INSTITUTE OF RADIOELECTRONICS

WARSAW UNIVERSITY OF TECHNOLOGY

FACULTY OF ELECTRONICS AND INFORMATION TECHNOLOGY

ANNUAL REPORT

2005

Warsaw, March 2006

From the Director

I take special pleasure in opening the 2005 Annual Report of the Institute of Radioelectronics.

This year will remain imprinted on our minds as **the year of the 35th anniversary** of the Institute. At first sight, one may not find thirty five to be a particularly round figure to celebrate; however, we have had good reasons to do so. A round decade has passed since our sliver jubilee, and this has been a challenging decade for all academic institutions in Poland. It has been the decade of our trying to adjust to the new emerging reality, shaped by political system transformations and solidifying market economy. Perpetual underfinancing of science and education has exposed us to unequal competition with a rapidly growing number of non-public schools. Many of our industrial partners have either collapsed or drastically reduced their research activities, which has broken many of our traditional funding links. Facing numerous layoffs, a gaping hole in the budget, and a shrinking laboratory basis – we have nevertheless made the right decision not to give up.

This **last decade** could also be perceived as a period of technical civilization, opening market per-spectives, and stepping over the frontiers. This is precisely the perspective we have chosen to take. The process of setting information technology society started in Poland with as much delay as acceleration, compared to Western Europe, and so did the interest in merging technical sci-ences with the biomedical ones. This has created new opportunities for research units such as our Institute, and we have restructured our profile accordingly. Our activities have focused on three subject areas: radiocommunications, multimedia technologies, and biomedical electronics. We have built upon earlier experience in the classical domains such as wave propagation phenomena, communications, transmit-receive technologies, microwave systems, television, acoustics, nuclear electronics, measurement techniques and signal processing – but also bridged the gaps and sup-ported interdisciplinary developments of our staff. The strategy has proven in-line with market de-mands. We have completed almost hundred of industrial projects in the broadly understood fields of **telecommunications**, **biomedical electronics** and **multimedia technologies**. Our share in teaching activities of the Faculty has increased and became dominant in two up-to-date disciplines: Radiocommunications / Multimedia Technologies and Biomedical Engineering. Moreover, our offer of continuing education has attracted vast interest, mainly from telecommunication service pro-viders and communications administration, and brought us two ministerial awards. The number of graduates of these courses exceeds three thousand. This is a valuable addition to, approximately, two thousand students who have received diplomas within our regular B.Sc. and M.Sc. studies over the last decade.

In recent years, we observe an increasing fraction of internationally oriented work. Earlier educa-tional collaboration within programmes such as TEMPUS in 1990s has developed into research projects within, for example, EUREKA and POLONIUM initiatives, and reached commercial matur-ity in industrial design for US, Swedish, and Japanese companies. In 2005 we have been involved in four projects under the European 6th Framework Programme as well as four industrial ones for the foreign contractors. At the same time, long-term collaboration with CERN and international bio-medical projects have been supported by the State Committee for Scientific Research. Our links with the Polish industry and administration have also strengthened.
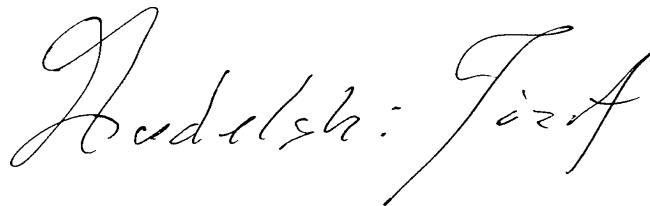
So, what is the tangible outcome of our decade efforts and endeavour for today. There are many, but I would like to spell out some details on just two. The first one is our dedicated staff, which includes 15 professors (including 9 with a state professorial title), 44 assistant professors, and over 40 doctoral students. Their sterling work and continuous quest for excellence attract national and international appreciation. The 2005 awards include: three State Medals, one Minister of Science and Education Award; the Walter Cox Award from the IEEE MTT Society; Golden Medal at the 4th World Exhibition of Innovation, Research and New Technology; and three awards to our M.Sc. and Ph.D. students for their theses or conference papers. Members of our staff have given invited

seminars and courses all over the world, including Norway, Mexico, USA, Canada, and China. Annual referred publications amount to 223.

