, R. Michnowski;
 Jan. 1, 2004 – Jan. 1, 2008
TARGET, EU Network of Excellence (Partially funded by MSHE);

The aim of TARGET is to overcome the fragmentation of European research in the field of microwave power amplifiers for broadband wireless access by creating a progressive and durable integration of research capacities of the network partners. Ultimately, European technology and research in the fields of active power devices beyond CMOS, the characterization and simulation of materials and devices, the amplifier design and linearisation, and in the field of broadband transmitter system design will attain a leading role in the world.

- [Pro6] **Networked Audiovisual Media Technologies**.
Władysław Skarbek; K. Ignasiak, A. Buchowicz, G. Galiński, K. Kucharski, K. Wnukowicz, M. Tomaszewski, M. Morgoś, S. Badura, M. Leszczyński;
 Jul. 1, 2006 – Jun. 30, 2009
VISNET II, EU Network of Excellence;

VISNET II builds on the success and achievements of the VISNET network of excellence to continue the progress towards achieving the NoE mission of creating a sustainable world force in Networked Audiovisual (AV) Media Technologies. VISNET II is a network of excellence with a clear vision for integration, research and dissemination plans. The research activities within VISNET II cover 3 major thematic areas related to networked 2D/3D AV systems and home platforms. These are: - Video Coding - Audiovisual Media Processing - Audiovisual Media Security and Protection VISNET II brings together 12 leading European organizations in the field of Networked Audiovisual Media Technologies. The consortium consists of the organizations known for their proved track record as well as both, national and international reputation in audiovisual information technologies. VISNET II integrates a number of researchers who have made significant contributions to the advance of this field of technology through standardization activities, international publications, conferences and workshops activities, patents as well as many other prestigious achievements. The 12 integrated organizations represent 7 European states spanning

across a major part of Europe, thereby promising the efficient dissemination of resulting technological development and exploitation to larger communities.

[Pro7] **Antenna Centre of Excellence.**

Jacek Jarkowski, J. Modelski, Y. Yashchyshyn;
Jan. 1, 2006 – Dec. 31, 2007

ACE2, EU Network of Excellence (Partially funded by MSHE)

ACE2 is focused on the IST strategic objectives „Mobile and Wireless Systems beyond 3G” and „Broadband for All” which in future wireless world will converge and antennas will be ubiquitous in very advanced forms. Antennas may therefore be the most important enabling technology for the future wireless system and network development. Adaptive array antennas will be required by some future systems and small very efficient antennas by others. The small antennas, mounted on every electronic equipment, on the body or in the body for medical implant communications, for example, must be carefully designed, so special software programs and test beds must be developed. All antenna to-day problems lay in particular interest of ACE2. Institute of Radioelectronics (IR) is involved in Work Packages concerned with near-field measurement techniques and dissemination of the results at academic and research level. In particular there are investigations of different measurement procedures for specific antenna quantities. The participation in the project reflects long term activity of the IR in European Antenna Community.

[Pro8] **Screening of Cardiovascular Systems Based on Multi-Parameter Analysis.**

Ewa Piątkowska-Janko, P. Bogorodzki, T. Wolak, M. Orzechowski;

Jan. 1, 2003 – Jan. 12, 2007

EUREKA – CAVASCREEN, (Partially funded by MSHE)

The project includes a description, comparison with clinical data and clinical exploitations of a non-invasive and relatively inexpensive method for screening cardiovascular systems based on multi-parameter analysis of heart haemodynamics and vascular perfusion in selected areas of the body areas.

[Pro9] **A Region of Interest Analysis Methods for Functional and Perfusion Imaging.**

Piotr Bogorodzki, E. Piątkowska-Janko, W. Gradkowski, M. Orzechowski;

Jan 1, 2005 – Dec 31, 2006

POLONIUM Program, (Partially Founded by MSHE)

The purpose of this scientific project was to develop a procedures allowing assessment of either functional or metabolic data in chosen anatomical regions. Cooperation with group from INSA de Lyon CREATIS Research and Applications Center for Image and Signal Processing, Lyon, France.

[Pro10] **COMPASS Experiment at CERN – Development of the Spectrometer and the Data Acquisition and Analysis.**

Krzysztof Zaremba, J. Marzec, Z. Pawłowski, G. Domański, B. Konarzewski, A. Padée, R. Sulej, M. Ziembicki;

Jan. 1, 2004 – Dec. 31, 2006

Funded by MSHE.

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). In the present stage the spectrometer of the experiment is being developed and upgraded for the measurements of the hadrons interactions with a matter. Within the framework of a new programme the team from the Institute of Radioelectronics is responsible (together with the Soltan Institute of Nuclear Studies) for the design and production of a new detector, based on the scintillating fibers, for the spectrometer of the experiment. The Institute is also involved in the applications of the "soft computing" methods (neural networks, genetic algorithms etc.) in the experimental data analysis.

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

[Pro11] **The Use of Modern IT Technologies in the Designing of Distributed Measurement Systems (DMS)** (Wykorzystanie nowoczesnych technologii komunikacyjnych i programowych

w projektowaniu przewodowych i bezprzewodowych rozproszonych systemów pomiarowych).

Wiesław Winięcki, P. Bilski, P. Bobiński, T. Daniluk, H. Chaciński, R. Łukaszewski, M. Karkowski, T. Mielcarz, K. Mroczek;

Apr. 7, 2004 – Jul. 6, 2006

Research grant.

The project concerns the use of modern IT technologies in metrology. Main objects of interest are distributed measurement systems (DMS). The main topics of this project are methods of network and a wireless DMS designing, allowing the resolving of such hardware and software problems as:

- making the network measurement systems' software independent of hardware platform and allowing it to access the system from any computer with a standard web browser, without the need installation of the dedicated measurement application on the client computer,
- expansion of the measurement systems' application as resulting from the use of wireless communication,
- improvement of DMS reliability resulting from the correction of timing parameters specific to the network and wireless systems.

Scientific aim of this project was to develop a network/wireless DMS' new design and to analyze methods taking advantage of modern wired and wireless communication technologies as well as software technologies. Engineering purpose of this project is to develop software tools and libraries for DMS' software development, which can be used in industry, environment and radiocommunication monitoring as well as in scientific and R&D laboratories.

[Pro12] **Methods and Algorithms for the Interpretation of Signals Spectrum, Dedicated to Applications in the Monitoring of Technological and Ecological Processes** (Metody i algorytmy interpretacji

widma sygnałów do zastosowań w monitoringu procesów technicznych i ekologicznych).

Roman Z. Morawski, A. Miękina, T. Woliński, A. Podgórski, N. Obarski;

Apr. 17, 2003 – Apr. 16, 2006

Research grant.

New methods and algorithms of digital signal processing of measurement data have been developed. They are designed for solving some fundamental problems related to the development of information infrastructure of technological and ecological monitoring.

[Pro13] **Electro-thermal Modeling of Microwave Power Transistors** (Elektryczno-termiczne modelowanie mikrofalowych tranzystorów mocy).
Wojciech Wojtasiak, D. Gryglewski, T. Morawski, J. Zborowska, J. Kraśniewski, M. Oleksy, M. Kraśniewski, S. Łuczak, M. Lubiejewski;
Nov. 5, 2003 – Feb. 4, 2006
Research grant.

The topic of the project was the electro-thermal modeling of modern, microwave high power FETs such as MESFET, HJFET and LDMOSFET. The thermal problem described by heat conducting equation is solved by means of 3D – FDTD method for arbitrary pulsed thermal excitation. In result, the transient temperature distribution in the active area of transistor is substituted into electrical model. The second aspect of this project focuses on the new method of determination methods and measurements of thermal impedance of high power microwave FETs.

[Pro14] **Hierarchical Statistics Modeling of Disease Process with Multiple Etiology** (Hierarchiczne modelowanie statyczne procesu chorobowego o złożonej etiologii).
Dariusz Radomski, A. Jakubiak, M. Kazubek, J. Malejczyk, P. Roszkowski;
Nov. 5, 2003 – May 4, 2006
Research grant.

The goal of the realized grant was the preparation of the methodology for the statistical modeling of a disease with multi-factorial etiology. One of the new elements is a concept of hierarchical model, which describes a disease process at levels of time-space resolution. The example of a disease used in this project is endometrioid cysts being the one of the more frequent ovarian tumors. At the moment, the authors are elaborating the model at the epidemiological level, which allow to identify risk factors associated with such cysts. Knowledge of these factors could be used in the diagnostic model of the disease. Moreover, the general methodology of mathematical modeling in gynecology and obstetrics has been elaborated.

[Pro15] **System for the Visualization and Acquisition of the Measurement Data from the X-Ray Inspection of Large Objects Intended for the Use in the Customs Inspection** (System wizualizacji i rejestracji wyników prześwietlania dużych obiektów wiązką promieniowania hamowania z akceleratora z przeznaczeniem do zastosowania w kontrolach granicznych).
Krzysztof Zaremba, Z. Pawłowski, J. Marzec, G. Domański, B. Konarzewski, W. Padée, M. Dziewiecki, T. Rubel, R. Sulej, M. Ziembicki;
Nov. 1, 2005 – Nov. 30, 2006
Goal oriented grant – partially funded by the Establishment for Nuclear Equipment ZdAJ IPJ.

The aim of the project is to design and build a small-scale model of the measurement system which is intended to be used for the trucks load X-ray scanning during the customs inspection. A braking radiation from the linear accelerator will be used as a high-energy X-ray source. The

project is realized in a collaboration with an industrial partner – Establishment for Nuclear Equipment ZdAJ IPJ.

[Pro16] **New Type of an Electronically Reconfigurable Smart Antennae** (Nowe rodzaje anten inteligentnych o rekonfigurowanej elektronicznie aperturze).
Józef Modelski, Y. Yashchyshyn, P. Grabiec, J. Marczewski, T. Keller, K. Kurek, H. Chaciński, P. Bajurko;
May. 24, 2005 – Nov. 23, 2007
Research grant.

The general model of the reconfigurable aperture in the impedance approximation is described in this project. The integral equation for the magnetic currents being excited on a aperture with the variable surface impedance is formulated. A highly effective numerical algorithm is used to obtain the solution of the integral equation. The Genetic Algorithm is used in the optimization of the desired radiation pattern. The optimizer tries to determine the configuration of a conductive pattern on a semiconductor substrate to obtain the desired radiation pattern. The key element of the antenna will be a semiconductor chip that contains a set of individually controlled PIN structures. Electromagnetic waves propagate through the chip, which also serves as a planar dielectric waveguide. The PIN structures locally affect the wave propagation velocity and the antenna can form a beam in practically any direction within a wide steering angle (like a leaky-wave antenna).

[Pro17] **Development of Methodology and Instrumentation for Functional Magnetic Resonance Imaging (fMRI) of Auditory Cortex** (Opracowanie metodyki i aparatury do klinicznych badań czynnościowych kory słuchowej metodą funkcjonalnego rezonansu magnetycznego).
Piotr Bogorodzki, K. Kochanek, L. Śliwa, M. Gołębiowski, J. Walecki, W. Szeszkowski, M. Kazubek, E. Piątkowska-Janko, T. Wolak, T. Jamró-giewicz, M. Orzechowski, R. Kurjata;
May 24, 2005 – May 23, 2007
Research grant.

The aim of the project was to build and test new experimental procedures for functional assessment of the human auditory cortex (AC). Although functional MR (fMRI) and perfusion methods are well recognized as powerful tools in various clinical and neurological applications, they still suffer from the lack of accurate and repeatable quantitative measures of studied effects. In order to overcome these limitation, the following problems will be studied:

- Design of the new pre-processing algorithms for the removal of physiological noise, motion correction and resolution improvement with shifted measurements. As a result, software will be written in MATLAB (MathWorks, USA) and the algorithms will be tested in fMRI and perfusion studies.
- Design and testing of the novel techniques for generation of fMRI activation maps based on features derived from time-intensity curves in anatomically or functionally defined regions of interest (ROIs). Basing on the measures derived from the time-intensity curves, differences between groups of subjects will be highlighted allowing inference about group separation based on functional responses in chosen regions. Resulting measures can be used for higher level analysis, such as ANOVA, MANOVA etc. in order to show group effects. The new algorithms will be compared with the existing ones and with the gold standard provided by metabolic map-

ping, which is more sensitive by an order of magnitude.

- Design and evaluation of new algorithms for fMRI image analysis based on anatomical and functional knowledge. Functional connectivity between clusters of activated voxels will be estimated by structural equation modeling.

[Pro18] **Wavelet-based Modeling of Diagnostic Information for Digital Radiography** (Modelowanie informacji istotnej diagnostycznie w dziedzinie przekształceń falkowych do zastosowań w radiologii cyfrowej).

Artur Przelaskowski, P. Wojtaszczyk, J. Walecki, M. Biesiadko-Matuszewska, R. Sikora, E. Wesółwska, P. Surowski, A. Wróblewska, P. Bargieł, P. Boniński, M. Skaliński, E. Fabiszewska, A. Kuła, K. Durasiewicz;

Mar. 17, 2005 – Dec. 16, 2006

Research grant.

The topics of the project were as follows: a) multi-scale image analysis, processing and enhancement, b) pathology signatures classification and improvement, c) CAD tools optimization for mammography, CT brain imaging and others, d) radiological tele-information system development, e) reference database indexing and retrieval.

[Pro19] **The Use of Formal Methods in Measuring Systems Design** (Wykorzystanie metod formalnych w projektowaniu systemów pomiarowych).

Wiesław Winięcki, R. Łukaszewski;

May 04, 2006 – May 04, 2007

Research grant.

The projects applies to the use of the formal methods in the measurement systems design. The main area of interest are the distributed measurement systems (DMS). The subject matter of the DMS design are the methods of the measurement systems design (therein DMS), which enable the improvement of the systems reliability (therein DMS) as a result of the allowance of the time conditions specific for such systems. The scientific aim of the design is the development of the new method of measurement systems design and analysis.

- The detailed scientific aims are: Development of the time flow of DMS model enabling the support of the system design;
- Development of the methods of design of the measurement systems of time dependencies in the DMS, with the use of the developed DMS time flow model.
- Experimental verification of the design methods developed.

The application purpose of the project is the development of the models of the standard functional blocks of the latest measurement systems. These models will primarily consider the aspects of the information flow within the system.

[Pro20] **Algorithms for Adaptive Video Transcoding and their Hardware Implementation** (Algorytmy adaptacyjnego transkodowania cyfrowego sygnału wizyjnego i ich implementacja sprzętowa).

Andrzej Buchowicz, W. Skarbek, G. Pastuszek, G. Galiński, K. Wnukowicz, S. Badura;

Jun. 04, 2006 – Jun. 04, 2008

Research grant.