The other achievement and asset of the Institute are its laboratories. Over the last decade several have been created from scratch, for example, in the domains of multimedia, antennae (including an anechoic chamber), digital mobile systems and radioelectronics measurements. Other ones, such as microwave, acoustic (also with its own anechoic chamber) and biomedical (including a tomograph) have been greatly modernized and expanded.

This quality of the laboratory basis would have not been achieved without generous support from the Foundation for Radiocommunication and Multimedia Technologies. This Foundation was established in year 2000 and has just celebrated its 5th anniversary simultaneously with the 35th anniversary of the Institute. This coincidence stimulates a summary of benefits granted to the Institute by the Foundation: modern laboratory equipment, over 100 of scholarships for B.Sc., M.Sc., Ph.D. and habilitation activities, and extensive support for new text books and participation in international projects and symposia.

I would like to express, once more, our gratitude to the Founders and Sponsors whose generosity has been helping us build our expertise and confidence. I would also like to offer warm thanks to those of our supporters, graduates, former employees, and friends who attended the Institute's Jubilee Session in October. Your coming, in many cases from rather remote places, has been to us a valuable sign that confirms the long-term quality of our activities and their current relevance. I hope this Annual Report will serve as meeting minutes to those who have recently been in touch with us, and as an encouragement to get in touch for others! Thank you for your time taken to look through it.

Professor Józef Modelski

Contents

This Annual Report summarizes the research activities
of the Institute in 2005, as well as the teaching activities
of the academic year 2004/2005

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,
- 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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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;
- Digital Processing of Measurement Signals Group.

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

1.3.1 Electroacoustics Division

Head of Division

Zbigniew Kulka, D.Sc., Professor
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Senior academic staff

Wiesław Winiecki, D.Sc., Professor, from Feb. 2005
Jan Żera, D.Sc., Associate Professor (0.5), from Oct. 2005
Piotr Bobiński, Ph.D., Assistant Professor
Ewa Kotarbińska, Ph.D., Assistant Professor (0.5)
Andrzej Leszczyński, Ph.D., Assistant Professor (0.75)
Krzysztof Mroczek, Ph.D., Assistant Professor
Maria Tajchert, Ph.D., Assistant Professor

Junior academic staff

Piotr Bilski, M.Sc., Assistant (0.5), from Nov. 2005
Robert Łukaszewski, M.Sc., Assistant, to Sept. 2005
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),
    from Oct. 2005

Ph.D. students

Michał Kostrzewa, M.Sc., from Oct. 2001
Grzegorz Kustra, M.Sc., to Sept. 2005
Mariusz Mikołowicz, M.Sc., from Mar. 2001
Aleksandra Młyńska, M.Sc., from Oct. 2004
Marcin Stolarski, M.Sc., from Oct. 2004
Aneta Świercz, M.Sc., from Oct. 2002

Retirements:

Andrzej Aronowski, Foreman
Jerzy Narkiewicz-Jodko, Ph.D., Assistant Professor

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;
- active noise reduction systems applied to acoustic waveguides;
- 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.

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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Wojciech Gwarek, Prof. D.Sc., Professor, from Jan. 2006
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Senior academic staff

Stanisław Rosłoniec, Prof. D.Sc., Professor

Małgorzata Celuch-Marcysiak, Ph.D., Assistant Professor

Daniel Gryglewski, Ph.D., Assistant Professor

Przemysław Miazga, Ph.D., Assistant Professor

Krzysztof Robaczyński, M.Sc., Senior Lecturer (0.5)