The overall purpose of the project is to develop an effective adaptive video transcoding algorithms for bit rate reduction, spatial and temporal resolution downsampling

and transcoding between video coding standards. Special attention will be paid to the transcoding from the MPEG-2 standard to the H.264 standard. The selected algorithms will be implemented in hardware allowing real time processing.

[Pro21] **Automatic System for the Technical Systems Diagnostics** (Automatyczny system diagnostyki systemów technicznych).

Jacek Wojciechowski, P. Bilski;

Apr. 1, 2005 – Apr. 1, 2006

Ph.D. grant.

The subject of the grant is to design the automated diagnostic architecture. Its purpose is the analysis of the analog systems of different technical nature. The architecture uses methods belonging to the artificial intelligence and machine learning methods, such as rough sets, fuzzy logic and decision trees.

[Pro22] **Method of Localization of Radio Terminals Inside Buildings** (Metoda lokalizacji terminali radiowych wewnątrz budynków).

Józef Modelski, R. Szumny;

Nov. 9, 2006 – Dec. 31, 2007

Ph.D. grant.

This work concerns indoor positioning subject. It will contain deep analysis of multi-path propagation influence to localization accuracy and proposal of localization error mitigation method. Researches will be based on simulations and measurements.

[Pro23] **Applications of the neural networks in classification tasks in the high energy physics experiments** (Sztuczne sieci neuronowe w zadaniach klasyfikacji w eksperymentach fizyki wysokiej energii).

Krzysztof Zaremba, R. Sulej

Nov. 9, 2006 – May 8, 2008

Ph.D. grant.

The aim of this project is to establish the methods of event selection and interaction parameters estimation for the COMPASS experiment. Currently used techniques require manual tuning of the parameters and presumably do not guarantee the highest quality of results. The method of extracting information contained in higher number of parameters and their mutual correlations is needed. Potential solution is the application of the neural network. We propose also the new algorithm for automated control of the network size (constructive network) resistant to the local minima and over-training problems.

4.3 Projects granted by the University

4.3.1 Statutory projects

[Pro24] **Design and Investigation of Electroacoustics Measuring Systems and Digital Audio Signal Processing 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;

Jun. 1, 2005 – Oct. 31, 2006

Primary topics, included in the statutory grant were as follows:

- subjective audio quality evaluation tests of the stereophonic signals coded at bit rates between 96 and

192 kbit/s by means of various digital audio compression algorithms,

- elaboration of new software solutions using the Java language for application in the sound data acquisition and processing laboratory system,
- design, construction, measurements and subjective sound quality evaluation of the two-channel, class-D digital audio power amplifier based on the Tripath RB-TA3020 reference board.

[Pro25] **Transmission Channel in Ultrawideband Systems** (Kanał transmisyjny w systemach ultraszerokopasmowych).

Jacek Cichocki, J. Kołakowski, K. Radecki, S. Maszczyk, W. Kiełek, S. Żmudzin D. Kolmas, P. Ziętek;

Jun. 1, 2005 – Oct. 31, 2006

In this research project the UWB transmission channel parameters were examined. The Matlab procedures to simulate ultrawideband signals influenced by channel phenomenon have been worked out. The source of impulse UWB signal was developed and used in experimental part of this work. Application software for UWB signal acquisition was also prepared. The software includes also wavelet based algorithm for reduction of noise in UWB signals. In research of propagation channel parameters, the LOS and NLOS cases were taken into account. On the basis of the measured results, the models of propagation were evaluated and verified.

[Pro26] **Implementation and Investigation of the Selected Algorithms for the Interpretation of Measurement Data** (Realizacja i badanie wybranych algorytmów interpretacji danych pomiarowych).

Roman Z. Morawski, A. Miękina, A. Podgórski;

Jun. 1, 2005 – Oct. 31, 2006

The primary objective of the project was related to the methodology of 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. The results of the project include: systematic approach of the design and implementation issues related to the applications of digital signal processing in measuring systems; a methodology for its implementation in the advanced instruction of graduate students; some new contributions to the development of logical and philosophical foundations of measurement theory; an original package of software for advanced USB controller to be applied in measurement instrumentation. The results of the accomplished research have been partially published in 4 papers.

[Pro27] **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, J. Marzec, T. Olszewski, Z. Pawłowski, E. Piątkowska-Janko, A. Przelaskowski, L. Padée, W. Smolik, R. Szabatin, P. Bargieł, P. Boniński, R. Kurjata, M. Orzechowski, A. Trybuła, T. Wolak, A. Wróblewska;

Jun. 1, 2005 – Oct. 31, 2006

Examination of brain by means of optical tomography and evoked potentials

The aim of the work was to elaborate effective methods enabling the linking of functional brain examinations by means of optical tomography with evoked potential studies. The optical tomograph for the measurement of change in brain blood oxygenation and accompanying evoked potential device were prepared. In vivo tests confirmed the usefulness of combining both techniques.

Wireless acquisition module for ECG stress examination

This project covers the design and prototyping of wireless module for acquisition of 12 lead ECG during a stress test. A proposed module can be used within VITACARD system from the Institute of Medical Technology and Equipment (ITAM), Poland. The designed and tested module has the following functionality:

- on-line acquisition of 12 lead ECG with conformance to IEC 60601-2-51 "Particular requirements for the essential performance of recording and analyzing electrocardiographs"
- weight approx. 200g (without cabling and battery), and double credit card size (86mm x 110mm),
- ≤ 300 mW power consumption, allowing 12 working hours without recharging (2000 mAh rechargeable battery),
- robust and error free transmission of ECG signal to 'master' point (medical acquisition computer) over the 20 m distance.

Content-based indexing of medical images: introductory research

The developed ImageShark system consists of 4 main elements: database environment, content-based image retrieval system FIRE with implemented indexes, JPEG 2000 interactive codec for data streaming, web service for distributed searching. Such an approach gives very flexible and effective image retrieval methods. A set of image- and wavelet-domain based indexes were implemented, verified in initial experiments and selected as suitable for mammograms, radiograms, CT exams and other modalities. Reference medical image databases were used in the experiments (DDSM, IRMA, our collected datasets). Precision of data retrieval was comparable with other engines (IRMA, others), giving very promising results with similar or better precision level. To improve retrieval precision, the local features for efficient content-based image retrieval in medical domain were extracted to characterize the images more effectively. The image analysis is limited to a subset of small image regions, where the image information is supposed to be the most important. Beside saving time in the indexing process, these points may lead to a more discriminant index because they are related to the visually or diagnostically most important parts of the image. Local features extraction, done in multi-resolution domain and based on modified salient points' algorithm was proposed. The method tries to find semantically important points in the image which constitute a base for the following steps in the retrieval. These points are selected by inclusion of multi-scale lesion models which classifies and allows the reduction of initial points' set to diagnostically important regions. The experimental comparison to other, state-of-art retrieval effects for medical images is promising for the proposed local image characteristics.

Electrical tomography techniques applied in medicine and industry

In the current year, the works on the capacitive tomograph were focused on the further development of the software used in modeling of the electrical field and simulation of the capacitive tomograph. The iteration algorithm developed by Jacek Mirkowski, Ph.D., applied in the reconstruction of tomographic images from the measurement data, obtained from the 16-electrode version of ET3 tomograph was implemented. The capacitive tomograph model in double plane version – 2x12 and 2x16 channels, was developed and activated. Within the framework of the project, the international co-operation with the team led by Prof. W.Q. Yang from Manchester University was being realized. The most significant achievement of the team in 2006 was the organization of the "IV International Symposium on Process Tomography in Poland – ProcTom 2006."

[Pro28] **Future of Wireless Systems – Selected Problems** (Perspektywy rozwoju systemów radiokomunikacyjnych – wybrane problemy).

Tomasz Kosiło, S. Hahn, T. Buczkowski, K. Czerwiński, J. Jarkowski, H. Chaciński, W. Kazubski, K. Snopek;

Jun. 1, 2005 – Oct. 31, 2006

The work "Future of wireless systems – selected problems" realized in Radiocommunications Division of Institute of Radioelectronics, contains the study and analysis of new promised wireless systems. The radio systems found many applications as access tool to the global telecommunication network. The digital broadcasting will be the near future reality. The new applications and tele-services are developed. The electromagnetic compatibility is becoming more and more important.

The study covers the following areas:

- New methods of theoretical description of signals in radio-communications
- Analysis and development of selected receiver units
- Selected problems of new localization algorithms
- Ecological problems of radiocommunications.

[Pro29] **Investigation of Analog Systems and Telecommunication Networks Using Artificial Intelligence** (Badanie systemów analogowych i sieci telekomunikacyjnych z wykorzystaniem sztucznej inteligencji).

Jacek Wojciechowski, Z. Walczak, P. Bilski, A. Dominik, A. Trojanowski;

Jun. 1, 2005 – Oct. 31, 2006

The project presents the model of spatial distribution of nodes in unit disk graph with local clusters. Additionally, the project concerns the use of this model for analysis of interference in wireless sensor network and solving traveling salesman problem, using specialized evolutionary algorithms.

[Pro30] **Modern Methods of Computer Measuring Systems Designing** (Nowoczesne metody projektowania komputerowych systemów pomiarowych).

Wiesław Winięcki, K. Mroczek, P. Bilski, R. Łukaszczyński, T. Daniluk;

Jun. 1, 2005 – Oct. 31, 2006

The project concerns the distributed measuring systems (DMS). The results of the project include: the methodology of design measuring systems with time limited data flow, the new method of describing measuring systems model

based on Petri Nets with the use of CPN/Tools; a method of using web-services technology and also static and mobile agent technologies in DMS with experimental verification of measurement stations delays and data transfer rate; the method of designing the real-time virtual instrumentation using ETS configuration. The results of the research have been published in 4 conference papers.

[Pro31] **Hybrid Multimedia Systems** (Hybrydowe systemy multimedialne).

Andrzej Buchowicz, W. Skarbek, G. Galiński, K. Ignasiak, K. Wnukowicz, S. Badura, K. Kucharzski, M. Leszczyński, M. Mogoś, G. Pastuszek, M. Tomaszewski;

Jun. 1, 2005 – Oct. 31, 2006

The main aim of the project was to create 3D models representing objects in audiovisual scenes. Special attention has been paid to the creation of the models representing human heads and faces. The effective data structures for storing and transmitting of the models in the IP networks have also been created. These data structures have been used in the Virtual Class application allowing distance learning with flexible interaction among the lecturer and the students. Additionally, the 3D model data acquisition setup has been created. The 3D model is created from several 2D views of the scenes, obtained with the digital camera. The camera calibration and the compensation of the distortions introduced by the camera optics have been also researched.

[Pro32] **Modern Localization and Object Shape Recognition Techniques** (Nowoczesne techniki lokalizacji i określania kształtów obiektów).

Józef Modelski, K. Kurek, Y. Yashchychyn, T. Keller, R. Szumny, A. Kurek;

Jun. 1, 2005 – Oct. 31, 2006

The main aim of the statutory work was the analysis of the techniques used in modern communication systems for indoor positioning of the wireless terminal with a proper accuracy. The research was based on the power delay profile parameters. Some work was dedicated to finalize system for space capsule's localization and to design the penetrating radar using the ultra short pulses for recognition of the shape of objects.

[Pro33] **Modeling of Electromagnetic Fields and Designing of Microwave High Power Amplifiers** (Modelowanie pól elektromagnetycznych i projektowanie mikrofalowych wzmacniaczy mocy).

Tadeusz Morawski, Wojciech Gwarek, M. Celuch, D. Gryglewski, M. Sypniewski, A. Więckowski, P. Miazga, W. Wojtasiak, J. Zborowska, R. Michnowski, K. Robaczyński, P. Kopyt, J. Rudnicki, A. Moryc, T. Ciamulski, W. Kijewska, M. Lubiejewski;

Jun. 1, 2005 – Oct. 31, 2006

In the first sub-project, new concepts and algorithms have been developed for the design of high-power high-efficiency microwave transistor amplifiers. They have been applied to manufacture telecommunication transmitters of 0.5W power at 410 MHz frequency band, and 1W/5W power at 3.5 GHz. In the second sub-project, numerical methods elaborated by the group have been extended towards the modeling of coupled electromagnetic-thermodynamic problems. The new tools have been applied to the analysis of industrial microwave processing of metal ores and foods, electromagnetic compatibility, EM safety in the

workplace, and MMIC design. The results have been published in international conferences proceedings and journals, and helped enhance international collaboration and industrial links.

4.3.2 Projects granted by the Rector

[Pro34] **Project of on-Board Computer for SSETI ESEO Satellite** (Projekt komputera pokładowego dla satelity SSETI ESEO).

Krzysztof Kurek, M. Olak, R. Graczyk, K. Bąk, T. Cedro, A. Cichocki, M. Dobrowolski, P. Grudziński, M. Iwiński, M. Kędzierawski, M. Kurowski, M. Mosdorf;
May 4, 2006 – Dec. 31, 2006
Educational Student Project.

The main purpose of the project is to design space computer for SSETIESEO satellite. It is a part of an educational student project supported by European Space Agency.

[Pro35] **Methods and Instrumentation for Tissue Properties Analysis for the Medical Diagnostics** (Metody i urządzenia do analizy właściwości tkanek dla diagnostyki medycznej).

Natalia Golnik, P. Bogorodzki, Sz. Cygan, G. Domański, Z. Dunajski, B. Galwas, M. Gołębiowski, K. Kałużński, M. Kazubek, B. Konarzewski, Ł. Krzemiński, A. Książkiewicz, R. Kurjata, B. Leśniak, W. Łukasik, K. Lebenstein, M. Orzechowski, Z. Pawłowski, E. Piątkowska-Janko, R. Plewiński, J. Skulski, T. Sołtyński, W. Szeszkowski, A. Trybuła, T. Wolak, K. Zaremba;
Jun. 1, 2006 – Dec. 31, 2006
University Research Program.

The main purpose of this University Research Program was the integration of research activities in the field of the tissue properties examinations carried out in two faculties of the University – The Faculty of Mechatronics (Institute of the Precision and Biomedical Engineering) and The Faculty of Electronics and Information Technology (Institute of Radioelectronics, Division of Nuclear and Medical Electronics).

The project covered the following areas:

- Development of methods and instrumentation for the tests of tissue mechanical properties;
- Analysis of the optical properties of tissue – optical tomography;
- Development and clinical applications of non-invasive imaging methods with the use of magnetic resonance techniques for the evaluation of metabolic effects in tissue.
- Development of the tissue impedance measurement methods and the improvement of existing impedance spectrometer.

4.3.3 Projects granted by the Dean

[Pro36] **Linear Radio Channel Prediction with Rayleigh Channel** (Liniowa prognoza kanału radiowego z zanikiem Rayleigha).

Jacek Wojciechowski, A. Trojanowski;
Jul. 1, 2006 - Dec. 31, 2006

This work investigated the use of linear MMSE prediction methods for the prognosis of non-stationary and non-selective Rayleigh fading channels. It was shown that a properly chosen and configured prediction algorithm offers much better knowledge of the future radio channel than

the raw estimate. Necessary conditions for successful prognosis were explored and the methods for improving prediction effectiveness were revealed. Three filter structures: traversal Wiener, adaptive and lattice filters were characterized and compared in numerical simulations in order to suggest the most functional algorithms for mobile adaptive transmissions.

[Pro37] **High-efficiency Microwave High-power Amplifiers for Radiocommunication Systems** (Wysokosprawne wzmacniacze mikrofalowe dużej mocy dla systemów radiokomunikacyjnych).

Wojciech Wojtasiak, D. Gryglewski, J. Piotrowski, J. Skulski, M. Lubiejewski;
Jul. 1, 2006 - Dec. 31, 2006

The main aim of the project is to elaborate the method of designing microwave high-power radiocommunication transmitters made by means of SiC and GaN layers with higher efficiency (PAE). The use of mentioned layers guarantees the high transmission quality.

[Pro38] **Time-frequency Properties of Broadband Telecommunication Signals and their Use in Watermarking and Steganography** (Czasowo-częstotliwościowe właściwości szerokopasmowych sygnałów telekomunikacyjnych i ich wykorzystanie w znakowaniu wodnym i steganografii).

Kajetana Snopek, S. Hahn, A. Dąbrowski, P. Dymarski;
Jul. 1, 2006 - Dec. 31, 2006

The research concerns the application of time-frequency (TF) methods in studying of the properties of wide-band telecommunication signals, i.e., pseudo-random sequences and M-ASK, M-PSK, M-FSK signals (including spread-spectrum techniques). The possibilities of applications in audio watermarking and steganography of TF methods are investigated.

[Pro39] **Transductive Support Vector Machine as a Classifier for Detection of ECG in Hypertensive Patients with Different Constitution of the Left Ventricular** (Transdukcyjna maszyna wektorów nośnych jako klasyfikator uśrednionych sygnałów wysokorozdzielczego EKG dla pacjentów z udokumentowanym nadciśnieniem tętniczym i różną budową lewej komory).

Ewa Piątkowska-Janko, S. Jankowski, A. Oręziak, Z. Szymański, P. Bogorodzki, M. Kazubek;
Jul. 1, 2006 - Dec. 31, 2006

The main purpose of this project was to applying the transductive support vector machine as a classifier for detection of the patients with high risk of ventricular tachyarrhythmias.

[Pro40] **Electroacoustic Methods of Measurement of Xylophagous Insects Activity Properties** (Elektroakustyczne metody pomiaru cech aktywności ksylofagicznych owadów).

Zbigniew Kulka, P. Bobiński, A. Leszczyński, M. Tajchert, A. Młyńska, P. Nykiel;
Jul. 1, 2006 - Dec. 31, 2006

The methods of sound registration produced by feeding of grown house longhorn beetle larvae have been presented. Specialized software for registered signals analysis was elaborated. Performed analysis should help to detect the insects' activity and estimate the population of insects'.

4.4 Other projects

[Pro41] **A Wireless Module Designed for the ECG Acquisition** (Moduł akwizycji elektrokardiogramu z radiową transmisją danych).

Piotr Bogorodzki, T. Jamrógiewicz, M. Kazubek, E. Piątkowska-Janko;

Oct. 15, 2004 – Jun. 30, 2006

Funded by the Institute of Medical Technology and Apparatus (Instytut Techniki i Aparatury Medycznej), Zabrze.

The aim of the project was to design a wireless module for ECG stress examination. The key feature of the projected device are as follows: 8/12 differential leads with defibrillation protection, frequency response 0.05÷150/250Hz, sampling frequency 4 kHz, supported data formats: 8/12 x 16bit x 1 kHz or 3 x 16bit x 4 kHz, input impedance >20 M, CMRR 120 dB, maximum input voltage ±10 mV.

[Pro42] **Radiocommunication Systems of the Future Generation** (Systemy radiokomunikacyjne przyszłych generacji).

Józef Modelski;

Jun. 8, 2005 – Jun. 8, 2008

Funded by the Foundation for Polish Science (Fundacja na Rzecz Nauki Polskiej).

In the project the research activities concentrate on: smart antennae (reconfigurable systems with electronic beam control, ferroelectric structures, multiple input, multiple output, MIMO systems, SAR/ISAR techniques); short range wireless systems (ultra wide-band UWB systems, compatibility WPAN and WLAN systems); radio navigation systems (Localization of radio terminal inside and outside buildings, navigation systems for urban areas with high buildings).

[Pro43] **Development and Implementation of Techniques for Advanced Image/Video Processing and Visualization** (Opracowanie technologii i oprogramowania do zaawansowanego przetwarzania i wizualizacji obrazów i video).

Władysław Skarbek, K. Wnukowicz;

Dec. 31, 2005 – Jun. 30, 2006

Funded by Mitsubishi Electric Information Technology Center Europe B.V.

The aim of this work was to develop an MPEG-2/MPEG-7 library of functions and GUI. The library allows MPEG-2 stream analyzing, extracting video frames into image files, and linking MPEG-7 meta-data to MPEG-2 stream.

[Pro44] **Development of Hierarchical Fuzzy Clustering Techniques Using Kernel PCA/LDA Methods and Implementation of Image Processing Tools on Embedded CPU Platform.** (Opracowanie hierarchicznych, rozmytych technik klasteryzacji z wykorzystaniem kernelowych metod PCA/LDA oraz oprogramowania do przetwarzania obrazów dla systemów wbudowanych).

Władysław Skarbek, G. Galiński, M. Leszczyński;

Feb. 1, 2006 – Mar. 24, 2006

Funded by Mitsubishi Electric Information Technology Center Europe B.V.

The work consist of two work-packages. The key objective of the first work-package was to develop hierarchical fuzzy clustering techniques using kernel PCA/LDA methods to be used in face recognition system. The face recognition system will have improved recognition performance with

good robustness for illumination and pose variations. In the second work-package, a real-time object recognition demo based on MPEG-7 descriptors was ported onto an embedded dual-processor CPU board running Linux OS.

[Pro45] **Checking and Control of Parameters Concerning AP-1 Units According to Tactical and Technical Regulations** (Sprawdzenie i regulacja parametrów zespołów AP-1 według wymagań taktyczno-technicznych).

Krzysztof Robaczyński;

Aug. 7, 2006 – Sept. 15, 2006

Funded by Military Institute of Armament Technology (Wojskowy Instytut Uzbrojenia).

The main goal of this project was to perform functional investigations and the analysis of results concerning specialized military units.

[Pro46] **Elaboration of the Investigations Program and Taking the Measures of Jump Antenna Characteristics by Means of Phase Shifter** (Opracowanie programu badań oraz przeprowadzenie pomiarów charakterystyk anteny skokowej za pomocą przesuwników fazy).

Daniel Gryglewski;

Jul. 1, 2006 – Nov. 30, 2006

Funded by Telecommunications Research Institute (Przemysłowy Instytut Telekomunikacji).

The main purpose of the project was to elaborate investigations and make the measurements of antenna characteristics by means of phase shifters. The work focus is to develop the main electronics modules of the shifter.

[Pro47] **Ultrawideband Systems** (Systemy ultraszerokopasmowe).

Jerzy Kołakowski, J. Cichocki, S. Maszczyk;

Jul. 18, 2006 – Dec. 5, 2006

Funded by Polish Telecommunications (Telekomunikacja Polska).

The first part of the project covered the analysis of a current state of development and implementation of UWB systems. The second part concerned the analysis of measurement methods suitable for UWB signals as well as investigations of influence of UWB signals on commonly used radiocommunication systems (Bluetooth, 802.11 b/g, DECT, GSM).

[Pro48] **Design and Construction of Research Stand for Functional Magnetic Resonance Imaging (fMRI) of Brain** (Przygotowanie i montaż stanowiska do prezentacji bodźców wzrokowych dla potrzeb badań czynnościowych mózgu).

Ewa Piątkowska-Janko;

Jul. 1, 2006 – Sept. 12, 2006

Funded by Institute of Psychiatry and Neurology, Warsaw (Instytut Psychiatrii i Neurologii).

The aim of the project is to build and test equipment for functional assessment of the human brain.

[Pro49] **Citizen Card and Public Internet Access Points for the City of Rybnik – Technical Expertise** (Ekspertyza techniczna dotycząca karty elektronicznej dla projektu Elektroniczna Karta Miejska i Publiczne Punkty Dostępu do Internetu w mieście Rybnik).

Jacek Wojciechowski, Z. Walczak, G. Bernatek, J. Twaróg;
Dec. 1, 2005 – Apr. 30, 2006
Center of Technology Transfer (Centrum Transferu Technologii).

Funded by the President of Rybnik.

The scope of the project included:

- preparation of technical and functional specification of the card;
- assistance in preparation of the documents for public bids;
- verification of offers.

[Pro50] **Recognition of Development of Radiocommunications and Broadcasting GEO Satellite Systems and Possible Spectrum of Management Issues in this Area** (Rozpoznanie rozwoju służb radiokomunikacji i radiodyfuzji satelitarnej na orbicie geostacjonarnej (GEO) oraz opis możliwych działań w gospodarce widmem).

Józef Modelski, K. Kurek, T. Keller;
Oct. 1 – Nov. 15, 2006

Funded by National Institute of Telecommunications (Instytut Łączności).

The main aim of this work was the description of possible directions of GEO satellite communications systems development in the nearest future.

[Pro51] **The Future of Satellite Technologies in Poland** (Przyszłość technik satelitarnych w Polsce).

Józef Modelski.

Dec. 1 – Dec. 27, 2006

FORESIGHT project funded by Polish Office for Outer Space (Polskie Biuro ds. Przestrzeni Kosmicznej).

The aim of this project is to estimate the prospects of the application of the new satellite technologies in Poland and the development of outer technologies in two perspectives till 2012 and 2020. The project is run in the co-operation with Polish Platform for Outer Technologies.

4.5 Other activities

4.5.1 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.

4.5.2 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 concentrates 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.

4.5.3 Visitors

From August 2005 to July 2006 **Prof. Li Yongfan**, from Hunan College (China), visited the Institute of Radioelectronics as a visiting scholar in the frame of co-operation between Polish and Chinese Ministry of National Education. This visit included the following subject matters: research on technology side interested in development of virtual multimedia classrooms and authoring tools for hypermedia electronic books.

Institute of Radioelectronics is involved in Marie Curie ToK (Transfer of Knowledge) European project. The project is titled: "*Evaluation and customization of electro-magnetic (EM) simulation tools for use in advanced antenna array applications*". The main aim of the project is to customize electromagnetic FDTD simulator to calculate huge antenna and other large microwave circuits, as well as transfer of knowledge. Mid-Sweden University - the coordinator of the project has experienced researchers and very good computer environment to achieve this goal. Transfer of knowledge regarding parallel computing and shared memory computational platforms from Mid-Sweden University to Warsaw University of Technology is performed. Knowledge about EM solvers and simulation tools from Warsaw University of Technology to the Mid-Sweden University is passed. Two researchers from Mid-Sweden University visited Institute of Radioelectronics in 2005, one for the full year. Also two researchers from Warsaw University of Technology worked in Mid-Sweden University this year.

4.5.4 Students' research groups

Student Space Engineering Scientific Group **K. Kurek** – tutor.

ESEO (European Student Earth Orbiter project) is designed within the frame of Student Space Engineering Scientific Group. It is an educational project of SSETI (Student Space Exploration and Technology Initiative). ESEO is a micro-satellite to Earth observation, designed, built and operated by the students from European Universities, and it has been launched in 2006. Students from Space Technology Student Group joined the project at the beginning of 2004. Main task of our team in this project is to design and realize core of the on-board data handling

(OBDH) subsystem that allows to monitor and control the status and operations of all satellite subsystems. A PC/104 CPU board will be used as OBDH core computer that will communicate with other ESEO subsystems using Controller Area Network(CAN) bus. Software of the computer will be written in C++ and Linux with Real-Time Application Interface will be used as an operating system.

Biomedical and Nuclear Engineering Student Scientific Group

E. Piątkowska-Janko – tutor.

Biomedical and Nuclear Engineering Student Scientific Group was formed in Dec. 2005 by a group of students from biomedical engineering. It has eight members. In May and June 2006 they organized workshop on the basic

features of construction and AutoCad. Current activity is focused on building of the mobile ECG equipment.

Innovative Information Technologies Student Scientific Group

P. Miazga – tutor.

The scope of interest of the Students' Circle for Innovative Informatics Technologies was to design a web-service which might 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).

5 TITLES AND DEGREES AWARDED

5.1 D.Sc. Degrees

- [DSc1] Yevhen Yashchysyn: "*Anteny z elektrycznym kształtowaniem charakterystyki kierunkowej – nowe rozwiązania*" (Electrically controlled beam-steering antennas), Warsaw, Dec. 5, 2006.

5.2 Ph.D. Degrees

- [PhD1] Piotr Biłski: "*Automatyczna diagnostyka systemów analogowych z wykorzystaniem logiki rozmytej*" (Automated diagnostics of analog systems using fuzzy logic), Prof. with Title **J. Wojciechowski** (supervisor), Warsaw, Feb. 7, 2006.
- [PhD2] Paweł Kopyt: "*Methods of coupled simulations of electromagnetic-thermodynamic problems*", Prof. with Title **W. Gwarek** (supervisor), Nov. 7, 2006.
- [PhD3] Krzysztof Kucharski: "*Face indexing by image components method*", Prof. with Title **W. Skarbek** (supervisor), Warsaw, Oct. 24, 2006.
- [PhD4] Ryszard Michnowski: "*Model elektrotermiczny tranzystora LDMOS*" (Electro-thermal model of LDMOS transistor), Tenured Prof. **T. Morawski** (supervisor), Warsaw, Jun. 6, 2006.
- [PhD5] Artur Moryc: "*Finite difference time domain electromagnetic modeling applied to dispersive and anisotropic media*", Prof. with Title **W. Gwarek** (supervisor), Nov. 14, 2006.
- [PhD6] Piotr Orleański: "*Optymalizacja układów redukcji szumów w satelitarnym teleskopie promieniowania*" (Optimization of noise reduction units in satellite radiation telescope), Tenured Prof. **J. Modelski** (supervisor), Warsaw, Jun. 13, 2006.
- [PhD7] Grzegorz Pastuszek: "*Optimization of hardware architectures of binary coders in compression of visual data*", Prof. with Title **W. Skarbek** (supervisor), Warsaw, Jun. 27, 2006.
- [PhD8] Dariusz Radomski: "*Identyfikacja czynników ryzyka torbieli endometrioidalnej jajnika*" (Identification of risk factors associated with ovarian endometroid cyst), Tenured Prof. **P. Roszkowski** (supervisor), Warsaw, May 2006; Ph.D. thesis from the Medical University of Warsaw.
- [PhD9] Robert Szelenbaum: "*Analiza wpływu energii sygnału i różnorodnych czynników środowiskowych na właściwości elektryczne sztyków antenowych*" (Analysis of influence of signal energy and different environment factors on electrical properties of antenna arrays), Prof. with Title **S. Rostonec** (supervisor), Warsaw, Jan. 10, 2006.