Maciej Sypniewski, Ph.D., Assistant Professor

Andrzej Więckowski, Ph.D., Assistant Professor

Wojciech Wojtasiak, Ph.D., Assistant Professor

Jolanta Zborowska, Ph.D., Assistant Professor

Ph.D. students

Marek Bury, M.Sc., from Oct. 2004

Paweł Kopyt, M.Sc., from Oct. 2001

Sebastian Kozłowski, M.Sc., from Oct. 2004

Artur Moryc, M.Sc., from Mar. 2002

Dawid Rosołowski, M.Sc., from Oct. 2005

Technical staff

Mirosław Lubiejewski, Foreman

Ryszard Michnowski, M.Sc., Senior Development Eng., to Apr. 2005

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

Retirement

Krzysztof Kowalski, Ph.D., Assistant Professor

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 2005 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, summators and dividers, switches, transistor circuits);
- analysis and design of multi-element planar in-phase radar antenna arrays intended to work at high power level;
- development of new structures of non-commensurate non-synchronous transmission line stop-band filters and application of them in various radar equipments;
- development of new optimization algorithms for computer-aided synthesis of antenna arrays with especially shaped radiation patterns;
- design of modern computer-aided measuring systems;
- development of numerical methods and implementation of computer programmes for full-wave analysis and design of two- and three-dimensional microwave circuits (filters, matching circuits, uniform and periodic guiding structures, polarizers, antennae);
- development of non-linear programming and artificial intelligence methods, and their application to the automated design of microwave circuits.

1.3.3 Nuclear and Medical Electronics Division

Head of Division

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Senior academic staff

Zdzisław Pawłowski, Prof. D.Sc., Tenured Professor

Janusz Marzec, D.Sc., Associate 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

Tomasz Jamrógiewicz, M.Sc., Senior Lecturer

Marian Kazubek, Ph.D., Assistant Professor

Bogumił Konarzewski, Ph.D., Assistant Professor

Tomasz Olszewski, M.Sc., Senior Lecturer

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

Technical staff

Mateusz Orzechowski, M.Sc., Development Eng. (0.5), from Aug. 2005

Andrzej Wasilewski, Worker

Joanna Witkowska, Senior Technician

Tomasz Wolak, M.Sc., Development Eng. (0.5),
    from Aug. 2005

Graduate trainees

Michał Dziewiecki, Assistant (0.5), to Sept. 2005

Katarzyna Skrajnowska, Assistant (0.5), to Sept. 2005

Ph.D. students

Paweł Bargieł, M.Sc., from Oct. 2001

Piotr Boniński, M.Sc., from Mar. 2002

Michał Dziewiecki, M.Sc., from Oct. 2005

Wojciech Kozerski, M.Sc., to Sept. 2005

Robert Kurjata, M.Sc., to Sept. 2005

Cezary Mróz, M.Sc., from Oct. 2005

Mateusz Orzechowski, M.Sc., to Sept. 2005

Adam Padée, M.Sc., from Mar. 2002

Wojciech Padée, M.Sc., from Oct. 2004

Tymon Rubel, M.Sc., from Oct. 2003

Robert Sulej, M.Sc., from Mar. 2002

Artur Trybuła, M.Sc., from Oct. 2002

Anna Wróblewska, M.Sc., from Oct. 2002

Marcin Ziembicki, M.Sc., from Mar. 2004

Retirement

Waldemar Scharf, Ph.D., Assistant Professor

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 the high energy physics experiments. The Division's research is focused on 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:
- multimodal imaging of topographic, tomographic and functional studies in medicine;

- region based methods for functional MRI;
- electrical instability of heart study;
- correlated methods for the investigation of neurosystems by NMR and SPECT tomography;
- MR imaging optimization for functional studies;
- telecardiology;
- expert systems for high resolution ECG;
- application of wavelet transform for echocardiographic images' quality improvement and for image data compression;
- algorithms for 3D brain imaging;
- dynamic tomographic studies (computer-aided methods of early diagnosis of brain strokes);
- digital structural radiography;
- X-ray stereoscopy;
- optical tomography applications in medicine;
- high resolution capacitance tomography;
- algorithms for image reconstruction for electrical and process tomography;
- construction of capacitance tomographs and sensors for medical and industrial applications;
- measurement and analysis of human limb tremor;
- designing detectors and read-out systems for high energy physics experiments;
- modeling of radiographic imaging systems;
- application of predictive models in algorithms of medical diagnosis;
- applications of "soft-computing" methods (neural networks, genetic algorithms, etc.) for data processing and optimization of the experimental setup in high energy physics experiments.