5.3 M.Sc. Degrees

- [MSc1] Albert Adamski: "*Analiza wybranych algorytmów przetwarzania sygnałów EKG pod kątem możli-*

wości ich implementacji w urządzeniach przenośnych" (Analysis of selected algorithms for ECG signals processing with a view to the possibilities of their implementation in portable devices), Assist. Prof. **M. Kazubek** (supervisor), (5).

- [MSc2] Przemysław Bartyzel: "*System generacji bodźców akustycznych do badań funkcjonalnych metodą rezonansu magnetycznego*" (Stimulus delivery sound system for use in functional magnetic resonance imaging), Assist. Prof. **P. Bogorodzki** (supervisor), (5).
- [MSc3] Marcin Bronowski: "*Analiza dystrybucji poprawek różnicowych w standardzie RTCM w sieciach szerokopasmowych z wykorzystaniem dostępnych systemów telekomunikacyjnych*" (Analysis of differentiation RTCM standard services distribution in broadband networks over accessible telecommunication systems), Assist. Prof. **K. Czerwiński** (supervisor), (4).
- [MSc4] Tomasz Brzozowski: "*Kierunkowe źródło dźwięku do dźwiękowych systemów ostrzegawczych*" (Directive sound source for fire alarm evacuation systems), Assist. Prof. **M. Tajchert** (supervisor), (5).
- [MSc5] Jakub Chatkowski: "*Uproszczony model tranzystora mocy MOSFET do projektowania rezonansowych wzmacniaczy mocy w.cz.*" (Simplified MOSFET transistor model in the design of high frequency resonance power amplifier), Assist. Prof. **J. Modzelewski** (supervisor), (5).
- [MSc6] Piotr Czechowicz: "*Mapy T2 i ich zastosowanie w diagnostyce chrząstki stawowej stawu kolanowego*" (T2 maps and their application in diagnosis of knee joint articular cartilage), Assist. Prof. **P. Bogorodzki** (supervisor), (5).
- [MSc7] Wojciech Czekajski: "*Pulsyksometr transmisyjny z amplitudową modulacją sygnału*" (Transmission pulse oximeter based on optical signal modulation), Assist. Prof. **G. Domański** (supervisor), (5).
- [MSc8] Damian Deja: "*Projekt i realizacja szyku antenowego ze sterowaną dookólnie wiązką*" (Project and realization of planar array with 360 degrees horizontal coverage), Senior Lecturer **H. Chaciński** (supervisor), (3.5).
- [MSc9] Łukasz Długosz: "*Porównanie właściwości obiektywnych i subiektywnych akustycznych wzmacniaczy mocy*" (Comparison of objective and subjective properties of power audio amplifiers), Prof. **Z. Kulka** (supervisor), (4.5).
- [MSc10] Emil Dmoch: "*Filtracja w dziedzinie czasu sterowania polem ruchu*" (Motion compensated temporal filtering), Assist. Prof. **A. Buchowicz** (supervisor), (5).
- [MSc11] Jakub Drulis: "*Strumieniowanie danych wideo w sieciach IP*" (Streaming of video data in IP networks), Assist. Prof. **A. Buchowicz** (supervisor), (5).

TITLES AND DEGREES AWARDED

- [MSc12] Michał Figiel: *"Zmniejszanie błędów pomiarowych oraz czasu pomiarów anten w strefie bliskiej"* (Decreasing measurements errors and time of antennas measurements in the near-field), Assoc. Prof. **Y. Yashchyshyn** (supervisor), (4.5).
- [MSc13] Tomasz Filipek: *"Measurement receivers at RF control system for superconducting cavities of linear accelerator"* Assist. Prof. **K. Poźniak** (supervisor), (4).
- [MSc14] Tomasz Gaśowski: *"Badania opóźnień w systemach pomiarowych wykorzystujących transmisję danych w sieciach telefonii komórkowej"* (Examinations of delays in the measurement systems using data transmission in the mobile telephony network), Prof. **W. Winiecki** (supervisor), (4).
- [MSc15] Wojciech Gradkowski: *"Optimization of functional magnetic resonance experimental design by using maximum-length shift-register sequences (m-sequences)"*, Assist. Prof. **P. Bogorodzki** (supervisor), (5), English-medium-studies.
- [MSc16] Igor Góralczuk: *"Adaptacyjne szyki antenowe w systemach anten inteligentnych"* (Adaptive arrays in smart antenna system), Assist. Prof. **J. Jarkowski** (supervisor), (5).
- [MSc17] Łukasz Gurmiński: *"System alarmowy do ochrony budynków"* (The alarm system for protection of buildings), Assist. Prof. **K. Mroczek** (supervisor), (4).
- [MSc18] Piotr Jaros: *"Heterodyna do zastosowania w odbiorniku radiofonii cyfrowej"* (Heterodyne for a digital radio receiver), Senior Lecturer **H. Chaciński** (supervisor), (5).
- [MSc19] Rafał Józwiak: *"Metody wstępnego przetwarzania obrazów ultrasonograficznych prostaty z wykorzystaniem przekształceń falkowych"* (Prostate ultrasound image pre-processing method based on the wavelet transform), Assoc. Prof. **A. Przelaskowski** (supervisor), (5).
- [MSc20] Albert Kaim: *"Oprogramowanie do planowania rozkładu dawki w oparciu o naświetlanie wiązką akceleratora"* (Software for planning dose distribution in radiation therapy treatment), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5).
- [MSc21] Krzysztof Kajkowski: *"System zdalnego monitoringu Seanux"* (A remote camera based monitoring system), Senior Lecturer **T. Jamrógiwicz** (supervisor), (4).
- [MSc22] Weronika Kijewska: *"Projektowanie jednomodowych wiązek cylindrycznych pracujących na częstotliwości 896 MHz do rozkruszania skał w procesie wydobywania metali kolorowych"* (Computer aided analysis of single mode cylindrical resonance cavities working at 896 MHz for use in microwave processing of rocks), Prof. **W. Gwarek** (supervisor), (5).
- [MSc23] Grzegorz Kondrak: *"Badania czteroelementowego szyku fazowanego dla systemu łączności z satelitą na orbicie LEO"* (Investigation of four elements 2D phased array for the communication system with satellite at LEO orbit), Assist. Prof. **K. Kurek** (supervisor), (5).
- [MSc24] Rafał Korycki: *"Projekt i realizacja układu dynamicznej regulacji wzmacnienia na procesorze sygnałowym"* (Design and realization of dynamic range controller on digital signal processor), Prof. **Z. Kulka** (supervisor), (5).
- [MSc25] Michał Krasnodębski: *"Analiza wpływu widma lampy rtg na pomiar densytometryczny"* (Analysis of x-ray spectrum influence on density measurement), Assist. Prof. **G. Domański** (supervisor), (5).
- [MSc26] Marek Krok: *"Energooszczędny system bezprzewodowej transmisji danych na małe odległości"* (Energy-saving wireless data transmission system), Prof. with Title **W. Gwarek** (supervisor), (5).
- [MSc27] Dawid Kublik: *"RFID – prezentacja technologii na przykładzie aplikacji wspierającej cykl obiegowy ubrań"* (Presentation of the RFID technology: case study of the application supporting the clothing circulation cycle), Prof. with Title **J. Wojciechowski** (supervisor), (5).
- [MSc28] Adam Kułagowski: *"System komputerowy dla tomografu rentgenowskiego Somatom DR"* (Creation of software for the use in computed tomograph Somatom DR), Assist. Prof. **W. Smolik** (supervisor), (5).
- [MSc29] Michał Lipiński: *"Analiza sygnałów niestacjonarnych w oparciu o dekompozycję EMD, widmo Hilberta oraz inne rozkłady typu czas-częstotliwość"* (The analysis of non-stationary signals on the basis of EMD decomposition, Hilbert spectrum and other time-frequency distributions), Assist. Prof. **K. Snopek** (supervisor), (5).
- [MSc30] Piotr Łuczka: *"System wizualizacji trójwymiarowej przepływów w systemie z wolnej ręki"* (3D "free hand" flow imaging system), Assist. Prof. **M. Kazubek** (supervisor), (5).
- [MSc31] Michał Mąkosza: *"Techniki ukrywania obrazu w obrazie"* (Picture in picture hiding techniques), Prof. with Title **W. Skarbek** (supervisor), (5).
- [MSc32] Ernest Mielniczek: *"Cyfrowy 64-stanowy przesuwnik fazy z diodami waraktorowymi na pasmo L"* (64-states digital phase shifter with varactor diodes), Assist. Prof. **D. Gryglewski** (supervisor), (5).
- [MSc33] Jacek Naruniec: *"Lokalizacja twarzy w obrazie cyfrowym z wykorzystaniem algorytmu AdaBoost"* (Face localization in digital images using AdaBoost algorithm), Prof. with Title **W. Skarbek** (supervisor), (4.5).
- [MSc34] Artur Nowakowski: *"Camera calibration techniques in vision systems"*, Prof. with Title **W. Skarbek** (supervisor), (5).
- [MSc35] Tomasz Odyniec: *"Przeñośny minirejestrator EKG z cyfrową filtracją sygnałów"* (Mini-EKG receipt

TITLES AND DEGREES AWARDED

- with digital signal filtration), Assist. Prof. **M. Kazubek** (supervisor), (5).
- [MSc36] Maciej Odzinkowski: "*Combining adaptive antennas at both the base station and the mobile terminal in UMTS*", Assist. Prof. **J. Jarkowski** (supervisor), (5).
- [MSc37] Piotr Orłowski: "*Analiza obrazów angiograficznych rezonansu magnetycznego: Pomiar mózgowego przepływu krwi*" (Analysis of magnetic resonance angiography images: cerebral blood flow assessment), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (4,5).
- [MSc38] Cezary Otowski: "*Symulator szerokopasmowego łącza radiowego*" (Broadband radio link simulator), Assist. Prof. **K. Kurek** (supervisor), (5).
- [MSc39] Waldemar Pacyna: "*Generowanie scen panoramicznych przy użyciu pojedynczej kamery*" (Panoramic scene generation using single camera), Assist. Prof. **G. Galiński** (supervisor), (5).
- [MSc40] Rafał Palmowski: "*Laboratoryjny system edycji i analizy dźwięku*" (The laboratory system of sound editing and analysis), Assist. Prof. **A. Lezczynski** (supervisor), (5).
- [MSc41] Karol Perkowski: "*Wyznaczanie trójwymiarowych obszarów zainteresowania*" (Marking out three-dimensional volumes of interest), Assist. Prof. **P. Brzeski** (supervisor), (5).
- [MSc42] Rafał Piróg: "*Wielokanałowy system pulsoksymetryczny*" (Multichannel pulseoxymeter system), Assist. Prof. **G. Domański** (supervisor), (5).
- [MSc43] Leszek Prokopczuk: "*Badania i ocena ilościowa wpływu czynników warunkujących tłumienie nauszników przeciwhałasowych w warunkach rzeczywistych*" (Investigation and quantitative assessment of factors influencing the real world attenuation of ear-muffs), Assist. Prof. **E. Kotarbińska** (supervisor), (5).
- [MSc44] Lech Raczyński: "*Algorytm detekcji torów cząstek w eksperymencie ICARUS*" (Tracks detection algorithm for the ICARUS experiment), Prof. **K. Zaremba** (supervisor), (5).
- [MSc45] Łukasz Radaj: "*Telemetryczny system zdalnej opieki medycznej wykorzystujący pomiar reograficzny*" (Patient's supervisory system based on an electrical impedance technique and GSM), Senior Lecturer **T. Jamrógiwicz** (supervisor), (5).
- [MSc46] Rafał Rybak: "*Internetowa wyszukiwarka obrazów w sieciach Peer-to-Peer z zastosowaniem deskryptorów standardu MPEG-7*" (Internet image search system in Peer-to-Peer networks with the use of MPEG-7 descriptors), Assist. Prof. **K. Ignasiak** (supervisor), (5).
- [MSc47] Łukasz Michał Rychlicki (co-author: Andrzej Sadłowski): "*Metody synchronizacji czasowej rozproszonych systemów pomiarowo-kontrolnych*" (Time synchronization methods in distributed measurement systems), Prof. **W. Winiecki** (supervisor), (5).
- [MSc48] Radosław Rymkiewicz: "*Projektowanie struktury sieci przy wykorzystaniu algorytmu ewolucyjnego i symulatora przepływowego*" (Design of network structure by evolution algorithms and flow based simulator), Assist. Prof. **Z. Walczak** (supervisor), (4).
- [MSc49] Bartłomiej Salski: "*Podział mocy pomiędzy apertury zasilające kuchenkę mikrofalową i jego wpływ na rozkład grzania mikrofalowego*" (Power balance in a multi-aperture feeding of the microwave oven cavity), Prof. with Title **W. Gwarek** (supervisor), (5).
- [MSc50] Piotr Skorek: "*Metody ultrasonograficzne w obrazowaniu i pomiarach przepływu krwi*" (Ultrasound methods in imaging and measurements of blood flow), Senior Lecturer **T. Jamrógiwicz** (supervisor), (5).
- [MSc51] Katarzyna Skrajnowska: "*Analiza zmienności załamka T w sygnale EKG w reprezentacji wektrokardiograficznej*" (Analysis of T-wave variability in vectocardiographic representation), Prof. **Z. Pawłowski** (supervisor), (5).
- [MSc52] Andrzej Sadłowski (co-author: Łukasz Michał Rychlicki): "*Metody synchronizacji czasowej rozproszonych systemów pomiarowo-kontrolnych*" (Time synchronization methods in distributed measurement systems), Prof. **W. Winiecki** (supervisor), (5).
- [MSc53] Paweł Sobieraj: "*Wpływ parametrów teletransmisyjnych na jakość transmisji systemu MDMS pracującego na paśmie 28 GHz*" (The influence of teletransmission parameters on the transmission quality of MDMS system reading in 28 GHz), Assist. Prof. **T. Kosilo** (supervisor), (5).
- [MSc54] Kamila Szczotka: "*Zmienność załamka T w sygnałach elektrokardiologicznych*" (T-wave alternans analysis in ECG recordings), Prof. **Z. Pawłowski** (supervisor), (4,5).
- [MSc55] Tomasz Sztokinier: "*Opracowanie programu do oceny ilościowej przepływu krwi przez nerki na podstawie danych z badania scyntygraficznego*" (Elaboration of computer program designed for renal blood flow quantitative analysis upon the scintigraphic study data), Assist. Prof. **P. Brzeski** (supervisor), (4,5).
- [MSc56] Jacek Tymicki: "*Wyważanie wirników za pomocą przenośnego analizatora drgań SVAN 946A*" (Balancing of rotating machinery using SVAN 946A, the vibration analyzer), Assist. Prof. **A. Podgórski** (supervisor), (5).
- [MSc57] Marcin Tymiński: "*Projekt systemu lokalizacji kapsuły kosmicznej: podsystem nadawczy*" (The project of localization of the space capsule system: The qualification model of subsystem's transmitter), Assist. Prof. **K. Kurek** (supervisor), (4).