1.3.4 Radiocommunications Division

Head of Division

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Senior academic staff

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Jacek Wojciechowski, Prof. D.Sc., Professor

Tomasz Buczkowski, Ph.D., Assistant Professor

Henryk Chaciński, M.Sc., Senior Lecturer

Jacek Cichocki, Ph.D., Assistant Professor

Krzysztof Czerwiński, Ph.D., Assistant Professor

Krzysztof Derzakowski, Ph.D., Assistant Professor

Jacek Jarkowski, Ph.D., Assistant Professor (0.5)

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

Yevhen Yashchyshyn, Ph.D., Assistant Professor

Ph.D. students

Paweł Bajurko, M.Sc., from Oct. 2004

Piotr Bilski, M.Sc., to Sept. 2005

Grzegorz Bernatek, M.Sc., from Oct. 2004

Andrzej Dominik, M.Sc., from Oct. 2004

Damian Kolmas, M.Sc., from Oct. 2004

Arkadiusz Kurek, M.Sc., from Oct. 2002

Piotr Majchrzak, M.Sc., from Oct. 2002

Sławomir Rzeszowski, M.Sc., from Oct. 2005

Rafał Szumny, M.Sc., from Oct. 2002

Arkadiusz Trojanowski, M.Sc., from Oct. 2002

Konrad Wojdan, M.Sc., from Oct. 2005

Sebastian Wydra, M.Sc., from Oct. 2002

Technical staff

Anna Czarnecka, M.Sc., Senior R&D Engineer (0.4)

Jacek Jarkowski, Ph.D., Senior R&D Engineer (0.5), to Apr. 2005

Marek Marcinkowski, Senior Foreman

Stanisław Żmudzin, M.Sc., Senior R&D Engineer (0.25)

Retirements:

Stefan Hahn, Prof. D.Sc.,Tenured Professor

Waldemar Kiełek, D.Sc., Associate Professor

The teaching activities of the Radiocommunications Division are related to radiocommunication systems, antennae, signal processing, measurements in radiocommunications, and networks.

Research is focused on digital radio transmission problems and advanced computer science applications, radio systems design, particularly cellular and short range systems, radio transmitting and receiving, as well as ecological, medical and electromagnetic compatibility problems. Current research topics include:

- radiocommunication systems and networks – 2G (GSM), 3G (UMTS) and 4G (MBS) mobile systems, short range ISM systems (e.g. Bluetooth), Radio Frequency Identity Devices (RFID), ad-hoc networks, satellite systems, radio navigation systems, broadband access networks (LMDS, WLAN) and ultra-wideband systems (UWB);
- antennae and radio waves propagation – complex, intelligent antennae and control algorithms; scanning antennae, automatic measurements of near zone antenna characteristics, propagation channel modeling;
- radiocommunication measurements – radio spectrum monitoring methods and systems; radio devices testing methods and systems; measurement automation;
- radio frequency power devices – class D, DE, E and C resonant power amplifiers, linear wide-band short-wave amplifiers, low-noise amplifiers, microwave filters and phase shifters;
- a theory of signals and modulations – multidimensional Hilbert transform and its applications, using time-division to frequency division transformations for radio-frequency signal processing;

- advanced numerical methods – circuits and systems design and optimization;
- environmental and biological problems – an influence of radio communication systems on a human health and environment as well as on electronic equipment, protection zones planning.

1.3.5 Television Division

Head of Division

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Grzegorz Galiński, Ph.D., Assistant Professor

Krystian Ignasiak, Ph.D., Assistant Professor

Tomasz Krzymień, M.Sc., Senior Lecturer

Marek Rusin, Ph.D., Assistant Professor (0.5)

Ph.D. students

Stanisław Badura, M.Sc., from Oct. 2004

Krzysztof Kucharski, M.Sc., from Oct. 2002

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

Grzegorz Pastuszak, M.Sc., from Mar. 2003

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 2005 included:

- video and audio compression;
- intelligent multimedia systems;
- networked audiovisual systems for immersive environments;
- 3D object modeling;
- image indexing, multimedia database indexing;
- object tracking and recognition;
- motion analysis;
- selected topics in the design of cable television networks.

1.3.6 Digital Processing of Measurement Signals Group

Head of Group

Roman Z. Morawski, Prof. D.Sc., Professor
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Senior academic staff

Andrzej Miękina, Ph.D., Assistant Professor

Andrzej Podgórski, Ph.D., Assistant Professor

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 computer-aided spectrophotometry for 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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Kajetana Snopek, Ph.D., from Oct. 2005
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1.4.2 Engineering Evening Studies on Radiocommunications

Head

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Board of Consultants

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Sławomir Kula, Ph.D.

Krzysztof Kowalski, Ph.D.

Waldemar Radzikowski, Ph.D.

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Head

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

Head

Maciej Konwicki, M.Sc.
RADEM@ire.pw.edu.pl

Secretariat

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Józef Modelski, Prof. D.Sc., (chairman)

Andrzej Buchowicz, Ph.D.

Jacek Cichocki, Ph.D.

Sławomir Kula, Ph.D.

Marek Rusin, Ph.D.

Maciej Konwicki, M.Sc.

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1.5 Other Institute's Units

1.5.1 Library

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Janina Chmielak, Senior Technician

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[Edu63], [Edu66];
[MSc7];
[Pro1], [Pro25], [Pro27], [Pro36], [Pro38];
[Pub10], [Pub13], [Pub25], [Pub96], [Pub209], [Pub210], [Pub211], [Pub215], [Pub217], [Pub218], [Pub219], [Pub220], [Pub221].

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[Edu3], [Edu52], [Edu53], [Edu54], [Edu125], [Edu126];
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[Pub57], [Pub130], [Pub169].

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[MSc12], [MSc15], [MSc25], [MSc30];
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[Edu51], [Edu62], [Edu123], [Edu147], [Edu154], [Edu176];
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[Pro3];
[Pub203], [Pub204], [Pub205].

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[Pub29], [Pub30], [Pub113], [Pub114].

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[Edu16], [Edu46], [Edu60], [Edu93], [Edu174], [Edu175];
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[Pub38], [Pub103], [Pub107], [Pub120], [Pub164], [Pub176], [Pub184].

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[Pub37],[Pub38], [Pub66], [Pub73], [Pub120], [Pub131], [Pub133], [Pub136], [Pub176], [Pub177], [Pub195], [Pub196], [Pub197], [Pub207], [Pub208], [Pub223].

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[PhD2];
[MSc17];
[BSc21];
[Pro1], [Pro20], [Pro23], [Pro41], [Pro42];
[Pub18], [Pub26], [Pub32], [Pub55], [Pub101], [Pub121], [Pub122], [Pub181], [Pub182], [Pub183].

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M.Sc. ('78), Ph.D. ('01); medical and nuclear engineering; **Assistant Professor**, Nuclear and Medical Electronics Division;
Team award of the Rector ('05); Silver Order of Merit ('05);
[MSc24];

[Pro1], [Pro25], [Pro27], [Pro36], [Pro38];
[Pub10], [Pub25], [Pub96], [Pub209], [Pub210], [Pub211], [Pub212], [Pub213, [Pub214], [Pub215], [Pub218], [Pub219], [Pub220], [Pub221].

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M.Sc. ('75), Ph.D. ('83); measurement and instrumentation; **Assistant Professor**, Digital Processing of Measurement Signals Group;
[Edu7], [Edu8];
[BSc26];
[Pro6]; [Pro17].

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M.Sc. ('90), Ph.D. ('95), D.Sc. ('04); signal & image processing, data compression; **Associate Professor**, Nuclear and Medical Electronics Division;
[Edu42], [Edu44];
[BSc16], [BSc41];
[Pro1], [Pro26], [Pro39];
[Pub4], [Pub10], [Pub11], [Pub47], [Pub48], [Pub49], [Pub50], [Pub51], [Pub63], [Pub74], [Pub75], [Pub82], [Pub158], [Pub159], [Pub160], [Pub161], [Pub162], [Pub193], [Pub194], [Pub216].

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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 of the Blind ('95-);
[Edu33], [Edu117], [Edu134], [Edu154];
[MSc33];
[BSc30], [BSc60];
[Pro4];
[Pub163].

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M.Sc. ('96), Ph.D. ('01); medical and nuclear engineering; **Assistant Professor**, Nuclear and Medical Electronics Division;
[Pro21], [Pro39];
[Pub16], [Pub17], [Pub54], [Pub57], [Pub130], [Pub169].