TITLES AND DEGREES AWARDED

- [MSc58] Michał Stanisław Urbanek: *"Telemetryczny system stałego nadzoru medycznego – telestetoskop"* (Telemetric continuous patient's supervisory system – the telestethoscope), Senior Lecturer **T. Jamrógiewicz** (supervisor), (5).
- [MSc59] Przemysław Wagner: *"Wykorzystanie technologii web-serwisów w rozproszonych systemach pomiarowo-kontrolnych"* (Utilizing web-services technology in distributed measurement systems), Prof. **W. Winiecki** (supervisor), (5).
- [MSc60] Maciej Witaszek: *"Implementacja systemu uClinux na platformie wbudowanej z procesorem Nios firmy Altera"* (Embedded system-using uClinux of the softcore Nios processor from Altera), Assist. Prof. **K. Mroczek** (tutor), (4.5).
- [MSc61] Piotr Woszczek: *"Implementacja cyfrowych modulatorów $\Sigma\Delta$ w układzie FPGA w zastosowaniu do fonicznych przetworników c/a $\Sigma\Delta$ "* (Implementation of digital $\Sigma\Delta$ modulators in FPGA dedicated for audio d/a $\Sigma\Delta$ converters), Prof. **Z. Kulka** (supervisor), (5).
- [MSc62] Paweł Ziętek: *"Badanie propagacji sygnałów ultraszerekopasmowych"* (The research on ultrawideband propagation), Assist. Prof. **J. Kołakowski** (supervisor), (5).
- [MSc63] Tomasz Jerzy Żołnierzak: *"Zastosowanie multimedialne systemu operacyjnego Symbian"* (Multimedia applications of Symbian operating system), Assist. Prof. **K. Ignasiak** (supervisor), (5).
- [MSc64] Mateusz Żukociński: *"Rezonator helikalny do pomiaru parametrów dielektryków na częstotliwości 25 MHz"* (Helical resonator for measurements of dielectrics at 25 MHz), Prof. with Title **W. Gwarek** (supervisor), (5).
- [BSc6] Filip Borowski: *"Eksperymentalny system nawigacji głosowej po serwisach WWW"* (Experimental system designed for voice navigation in web sites), Prof. with Title **W. Skarbek** (supervisor), (4.5).
- [BSc7] Radosław Ciszewski: *"Foniczne korektory charakterystyk częstotliwościowych – korektor graficzny"* (Audio equalizers – graphic EQ), Prof. **Z. Kulka** (supervisor), (5).
- [BSc8] Piotr Czarnecki: *"Korekcja niejednorodności gammakamer"* (Correction of gamma-camera nonuniformity), Assist. Prof. **R. Szabatin** (supervisor), (5).
- [BSc9] Daniel Dutkiewicz: *"Urządzenie nadawczo-odbiorcze wspomagające badania czynnościowe mózgu z wykorzystaniem techniki obrazowej rezonansu magnetycznego"* (Response-box for functional Magnetic Resonance Imaging (fMRI) experiments), Assist. Prof. **P. Bogorodzki** (supervisor), (4.5).
- [BSc10] Przemysław Fabianowicz: *"Bezprzewodowy most USB"* (Wireless USB bridge), Senior Lecturer **T. Jamrógiewicz** (supervisor), (4.5).
- [BSc11] Jacek Falkowski: *"Program kliniczny do analizy dynamicznych badań scyntygraficznych wątroby"* (Clinical program for analysis of dynamical liver scintigraphic studies), Assist. Prof. **P. Brzeski** (supervisor), (4.5).
- [BSc12] Paweł Foryt: *"Analiza przestrzennych badań 3W USG piersi"* (The analysis of 3D USG breast exams), Assoc. Prof. **A. Przelaskowski** (supervisor), (4.5).
- [BSc13] Michał Gad: *"System rejestracji błędów w projektach informatycznych"* (System of registration of IT projects errors), Assist. Prof. **A. Buchowicz** (supervisor), (4.5).
- [BSc14] Przemysław Gruzdź: *"Minirejestrator EKG z transmisją bezprzewodową"* (Portable ECG device with wireless transmission), Assist. Prof. **M. Kazubek** (supervisor), (5).
- [BSc15] Kamil Paweł Jakubiec: *"Baza danych kardiologicznych"* (Cardiological database), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5).
- [BSc16] Paweł Jamiola: *"Programowy analizator komunikacji w standardzie Bluetooth"* (Programming analyzer of communication in Bluetooth standard), Assist. Prof. **T. Keller** (supervisor), (4.5).
- [BSc17] Mariusz Jarczewski: *"Zaprojektowanie i zaimplementowanie systemu rozwiązywania testów wielokrotnego wyboru"* (Design and implementation of system of multiple choice examination tests), Assist. Prof. **P. Dynarowski** (supervisor), (5), Warsaw University of Technology Distant Learning Center (Ośrodek Kształcenia na Odległość PW).
- [BSc18] Maciej Juklaniuk: *"Ontogeniczne sieci neuronowe: sieć RBF wzorowana na sieciach Inc Net"*

TITLES AND DEGREES AWARDED

- (Ontogenic neural networks: Inc Net-like radial basis network), Prof. **K. Zaremba** (supervisor), (5).
- [BSc19] Karolina Kaczmarek: "*Analizator strumienia H.264*" (H.264 stream analyzer), Assist. Prof. **G. Galiński** (supervisor), (5).
- [BSc20] Adam Kalisz: "*Symulator systemu obrazowania radiograficznego wielkich energii*" (Simulator of high-energy radiographic system), Assist. Prof. **B. Konarzewski** (supervisor), (4.5).
- [BSc21] Stefan Kiszczurno: "*Class D audio amplifier*", Assist. Prof. **M. Mikołajewski** (supervisor), (4). English-medium-studies.
- [BSc22] Marcin Kłos: "*Karta akwizycji danych dla tomografu SIEMENS Somatom DR 2*" (Data acquisition module for Siemens Somatom DR2), Assist. Prof. **W. Smolik** (supervisor), (4).
- [BSc23] Marek Kretkiewicz: "*Opracowanie oprogramowania umożliwiającego generację wybranych sygnałów systemu UMTS w trybie pracy TDD za pomocą generatora HP E4432B*" (Development of the software enabling of the generation UMTS signal in TDD mode with the use of HP E4432B generator), Assist. Prof. **S. Maszczyk** (supervisor), (5).
- [BSc24] Anna Ksyta: "*System do pomiaru efektywności transmisji w standardzie Bluetooth*" (Transmission efficiency measurement system for Bluetooth standard), Assist. Prof. **T. Keller** (supervisor), (4.5).
- [BSc25] Ryszard Kuryjański: "*Wykrywanie bezdechu periodycznego na podstawie zapisu EKG*" (Detection of sleep apnea by means of ECG), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (3.5).
- [BSc26] Błażej Lewandowski: "*Development of a software used to process the star transit observation data for an astronomic observatory*", Assist. Prof. **K. Czerwiński** (supervisor), (4.5). English-medium-studies.
- [BSc27] Jacek Tadeusz Malesa: "*Programowy interfejs do akwizycji danych scyntygraficznych*" (The software interface for scintigraphic data), Assist. Prof. **R. Szabatin** (supervisor), (5).
- [BSc28] Łukasz Malinowski: "*System alarmowy pracujący na częstotliwości 433 MHz, wykorzystujący czujnik podczerwieni*" (Alarm system working on 433 MHz frequency using infrared sensors), Assist. Prof. **T. Kosiło** (supervisor), (5).
- [BSc29] Karol Mazurek (co-author: Jarosław Skaba): "*Modernizacja systemu do odbioru sygnału EKG*" (Modernization of electrocardiograph system), Prof. **J. Marzec** (supervisor), (5).
- [BSc30] Michał Mirosław: "*System obsługi tomografu CT Somatom DR*" (CT tomograph control system for Somatom DR), Assist. Prof. **W. Smolik** (supervisor), (5).
- [BSc31] Jacek Krzysztof Naruniec: "*Detekcja i rozpoznawanie twarzy w obrazie cyfrowym*" (Face detection and recognition in digital image), Prof. with Title **W. Skarbek** (supervisor), (5).
- [BSc32] Daniel Niemczynowicz: "*Programowy emulator gammakamery – moduł programowy*" (Programmable gamma camera emulator – software module), Assist. Prof. **R. Szabatin** (supervisor), (5).
- [BSc33] Zbigniew Nosarzewski: "*Rekonstrukcja 3D rozkładów promieniowania akceleratora medycznego na podstawie danych 2D zebranych przez fantom wodny*" (Reconstruction of 3D distributions of the medical accelerator radiation based on 2D profiles measured in the water phantom), Prof. **K. Zaremba** (supervisor), (5).
- [BSc34] Jakub Nowakowski: "*Domofon cyfrowy*" (Digital intercom system), Senior Lecturer **H. Chaciński** (supervisor), (4.5).
- [BSc35] Wojciech Obrębski: "*System do stymulacji akustycznej w badaniach z wykorzystaniem techniki funkcjonalnego rezonansu magnetycznego (fMRI)*" (System for acoustic stimulation in functional magnetic resonance imaging (fMRI) tests), Assist. Prof. **P. Bogorodzki** (supervisor), (4.5).
- [BSc36] Tomasz Piotr Ostrowski: "*Cyfrowy korektor barwy dźwięku (w zastosowaniu do sygnału gitary elektrycznej)*" (Digital audio timbre processor (in application to electric guitar's signal), Prof. **Z. Kulka** (supervisor), (5).
- [BSc37] Radosław Pacek: "*Wzmacniacz mocy klasy E z kluczowaniem napięcia zasilania*" (Class E power amplifier with power supply switching), Assist. Prof. **M. Mikołajewski** (supervisor), (5).
- [BSc38] Adam Paziewski: "*Syntezer częstotliwości na pasmo 6 – 6.8 GHz z układem przemiany częstotliwości*" (Frequency synthesizer with down conversion block), Assist. Prof. **W. Wojtasiak** (supervisor), (5).
- [BSc39] Wojciech Pilip: "*Badanie efektywności transmisji danych multimedialnych w sieciach WLAN*" (Analysis of multimedia data transmission effectiveness in WLAN network), Assist. Prof. **T. Keller** (supervisor), (4).
- [BSc40] Krzysztof Plona: "*Filtr i wzmacniacz nadawczy transwertera TDD 2,4 GHz ↔ 2,18 GHz*" (Filter and transmitting amplifier of a transverter TDD 2.4 GHz ↔ 2.18 GHz), Assist. Prof. **W. Wojtasiak** (supervisor), (4.5).
- [BSc41] Radosław Poświata: "*Skomputeryzowany akustyczny system pomiarowy z wykorzystaniem analizatora Portable One+*" (Computerized acoustic measurements system using portable One+ analyzer), Assist. Prof. **A. Leszczyński** (supervisor), (4.5).
- [BSc42] Radosław Przeździak: "*Analiza porównawcza wyników pomiarów i wyników symulacji na przykładzie zestawu głośnikowego*" (Comparative analysis of the measurement results and

TITLES AND DEGREES AWARDED

- simulation results by the example of loudspeakers combine), Assist. Prof. **M. Tajchert** (supervisor), (4).
- [BSc43] Łukasz Pskit: "*Optymalizacja charakterystyki promieniowania liniowych adaptacyjnych szczyków antenowych przy użyciu metody Howells-Applebaum*" (Linear adaptive arrays beam-forming using Howells-Applebaum method), Assist. Prof. **J. Jarkowski** (supervisor), (3).
- [BSc44] Leszek Radecki: "*Wizualizacja struktur sutka w 3W USG*" (Structure of nipple visualization in three dimensional ultrasound system), Assoc. Prof. **A. Przelaskowski** (supervisor), (5).
- [BSc45] Bartosz Rams: "*Modem do odbioru transmisji danych cyfrowych w standardzie PSK31 w paśmie fal krótkich*" (Modem for receiving PSK 31 short-wave digital signals), Assist. Prof. **T. Kosilo** (supervisor), (4.5).
- [BSc46] Maria Ewa Raniecka: "*Czasowo-częstotliwościowa analiza wysokorozdzielczego EKG*" (Analysis of high-resolution signal-averaged ECG in time-frequency domain), Assist. Prof. **E. Piątkowska-Janko** (supervisor), (5).
- [BSc47] Dominik Reszka: "*Układ rejestracji odpowiedzi pacjenta do fMRI*" (Response box for functional magnetic resonance imaging), Assist. Prof. **P. Bogorodzki** (supervisor), (4).
- [BSc48] Tomasz Rykowski: "*Analiza właściwości akustycznych małego studia nagrań*" (The analysis of acoustics of small recording studio), Assist. Prof. **M. Tajchert** (supervisor), (4.5).
- [BSc49] Michał Rymarczuk: "*Minireograf z transmisją bezprzewodową*" (Portable reograph with wireless transmission), Assist. Prof. **M. Kazubek** (supervisor), (5).
- [BSc50] Sławomir Rymaszeński: "*Internetowy system przekazywania ukrytych w obrazie informacji*" (Internet system for transmit -hidden information in the images), Prof. with Title **W. Skarbek** (supervisor), (5).
- [BSc51] Wiktor Rynowiecki: "*Wzmacniacz nadawczy konwertera 2,4 ↔ 3,5 GHz*" (Power amplifier for 2.4 ↔ 3.5 GHz frequency up/down converter), Assist. Prof. **W. Wojtasiak** (supervisor), (5).
- [BSc52] Marcin Sańko: "*Analizator magistrali USB*" (USB bus analyzer), Senior Lecturer **T. Jamrógiwicz** (supervisor), (4.5).
- [BSc53] Jarosław Skaba (co-author: Karol Mazurek): "*Modernizacja systemu do odbioru sygnału EKG*" (Modernization of electrocardiograph system), Prof. **J. Marzec** (supervisor), (5).
- [BSc54] Jan Jakub Skwara: "*Sieciowy system zarządzania ofertami nieruchomości na platformie Java 2E Enterprise Edition*" (Network system for managing real estate related offers on Java 2 Enterprise Edition), Assist. Prof. **A. Buchowicz** (supervisor), (4.5).
- [BSc55] Marcin Słowikowski: "*Usługi sieciowe z wykorzystaniem języka Java*" (Java technology and web services), Assist. Prof. **K. Ignasiak** (supervisor), (5).
- [BSc56] Ireneusz Sobipan: "*Model układu pozycjonowania listków w kolimatorze wielolistkowym*" (Model of the multi-leaf collimator leafs positioning system), Prof. **K. Zaremba** (supervisor), (5).
- [BSc57] Maciej Staniszewski: "*System odpowiedzialny za synchronizację i odbiór odpowiedzi pacjenta w badaniach funkcjonalnych z wykorzystaniem techniki fMRI*" (Synchronization & response delivery system to functional magnetic resonance imaging), Assist. Prof. **P. Bogorodzki** (supervisor), (5).
- [BSc58] Grzegorz Strzałka: "*Internetowy system pomiarowy*" (Internet measurement system), Assist. Prof. **P. Bobiński** (supervisor), (5).
- [BSc59] Jakub Studziński: "*Odbiornik satelitarnej NOAA*" (NOAA satellite receiver), Assist. Prof. **W. Kazubski** (supervisor), (4).
- [BSc60] Jarosław Szustek: "*Oprogramowanie do wykrywania zjawiska zmienności załamka T*" (Software for detecting the T-wave alternans), Prof. **Z. Pawłowski** (supervisor), (5).
- [BSc61] Marcin Szymański: "*Dekoder trybu transmisji sygnału DRM*" (Decoder of the DRM signal's transmission mode), Senior Lecturer **H. Chaciński** (supervisor), (5).
- [BSc62] Olimpia Śledź: "*Programowy analizator komunikacji w standardzie Bluetooth*" (Programming analyzer of communication in Bluetooth standard), Assist. Prof. **T. Keller** (supervisor), (4.5).
- [BSc63] Janusz Twardziak: "*A multimedia monitoring system*", Assist. Prof. **G. Galiński** (supervisor), (4), English-medium-studies.
- [BSc64] Michał Wachowiak: "*Porównanie wyników pomiarów głośników w polu swobodnym i polu fal odbitych*" (Comparative analysis of loudspeakers measurement in free sound field and diffuse sound field), Assist. Prof. **M. Tajchert** (supervisor), (4).
- [BSc65] Piotr Wojtkiewicz: "*Komputerowy model klasycznej lampy cezowej atomowego wzorca częstotliwości na platformie NET*" (A conventional cesium beam tube computer model in atomic frequency standard in NET platform), Assist. Prof. **K. Radecki** (supervisor), (5).
- [BSc66] Kamil Wrzosek: "*Analiza i implementacja algorytmów wyznaczania tłumienia w naziemnych liniach radiowych bezpośrednio widoczności w terenach pozamiejskich*" (Analysis and implementation of countryside, terrestrial line-of sight (LOS) radio waves attenuation algorithms), Assist. Prof. **J. Jarkowski** (supervisor), (5).
- [BSc67] Marcin Zaręba: "*Biblioteka procedur do modelowania metodą Monte Carlo oddziaływania światła z materią – sensory luminescencyjne*" (The

library of procedures followed in modeling using the Monte Carlo method of light and matter interaction – luminescent sensors), Assist. Prof. **B. Konarzewski** (supervisor), (4).

- [BSc68] Łukasz Zygarlicki: *"Korektory charakterystyk częstotliwościowych – analogowy korektor parametryczny"* (Frequency characteristics equalizers – analog parametric equalizer), Prof. **Z. Kulka** (supervisor), (4.5).

5.5 B.Sc. Evening Studies on Radiocommunications – B.Sc. Degrees

- [BSc69] Piotr Basta: *"Przystosowanie obiektów radiokomunikacyjnych do nadawania telewizji cyfrowej"* (Adaptation of radiocommunication objects for transmission of digital television), Assist. Prof. **K. Snopek** (supervisor), (5).
- [BSc70] Artur Bielak: *"Reprezentacja zmodulowanych sygnałów cyfrowych w dziedzinie czasu i częstotliwości w środowisku Matlab"* (Representation of the modulated digital signals in time and frequency domain in Matlab), Assist. Prof. **K. Snopek** (supervisor), (4,5).
- [BSc71] Jarosław Dzieliński: *"Przebudowa istniejącej sieci SDH dla potrzeb łączenia sieci LAN"* (The existing SDH network restructure for the needs of connecting the LAN network creation), Assist. Prof. **S. Kula** (supervisor), (4).
- [BSc72] Artur Gajcy: *"Liniowy szerokopasmowy wzmacniacz mocy na zakres fal krótkich"* (A wideband linear power amplifier for HF range), Assist. Prof. **J. Modzelewski** (supervisor), (5).
- [BSc73] Grzegorz Kapuściński: *"Łącze RS-232 na podczerwień – część nadawcza"* (Comlink RS-232 in infrared band - IR transmitter), Senior Lecturer **H. Chaciński** (supervisor), (3.5).
- [BSc74] Wojciech Kiszka: *"Odbiornik FM 144 MHz z podwójną przemianą częstotliwości na układzie Motorola MC 3362"* (Double conversion FM receiver for 144 MHz band using Motorola MC 3362

integrated circuit), Assist. Prof. **W. Kazubski** (supervisor), (5).

- [BSc75] Rafał Pachulski: *"Nagrzewnica indukcyjna z wysokosprawnym wzmacniaczem klasy DE – modernizacja urządzenia"* (Inductor heater device with efficiency class DE amplifier – modernization of the device), Assist. Prof. **M. Mikołajewski** (supervisor), (4).
- [BSc76] Zbigniew Siwek: *"Kodowanie wielomianowe – symulacja pracy kodera i dekodera"* (Polynomial coding-simulation of coder and decoder), Assist. Prof. **K. Snopek** (supervisor), (5).
- [BSc77] Kamil Zbrzeźny: *"Lokalizacja i nadzór samochodu przez telefon GSM z wykorzystaniem współrzędnych GPS"* (Localization and supervising of a car throughout GSM phone using GPS), Assist. Prof. **T. Kosiło** (supervisor), (5).
- [BSc78] Tomasz Zysser: *"Wzmacniacz mocy w.cz. do nadajnika UKF z modulacją częstotliwości"* (Resonant power amplifier for VHF transmitter with frequency modulation), Assist. Prof. **J. Modzelewski** (supervisor), (5).

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

- [MSc65] Łukasz Błogowski (co-author: Sławomir Hetmanowski): *"System Ifotec DSL Fiber 24 jako przedłużacz pętli abonenckiej"* (Ifotec DSL 24 system as a subscriber line extender), Assoc. Prof. **P. Dymarski** (supervisor), (4.5).
- [MSc66] Sławomir Hetmanowski (co-author: Łukasz Błogowski): *"System Ifotec DSL Fiber 24 jako przedłużacz pętli abonenckiej"* (Ifotec DSL 24 system as a subscriber line extender), Assoc. Prof. **P. Dymarski** (supervisor), (4.5).
- [MSc67] Sergiusz Roszczyk: *"Sterownik liniowego czujnika obrazu Hamamatsu S9226 z interfejsami EIA-232 oraz Ethernet"* (Hamamatsu S9226 CMOS linear image sensor driver with EIA-232 and Ethernet interface), Assist. Prof. **G. Domański** (supervisor), (5).

6 PUBLICATIONS

6.1 Scientific and technical books, chapters in books

- [Pub1] W. Glinowski, A. Przelaskowski, A. Staniszewski "Selected Telemedicine and e-Health Applications, Initiatives, Surveys and Reviews", in: Advances in International Telemedicine and e-health, vol. 1 Around the World, *MediPage Ltd.* (2006), ISBN 83-89769-22-0, pp. 164-185.
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6.2 Scientific and technical papers in journals

6.2.1 ISI ("Philadelphian") list journals

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- [Pub7] M. Kazubek: "Improving Local Wiener Filtering Using Matched Filter", *IEE Proc. Vision Image Signal Processing*, vol. 152, no. 4 (2006), pp. 501-504.
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- [Pub9] J. Marzec, A. Padée, R. Sulej, K. Zaremba, et al.: "Gluon Polarization in the Nucleon from Quasi-real Photoproduction of High- p_T Hadron Pairs", *Physics Letters B*, no. 633 (2006), pp. 25-32.
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- [Pub18] J. Wojciechowski, J. Arabas, B. Sawionek: "Heuristic Maximization of the Number of Spanning Tress in Regular Graphs", *Journal of the Franklin Institute, Elsevier*, no. 243 (2006), pp. 309-325.

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6.6 Books and special issues edited by the staff

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- [Pub233] A. Dobrucki, A. Pietrovsky, W. Skarbek (Eds.): "New Trends in Audio and Video", *Wydawnictwo Politechniki Białostockiej, Rozprawy Naukowe* nr 134, vol. I, ISSN 0867-096X, 526 pp.
- [Pub234] J. Wojciechowski, B. Smolka, H. Palus, R. S. Kozera, W. Skarbek and L. Noakes (Eds.): "Computer Vision and Graphics", International Conference, ICCVG 2004, Warsaw, Poland, Sept. 2004, Proceedings, *Computational Imaging and Vision*, vol. 32, *Springer*, ISBN-10: 1-4020-4178-0, (2004), ISBN-13: 978-1-4020-4178-5 (2006), 1134 pp.
- [Pub235] J. Wojciechowski, D. Strzemiłk, M. Krawiec (Eds.): "Lecture Notes on Information Technology in Business: ITIB 2006", *Warsaw Agricultural University*, ISBN 83-7244-746-2, 468 pp.

7 RESEARCH REPORTS

- [Rep1] G. Bernatek, E. Konarzewski, T. Kulisiewicz: "Czy polskie przedsiębiorstwa mogą czuć się bezpieczne?" (May the Polish Enterprises be Safe?), Raport rynkowy Audyteł Sp. z o.o., (market report), Sept. 2006.
- [Rep2] G. Bernatek, E. Konarzewski, T. Kulisiewicz: "Outsourcing oswojony. Polski rynek outsourcingu ICT 2006", (Outsourcing – Polish ICT 2006 Market), Raport rynkowy Audyteł Sp. z o.o., (market report), Apr. 2006.
- [Rep3] G. Bernatek, E. Konarzewski, T. Kulisiewicz: "Stan i perspektywy rozwoju rynku telekomunikacyjnego w Polsce", (Development of Telecommunication Market in Poland) Raport rynkowy Audyteł Sp. z o.o., (market report), Aug. 2006.
- [Rep4] P. Bogorodzki, T. Jamrógiewicz, M. Kazubek, E. Piątkowska-Janko: "Moduł akwizycji elektrokardiogramu z radiową transmisją danych" (Wireless Module Dedicated for the ECG Acquisition), Final report for the Institute of Medical Technology and Apparatus (Instytut Techniki i Aparatury Medycznej, Zabrze), Institute of Radioelectronics, WUT, Warsaw, Jun. 2006.
- [Rep5] A. Buchowicz, W. Skarbek, G. Galiński, K. Ignasiak, K. Wnukowicz, S. Badura, K. Kucharski, M. Leszczyński, M. Morgoś, G. Pastuszek, M. Tomaszewski: "Hybrydowe systemy multimedialne" (Hybrid Multimedia Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep6] J. Cichocki, J. Kołakowski, K. Radecki, S.W. Kiełek, S. Żmudzin D. Kolmas, P. Ziętek: "Kanał transmisyjny w systemach ultraszerokopasmowych" (Transmission Channel in Ultrawideband Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep7] S. L. Hahn: "Cross-terms of Wigner distributions of noise and telecommunication signals", Internal report of the Institute of Radioelectronics, WUT, Warsaw, Nov. 2006.
- [Rep8] J. Kołakowski, J. Cichocki, S. Maszczyk: "Systemy ultraszerokopasmowe" (Ultrawideband Systems), Reports for grant funded by Polish Telecommunications: part 1 (Sept. 2006), part 2 (Dec. 2006).
- [Rep9] T. Kosiło, S. Hahn, T. Buczkowski, K. Czerwiński, J. Jarkowski, H. Chaciński, W. Kazubski, K. Snopek: "Perspektywy rozwoju systemów radiokomunikacyjnych – wybrane problemy" (Future of Wireless Systems-Selected Problems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep10] J. Kubasik, G. Bernatek, E. Konarzewski, T. Kulisiewicz: "Tendencje i kierunki rozwoju polityki cenowej w Polsce i Unii Europejskiej" (Tendencies and Directions of the Development of Price Policy in Poland and EU), Raport na zamówienie Telefonii Dialog S.A., (invited report), Oct. 2006.
- [Rep11] Z. Kulka, P. Bobiński, A. Leszczyński, M. Tajchert, A. Młyńska, P. Nykiel: "Elektroakustyczne metody pomiaru cech aktywności ksylofagicznych owadów" (Electroacoustic Methods of Measurement of Properties of Activity of Xylophagous Insects), Final report for the Dean grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2006.
- [Rep12] Z. Kulka, P. Bobiński, E. Kotarbińska, A. Leszczyński, M. Tajchert, A. Młyńska, J. Żera: "Projektowanie i badania systemów elektroakustycznych oraz systemów cyfrowego przetwarzania sygnałów fonicznych" (Design and Investigation of Electroacoustics Measuring Systems and Digital Audio Signal Processing Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep13] K. Kurek, M. Olak, R. Graczyk, K. Bąk, T. Cedro, A. Cichocki, M. Dobrowolski, P. Grudziński, M. Iwiński, M. Kędzierawski, M. Kurowski, M. Mosdorf: "Projekt komputera pokładowego dla satelity SSETIESEO" (Project of Board Computer for SSETIESEO Satellite), Final report for the Rector grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2006.
- [Rep14] J. Modelski: "Analiza możliwości wykorzystania technik radiowych w budowie regionalnego systemu dostarczania usług teleinformatycznych na terenie województwa mazowieckiego" (Analysis of the Possibilities of Utilizing the Radio Techniques in Building of the Teleinformatics and Services in Mazowieckie District), Final report for the Marshal of the Mazowieckie District Office, Dec. 2006.
- [Rep15] J. Modelski: "Przyszłość technik satelitarnych w Polsce" (The Future of Satellite Technologies in Poland), Final report for Polish Office for Outer Space, Dec. 2006.
- [Rep16] J. Modelski, K. Kurek, T. Keller: "Rozpoznanie rozwoju służb radiokomunikacji i radiodifuzji satelitarnej na orbicie geostacjonarnej (GEO) oraz opis możliwych działań w gospodarce widmem" (Recognition of Development of Radiocommunications and Broadcasting GEO Satellite Systems and Possible Spectrum Management Issues in this Area), Final report for National Institute of Telecommunications, Institute of Radioelectronics, WUT, Warsaw, Nov. 2006.
- [Rep17] J. Modelski, T. Kosiło, B. Węgliński, T. Keller: "Ekspertyza dokumentu: e-Strategia Województwa Mazowieckiego", (Expertise of Document : e-Strategy of the Mazowieckie District), Final report for Center of Technology Transfer and the Marshal of the Mazowieckie District Office, Mar. 2006.
- [Rep18] J. Modelski, K. Kurek, Y. Yashchyshyn, T. Keller, R. Szumny, A. Kurek: "Nowoczesne techniki

- lokalizacji i określania kształtów obiektów*" (Modern Localization and Object Shape Recognition Techniques), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep19] R. Z. Morawski, A. Miękina, T. Woliński, A. Podgórski, N. Obarski: *"Metody i algorytmy interpretacji widma sygnałów do zastosowań w monitoringu procesów technicznych i ekologicznych"* (Methods and Algorithms for Interpretation of Signals Spectrum, Dedicated to Applications in Technological and Ecological Monitoring), Final report for the MSHE Grant, Institute of Radioelectronics, WUT, Warsaw, Apr. 2006.
- [Rep20] R. Z. Morawski, A. Miękina, A. Podgórski: *"Realizacja i badanie wybranych algorytmów interpretacji danych pomiarowych"* (Implementation and Investigation of the Selected Algorithms for the Interpretation of Measurement Data), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep21] T. Morawski, W. Gwarek, M. Celuch, D. Gryglewski, M. Sypniewski, A. Więckowski, P. Miazga, W. Wojtasiak, J. Zborowska, R. Michnowski, K. Robaczyński, P. Kopyt, J. Rudnicki, A. Moryc, T. Ciamulski, W. Kijewska, M. Lubiejewski: *"Modelowanie pól elektromagnetycznych i projektowanie mikrofalowych wzmacniaczy mocy"* (Modeling of Electromagnetic Fields and Designing of Microwave High Power Amplifiers), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep22] E. Piątkowska-Janko, P. Bogorodzki, T. Wolak, M. Orzechowski: *"System do badań przesiewowych układu sercowo-naczyniowego bazujący na wielo-parametrowej analizie hemodynamiki serca i perfuzji naczyniowej w wybranych obszarach ciała"* (*Screening of Cardiovascular Systems Based Upon Multi-parameter Analysis*), Final report for EUREKA – CAVASCREEN, Project No. 2939 – SPUB, (Partially funded by MSHE), Institute of Radioelectronics, WUT, Warsaw, Jan. 2006.
- [Rep23] E. Piątkowska-Janko, S. Jankowski, A. Oręziak, Z. Szymański, P. Bogorodzki, M. Kazubek: *"Transdukccyjna maszyna wektorów nośnych jako klasyfikator uśrednionych sygnałów wysokorozdzielczego EKG dla pacjentów z udokumentowanym nadciśnieniem tętniczym i różną budową lewej komory"* (Transductive Support Vector Machine Classifier for Detection of ECG in Hypertensive Patients with Different Constitution of the Left Ventricular), Final report for the Dean Grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2006.
- [Rep24] A. Przelaskowski, P. Wojtaszczyk, J. Walecki, M. Biesiadko-Matuszewska, R. Sikora, E. Weśółowska, P. Surowski, A. Wróblewska, P. Bargieł, P. Boniński, M. Skaliński, E. Fabiszewska, A. Kukuła, K. Durasiewicz: *"Modelowanie informacji istotnej diagnostycznie w dziedzinie przekształceń falkowych do zastosowań radiologii cyfrowej"* (Wavelet-based Modeling of Diagnostic Information for Digital Radiography), Final report for the MSHE Grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2006.
- [Rep25] D. Radomski, A. Jakubiak, M. Kazubek, J. Malejczyk, P. Roszkowski: *"Hierarchiczne modelowanie statyczne procesu chorobowego o złożonej etiologii"* (Hierarchical Statistics Modeling of Disease Process with Multiple Etiology), Final report for the MSHE Grant, Institute of Radioelectronics, WUT, Warsaw, May 2006.
- [Rep26] K. Snopek, S. Hahn, A. Dąbrowski, P. Dymarski: *"Czasowo-częstotliwościowe właściwości szerokopasmowych sygnałów telekomunikacyjnych i ich wykorzystanie w znakowaniu wodnymi steganografii"* (Time-frequency Properties of Broadband Telecommunication Signals and their Use in Watermarking and Steganography), Final report for the Dean Grant, Institute of Radioelectronics, WUT, Warsaw, Dec 2006.
- [Rep27] W. Winięcki, P. Bilski, P. Bobiński, T. Daniluk H. Chaciński, R. Łukaszewski, M. Karkowski T. Mielcarz, K. Mroczek: *"Wykorzystanie nowoczesnych technologii komunikacyjnych i programowych w projektowaniu przewodowych i bezprzewodowych rozproszonych systemów pomiarowych"* (The Use of Modern IT Technologies in Designing of Distributed Measurement Systems (DMS)), Final report for the MSHE Grant, Institute of Radioelectronics, WUT, Warsaw, Jul. 2006.
- [Rep28] W. Winięcki, K. Mroczek, P. Bilski, R. Łukaszewski, T. Daniluk: *"Nowoczesne metody projektowania komputerowych systemów pomiarowych"* (Modern Methods of Designing of Computer Measuring Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep29] J. Wojciechowski, P. Bilski: *"Automatyczny system diagnostyki systemów technicznych"* (Automatic System for the Technical Systems Diagnostics), Final report for the MSHE Grant, Institute of Radioelectronics, WUT, Warsaw, Apr. 2006.
- [Rep30] J. Wojciechowski, A. Trojanowski: *"Liniowa prognoza kanału radiowego z zanikiem Rayleigha"* (Linear Radio Channel Prediction with Rayleigh Channel), Final report for the Dean Grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2006.
- [Rep31] J. Wojciechowski, Z. Walczak, P. Bilski, A. Dominik, A. Trojanowski: *"Badanie systemów analogowych i sieci telekomunikacyjnych z wykorzystaniem sztucznej inteligencji"* (Investigations of Analog Systems and Telecommunication Networks by means of Artificial Intelligence), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.
- [Rep32] J. Wojciechowski, Z. Walczak, G. Bernatek, J. Twaróg: *"Ekspertyza techniczna dotycząca karty elektronicznej dla projektu Elektroniczna*

Karta Miejska i Publiczne Punkty Dostępu do Internetu w mieście Rybnik" (Citizen Card and Public Internet Access-Points for the City of Rybnik – Technical Expertise), Final report for Center of Transfer Technology and the President of Rybnik, Apr. 2006.

[Rep33] W. Wojtasiak, D. Gryglewski, T. Morawski, J. Zborowska, J. Kraśniewski, M. Oleksy, M. Kraśniewski, S. Łuczak, M. Lubiejewski: *"Elektryczno-termiczne modelowanie mikrofalowych tranzystorów mocy"* (Electro-thermal Modeling of Microwave Power Transistors), Final report for the MSHE Grant, Institute of Radioelectronics, WUT, Warsaw, Feb. 2006.

[Rep34] W. Wojtasiak, D. Gryglewski, J. Piotrowski, J. Skulski, M. Lubiejewski: *"Wysokosprawne*

wzmacniacze mikrofalowe dużej mocy dla systemów radiokomunikacyjnych" (High-efficiency Microwave High-power Amplifiers for Radiocommunication Systems), Final report for the Dean grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2006.

[Rep35] K. Zaremba, P. Bogorodzki, P. Brzeski, G. Domański, T. Jamrógiewicz, M. Kazubek, B. Konarzewski, J. Marzec, T. Olszewski, Z. Pawłowski, E. Piątkowska-Janko, A. Przelaskowski, L. Padée, W. Smolik, R. Szabatin, P. Bargieł, P. Boniński, R. Kurjata, M. Orzechowski, A. Trybuła, T. Wolak, A. Wróblewska: *"Nowoczesne techniki elektroniki jądrowej i medycznej"* (Modern Techniques in Nuclear and Medical Electronics), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2006.

8 PATENTS

[Pat1] A. Barwicz, R. Z. Morawski, M. Ben Slima: *"Apparatus and Method for Light Spectrum Measurement"*, United States Patent, No. #7,084,974 issued on Aug. 1, 2006.

[Pat2] A. Barwicz, R. Z. Morawski, M. Ben Slima: *"Apparatus and Method for Light Spectrum Measurement"*, Patent No. #2,237,970 issued on Dec. 19, 2006 by Canadian Intellectual Property Office.

9 CONFERENCES, SEMINARS AND MEETINGS

9.1 Conferences co-organized by the Institute

- [Con1] *COMPASS-CERN Collaboration Annual Meeting "COMPASS Week in Warsaw"*, (Warsaw, Poland, Feb. 15-18, 2006), K. Zaremba (co-chair of the Organizing Committee), A. Padée (speaker), J. Marzec, R. Sulej, M. Ziembicki (participants).
- [Con2] *Microwave and Radar Week in Poland: MIKON 2006* (Kraków, Poland, May 22-24, 2006), J. Modelski (chairman), W. Gwarek, T. Morawski (members of the Technical Program Committee), M. Celuch, D. Gryglewski, J. Jarkowski, W. Kijewska, P. Kopyt, M. Krok, S. Kozłowski, P. Kucharski, K. Kurek, M. Mikołajewski, R. Michnowski, I. Prudyus, D. Rosołowski, J. Rudnicki, M. Stolarski, R. Szumny, P. Węgrzyniak, Y. Yashchyshyn, M. Żukociński (speakers).
- [Con3] *PROCTOM 2006: 4th International Symposium on Process Tomography in Poland* (Warsaw, Poland, Sept. 14-15, 2006), K. Zaremba (chair of the Conference), R. Szabatin, (chair of the Local Organizing Committee).
- [Con4] *XI Międzynarodowe Sympozjum "New Trends in Audio and Video"* (XIth International Symposium: "New Trends in Audio and Video"), (Białystok, Poland, Sept. 20-22, 2006), W. Skarbek, (chair of the Scientific Committee), Z. Kulka, K. Zaremba (members of the Scientific Committee), A. Buchowicz, A. Nowakowski, G. Pastuszek, A. Przelaskowski, K. Wnukowicz (speakers).
- [Con5] *Konferencja Naukowa: Funkcja a Struktura – Czynnościowe Obrazowanie Mózgu* (Scientific Conference: Function vs. Structure – Functional Brain Imaging), (Kajetany, Poland, Dec. 4, 2006), the Institute of Physiology and Pathology of Hearing and Institute of Radioelectronics, K. Zaremba (member of the Scientific Committee) P. Bogorodzki (speaker), E. Piątkowska-Janko, T. Wolak, M. Orzechowski (participants).

9.2 International conferences

- [Con6] *32nd International Conference on Current Trends in Theory and Practice of Computer Science* (Měřin, Czech Republic, Jan. 21-27, 2006), Z. Walczak (speaker).
- [Con7] *European Congress of Radiology: ECR'2006* (Vienna, Austria, Mar. 2-7, 2006), E. Piątkowska-Janko, M. Orzechowski (speakers).
- [Con8] *International Conference: TCSET'2006* (Lviv, Ukraine, Feb. 28-Mar. 4, 2006), M. Bury (speaker).
- [Con9] *IEEE Instrumentation & Measurement Technology Conference: IMTC'2006* (Sorrento, Italy, Apr. 24-27, 2006), R. Z. Morawski (speaker, session chairman, member of TPC), W. Winiecki

(member of TPC, speaker), A. Podgóřski, R. Łukaszewski (speakers).

- [Con10] *International Trade Event and Conference for Telemedicine and Health* (Luxemburg, the Netherlands, Apr. 5-8, 2006), P. Boniński (speaker).
- [Con11] *IEEE International Microwave Symposium* (San Francisco, USA, Jun. 11-16, 2006), M. Celuch, W. Gwarek, J. Modelski (members of the Technical Program Committee)
- [Con12] *18th International Wrocław Symposium and Exhibition on Electromagnetic Compatibility* (Wrocław, Poland, Jun. 28-30, 2006), J. Kołakowski, S. Maszczyk (speakers).
- [Con13] *The Seventh International Conference on Artificial Intelligence and Soft Computing* (Częstochowa, Poland, Jun. 26-29, 2006), A. Dominik, A. Padée, R. Sulej, Z. Walczak (speakers).
- [Con14] *International Conference on Wireless and Mobile Communication* (Bucharest, Romania, Jul. 28 – Aug. 3, 2006), Z. Walczak (speaker).
- [Con15] *International Society for Clinical Biostatistics Conference* (Geneva, Switzerland, Aug. 27-31, 2006), D. Radomski (speaker).
- [Con16] *17th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications* (Helsinki, Finland, Sept. 11-14, 2006), A. Trojanowski (speaker).
- [Con17] *The 6th International Symposium on Signal Processing and Information Technology* (Vancouver, Canada, Aug. 26-30, 2006), K. Snopek (speaker).
- [Con18] *European Microwave Conference* (Manchester, Great Britain, Sept. 9-15, 2006), J. Modelski (session chairman, speaker).
- [Con19] *The European Conference on Wireless Technology: ECWT 2006* (Manchester, UK, Sept. 10-12, 2006), J. Modelski (speaker).
- [Con20] *5th International Symposium on Parallel Computing in Electrical Engineering* (Białystok, Poland, Sept. 13-17, 2006), G. Pastuszek (speaker).
- [Con21] *XVIII International IMEKO Congress: "Measurement for a Sustainable Development"* (Rio de Janeiro, Brazil, Sept. 17-22, 2006), R. Z. Morawski (speaker, invited speaker, session chairman, round-table chairman, member of International Programme Committee, chairman of Junior Award Jury), W. Winiecki (speaker).
- [Con22] *Computers in Cardiology* (Valencia, Spain, Sept. 17-20, 2006), E. Piątkowska-Janko (speaker).
- [Con23] *V Symposium on Medical Physics and III International Symposium on Medical Physics: ISMP 2006* (Ustroń, Poland, Sept. 20-23, 2006), K. Zaremba (member of the Scientific Committee).

- [Con24] *5th International Conference "Multimedia & Network Information Systems": MISS'2006* (Wrocław, Poland, Sept. 21-22, 2006), G. Galiński (speaker).
- [Con25] *XI International Conference: Medical Informations & Technologies: MIT'2006* (Wisła-Malinka, Poland, Sept. 25-27, 2006), A. Przelaskowski (speaker).
- [Con26] *Third Annual IEEE Communications Society Conference on Sensor, Mesh and AdHoc Communications and Networks: SECON 2006* (San Diego, USA, Sept. 25-28, 2006), K. Bryłka, M. Dąbrowski (participants).
- [Con27] *IEEE Radio and Wireless Symposium RWS* (San Diego, US, Jan 17-19 2006), J. Modelski (speaker).
- [Con28] *PIKE 2006 XXIX International Conference on Exhibition: "The Digital Home – New Challenges for Operators of Electronic Communication"* (Zakopane, Poland, Oct. 22-25, 2006), J. Modelski (chairman, speaker).
- [Con29] *2006 Asia-Pacific Microwave Conference: APMC'2006* (Yokohama, Japan, Dec. 12-15, 2006), J. Modelski (invited speaker).
- [Con30] *Przyszłość rynku mediów elektronicznych w Polsce* (The Future of Electronic Media in Poland), (Warsaw, Poland, Mar. 14-16, 2006), J. Modelski (speaker).
- [Con31] *Konferencja "Obrazowanie funkcji i struktury układu nerwowego"* (Imaging of Function and Structure of Central Nervous System), (Kraków, Poland, May 16, 2006), P. Bogorodzki (speaker).
- [Con32] *XXVIII Konferencja PIKE, Seminarium "IP-TV – szansa czy zagrożenie?"* (XXVIII Polish Chamber of Electronic Communication, Seminar: IP-TV – Prospect or Risk?), (Jachranka k/Warszawy, May 17, 2006), J. Modelski (chair of the seminar).
- [Con33] *Reprogramowalne Układy Cyfrowe RUC'2006* (Reprogrammable Digital Units), (Szczecin, Poland, May 18-19, 2006), K. Mroczek (speaker).
- [Con34] *Kongres Telemedycyna 2006: Medycyna w zasięgu telefonu i Internetu* (Telemedicine 2006 Congress: Medicine in Telephone and the Internet), (Warsaw, Poland, Jun. 22, 2006), A. Przelaskowski (speaker).
- [Con35] *Krajowa Konferencja Radiokomunikacji, Radiofonii i Telewizji: KKRRiT'2006* (National Conference on Radiocommunications, Broadcasting and Television), (Poznań, Poland, Jun. 7-9, 2006), J. Modelski, W. Skarbek (members of the Programme Committee), J. Cichoński, P. Bajurko, S. Badura, A. Buchowicz, J. Jarkowski, T. Kosito, K. Kurek, S. Kozłowski, J. Kołakowski, M. Leszczyński, S. Maszczyk, A. Nowakowski, R. Szumny, S. Wydra, Y. Yashchyshyn (speakers).
- [Con36] *Intelligent Information Systems 2006: New Trends in Intelligent Information Processing and Web Mining* (Ustroń, Poland, Jun. 19-22, 2006), A. Dominik (speaker).
- [Con37] *Systemy Pomiarowe w Badaniach Naukowych i w Przemysle SP'2006* (VIth Conference on Measuring Systems in Research and Industry), (Łagów, Poland, Jun. 21-24, 2006), W. Winięcki (member of the Scientific Committee, speaker), R. Łukaszewski, P. Bobiński (speakers).
- [Con38] *Międzyuczelniana Konferencja Metrologów MKM'2006* (Inter-university Metrologists' Conference), (Warsaw, Poland, Sept. 4-6, 2006), W. Winięcki, R. Łukaszewski, K. Mroczek (speakers).
- [Con39] *Symposium "Inżynieria Biomedyczna i Telemedycyna"* (National Symposium on Biomedical Engineering and Telemedicine "IBITEL"), (Warsaw, Poland, Sept. 8-9, 2006), A. Przelaskowski, K. Zaremba (members of the Scientific Committee).
- [Con40] *Krajowe Sympozjum Telekomunikacji: KST'2006* (National Symposium on Telecommunications), (Bydgoszcz, Poland, Sept. 13-15, 2006), S. Hahn, J. Jarkowski, R. Michnowski (participants).
- [Con41] *XX Konferencja Naukowa Wydziału Technologii Drewna SGGW pt. "Drewno – materiał XXI wieku"* (XXth Scientific Conference of Warsaw Agricultural University: Forestry and Wood Technology), (Rogów k/Koluszek, Poland, Nov. 7-8, 2006), P. Bobiński (speaker).
- [Con42] *V Sympozjum Naukowe "Techniki Przetwarzania Obrazu"* (Vth Symposium: Image Processing Technologies), (Serock, Poland, Nov. 16-18, 2006), J. Modelski, W. Skarbek (members of the Scientific Committee), S. Badura, A. Buchowicz, A. Nowakowski (speakers).
- [Con43] *Ogólnopolska Konferencja "Techniki obrazowania czynności i narządów człowieka"* (National Conference: Technologies of Functions and Human Organs Imaging), (Warszawa, Poland, Dec. 8, 2006), A. Przelaskowski, T. Wolak (speakers).

9.4 Schools, seminars and meetings

- [Con44] *9th IEEE Workshop on Design and Diagnostics of Electronic Circuits and Systems: DDECS 2006* (Prague, Czech Republic, Apr. 18-21, 2006), G. Pastuszek (speaker).
- [Con45] *Space Technology Workshop: STW'006 (MIKON 2006)*, (Kraków, May 23, 2006), J. Modelski (member of the Program Committee), K. Kurek, M. Stolarski (speakers).
- [Con46] *4th International Workshop on Biological Effects of Electromagnetic Fields* (Crete, Greece, Oct. 16-20, 2006), W. Kijewska (participant).

CONFERENCES, SEMINARS AND MEETINGS

- [Con47] *1st International Workshop on Ground Station Network* (Tokyo, Jul. 18-19, 2006), M. Stolarski (speaker).
- [Con48] *VIIth Grantees Seminar of the Foundation for the Development of Radiocommunication and Multimedia Technologies*, (Warsaw, Dec. 2006), J. Kołakowski (chairman), P. Bargieł, P. Boniński, E. Dmoch, P. Furtak, R. Graczyk, M. Kościelak, A. Kurek, K. Kurek, S. Serjant, M. Stolarski, R. Szumny, S. Wydra, P. Ziętek (speakers).
- [Con49] *1st IEEE Region-8 Trans-European Industry Applications Chapters' Joint Workshop* (June 25-28, St. Petersburg; June 29 – July 1, 2006, Moscow), J. Modelski (speaker).
- [Con50] *16-th International Traveling Summer School on Microwaves and Lightwaves*, (Warsaw, July 2006), lecture of prof. W. Gwarek entitled "Electromagnetic Simulators"

10 PRIZES AND DISTINCTIONS

State Medals

Maciej Konwicki, M.Sc.
Srebrny Krzyż Zasługi (Silver Order of Merit)

Medal of 80th Anniversary of the Polish Broadcasting

Józef Modelski, Prof., D.Sc.

Award of the Minister of Science and Higher Education

Jan Ebert, Prof., D.Sc.
Individual award for the outstanding achievements in the research and teaching activities

Artur Przelaskowski, D.Sc.
Individual award for the book: "Kompresja danych, metody bezstratne, kodery obrazów" (Data Compression; Basics, Lossless Methods, Image Coders).

Awards of the Rector

Zbigniew Kulka, D.Sc.
Andrzej Leszczyński, Ph.D.
Maria Tajchert, Ph.D.
Team award (I^o) for elaboration of the conception of lectures: "Podstawy techniki dźwiękowej" (Basics of Audio Techniques), and "Urządzenia i systemy techniki dźwiękowej" (Devices and Systems of Audio Techniques)

Tadeusz Morawski, Prof., D.Sc.
Jolanta Zborowska, Ph.D.
Team award (II^o) for the book: "Pola i fale elektromagnetyczne" (Electromagnetic Fields and Waves)

Awards of the Warsaw University of Technology

Stefan Hahn, Prof., D.Sc.
Tadeusz Morawski, Prof., D.Sc.
Zdzisław Pawłowski, Prof., D.Sc.
Krzysztof Kowalski, Ph.D.
Persons of Merit from Warsaw University of Technology

Prof. M. Pożaryski Competition

Józef Modelski, Prof., D.Sc.
Krzysztof Kurek, Ph.D.
The first award for the article titled: "Perspektywy rozwoju systemów łączności satelitarnej" (Future Trends in Satellite Communication Systems), *Przegląd Telekomunikacyjny i Wiadomości Telekomunikacyjne*.

Prizes granted by European Microwave Association

Rafał Szumny, M.Sc.
Awarded the second prize for the paper titled "Closely Spaced Paths Effect Mitigation for Indoor Location Systems", Proc. Microwave and Radar Week in Poland: MIKON 2006 (Kraków, Poland, May 22-24, 2006).

The Best Master's Theses Awards founded by AP/AES/MTT Joint Chapter, Poland Section IEEE

First Prize
Jarosław Antoniuk "Integration of microstrip patch antennas into laptop computers", Technical University of Lisbon, Portugal / Inst. of Radioelectronics WUT, Supervisors: Prof. Custodio Peixeiro /Prof. Wojciech Gwarek

Second Prize
Dawid Rosołowski "Band conversion 2.4-2.5 GHz in wireless networks", Inst. of Radioelectronics WUT, Supervisor: Dr. D. Gryglewski

Diploma
Artur Toczyłowski „A setup for measurements of thermal characteristics of microwave power transistors”, Inst. of Radioelectronics WUT, Supervisor: Dr. D. Gryglewski

Scholarships granted by Foundation for the Development of Radiocommunication and Multimedia Technologies

For preparing course book
Juliusz Modzelewski, Ph.D. - "Wzmacniacze mocy wielkiej częstotliwości" (High-Frequency Power Amplifiers)

For preparing Ph.D. thesis
Paweł Bargieł, M.Sc. - "Komputerowe metody poprawy jakości medycznych danych obrazowych" (Computer Methods of Improvement of Image Medical Data)
Piotr Boniński, M.Sc. - "Metody indeksowania obrazów medycznych na potrzeby radiologii cyfrowej" (Content-based Indexing of Medical Images for Digital Radiology Applications)

Arkadiusz Kurek, M.Sc. - "System wspomagania osób niewidomych z wykorzystaniem nawigacji satelitarnej" (System for the Orientation of the Blind People Using Satellite Navigation)

Rafał Szumny, M.Sc. - "Metoda lokalizacji terminali radiowych wewnątrz budynków" (Method of Localizing of Radio Terminals Inside Buildings)

Arkadiusz Trojanowski, M.Sc. - "Liniowa prognoza kanału radiowego z zanikami Rayleigha" (Linear Radio Channel Prediction with Rayleigh Channel)

Sebastian Wydra, M.Sc. - "Zastosowanie ukrytych modeli Markowa w aplikacjach głosowych dla mowy polskiej" (Using Hidden Markov Models in the Voice Applications for Polish Speech)

Student scholarships

Emil Dmoch, B.Sc.
Artur Nowakowski, B.Sc.
Serguei Serjant, B.Sc.
Paweł Ziętek, B.Sc.
Michał Żebrowski, B.Sc.
Rafał Wojda

For participation in international educational program

Michał Kościelak, **Piotr Furtak** - SOCRATES (Universidade Tecnica de Lisboa, Portugal)
Rafał Graczyk - Young Engineers Satellite 2 (YES2), (Leiden, The Netherlands)

11 STATISTICAL DATA (for Dec. 31st of each year)

SPECIFICATION	2002	2003	2004	2005	2006
academic staff					
total	59.43	61.33	61.89	61.58	61.08
tenured professors	3.6	3.5	3.4	3.4	2.75
professors	6	5	6.6	7.6	9
associate professor	0	3	3	2.5	2.5
assistant professors	43	42	42.5	42.25	41.5
senior lecturers	4.83	4.83	4.83	4.83	4.83
lecturers	0	0	0	0	0
assistants	2	3	1.5	1	0.5
Ph.D. students					
total	49	39	43	38	44
regular, the third level studies	39	27	24	24	20
without scholarship	10	12	19	14	24
technical and administrative staff					
total	20	19	22.65	20.4	20.6
R&D associates	9	9	11.15	8.9	11.6
administrative associates	9	8	8.5	8.5	6
librarian	1	1	1	1	1
service workers	2	2	2	2	2
space					
total [m ²]	2549.1	2592.1	3069.6	3069.6	3069.6
laboratories	1172.8	1279.8	1320.0	1320.0	1320.0
library	71.2	71.2	81.1	81.1	81.1
offices of academic staff	1305.6	1241.1	1355	1355	1355
library resources					
books (number of volumes)	14543	14756	15133	15344	15501
books (number of titles)	8012	8107	8262	8353	8459
journals (number of titles subscribed to)	125	125	125	126	126
teaching activities					
basic courses	49	47	48	60	62
advanced courses	28	35	37	33	22
other courses	58	57	59	80	66
international projects	1	1	1	6	1
research projects					
total	43	56	58	41	51
International projects	4	7	11	6	10
granted by Ministry	15	16	12	11	13
granted by the University	16	24	20	15	17
other projects	8	9	15	9	11
research projects budget	2 599 000 zł + 64 000 €	2 828 000 zł + 13 000 €	3 806 000 zł + 228 000 €	4 397 000 zł + 331 000 €	5 020 000 zł + 323 000 €
titles and degrees awarded					
Prof. titles	1	1	0	0	0
D.Sc. degrees	0	3	2	0	1
Ph.D. degrees	5	1	6	5	9
M.Sc. degrees	83	91	85	50	64+3
M.Sc. Degrees (English-medium studies)	0	0	0	0	1
B.Sc. degrees	53+29	54+32	58+54	51+14	68+10
B.Sc. degrees (English-medium-studies)	5	0	4	7	3
B.SC. degrees (Distant Learning Center)	0	0	0	0	2
publications					
total	149	185	222	224	235
sci.-tech. books and chapters in books	2	3	1	6	5
sci.-tech. papers in journals	19	59	52	65	62
sci.-tech. papers in conf. proceedings	119	110	145	131	148
other publications	9	13	19	19	22
research reports	38	37	43	27	35
patents granted	0	2	0	0	2
conferences attended by the staff	41	47	39	48	50

EXPLANATORY NOTE ON POLISH ACADEMIC AND PROFESSIONAL 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.)*, translated here as **Professor Title (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**.

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: humanities, natural sciences, mathematics etc.
- *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 Professor** – the holder of *doktor* degree in the post of *adiunkt*;
- **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*;
- **Professor with Title** – the holder of *profesor* title in the post of *profesor nadzwyczajny*;
- **Tenured Professor** – the holder of a *profesor* academic title in the post of *profesor zwyczajny*.