Krzysztof Robaczyński
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M.Sc. ('69); microwave technique; **Senior Lecturer** (0.5), Microwave and Radiolocation Engineering Division;
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[Edu97].

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[Edu10], [Edu37];
[MSc13];
[Pub52], [Pub53].

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M.Sc. ('66), Ph.D. ('75); radiocommunications, television; **Assistant Professor** (0.5), Television Division;
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[Edu11], [Edu84];
[BSc52];

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M.Sc. ('72), Ph.D. ('77), D.Sc. ('94); Prof. Title ('03); informatics; **Professor**, Television Division, Head ('00-);
Member of the Faculty Council Committee on Academic Staff Development ('99-'05); Head of Multimedia Technical Committee no. 288 at Polish Committee for Standardization ('99-); ISO/S.C.29/WG11 (MPEG) expert ('00-); Convener of Media Processing Coordination Group for Networked Audiovisual Systems and Home Platforms of the 6th Framework Programme NAVSHP ('04-'05); Member of the Review Boards of: *IEEE Trans. On Pattern Analysis and Machine Intelligence, Pattern Recognition, Fundamenta Informaticae*; Golden Order of Merit ('05);
[Edu6], [Edu36], [Edu61], [Edu73];
[PhD5];
[BSc29];
[Pro10], [Pro14], [Pro40], [Pro44];
[Pub31], [Pub33], [Pub34], [Pub45], [Pub46], [Pub56], [Pub70], [Pub71], [Pub72], [Pub86], [Pub97], [Pub98], [Pub99], [Pub100], [Pub118], [Pub119], [Pub123], [Pub124], [Pub141], [Pub144], [Pub151], [Pub152], [Pub153], [Pub154], [Pub155], [Pub166], [Pub167], [Pub189], [Pub190], [Pub191], [Pub192], [Pub201], [Pub202].

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Team award of the Rector ('05);
[Edu27], [Edu41], [Edu88];
[BSc42], [BSc43];
[Pro1], [Pro18], [Pro28], [Pro39];
[Pub57], [Pub130], [Pub168], [Pub169].

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[Edu134];
[Pro3];
[Pub24], [Pub58], [Pub170].

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[Edu28];
[BSc44];
[Pro5].

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[Edu76];
[Pro1], [Pro18], [Pro28], [Pro39];
[Pub57], [Pub130], [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 ('05)
[Edu32], [Edu174], [Edu175];
[MSc9], [MSc45];
[BSc25];
[Pro2];
[Pub165], [Pub200].

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M.Sc. ('98), Ph.D. ('02); radio networks, heuristics methods, radiocommunications; **Assistant Professor**, Radiocommunications Division;
[Edu71];
[MSc3], [MSc8], [MSc31];
[Pub79], [Pub87], [Pub185].

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M.Sc. ('70), Ph.D. ('80); microwaves, computer engineering, measurements; **Assistant Professor**, Microwave and Radiolocation Engineering Division;
[Edu28];
[BSc28];
[Pro5];
[Pub93].

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M.Sc. ('75), Ph.D. ('86), D.Sc. ('03); measurement and instrumentation; **Professor** ('05-), Electroacoustics Division;
Vice-Dean for Scientific Affairs ('05-); Member of the Faculty Council Committee on Research ('02-'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-); Member of the Scientific Committee of the National Conference SP ('01-), 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-);
[Edu67], [Edu87], [Edu100];
[MSc18], [MSc29], [MSc35], [MSc43];
[BSc1], [BSc22];
[Pro8], [Pro16];
[Pub12], [Pub28], [Pub35], [Pub76], [Pub77], [Pub81], [Pub89], [Pub125], [Pub126], [Pub128], [Pub187], [Pub188].

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M.Sc. (electronics '66), M.Sc. (mathematics '75), Ph.D. ('76), D.Sc. ('89); Prof. Title ('02); signals and systems, radiocommunications, computer aided design, graphs and networks, mathematical methods in engineering; **Professor**, Radiocommunications Division;
Head of the Faculty Council Committee on Scientific Research ('02-'05); Member of the University Council Committee on Scientific Research ('02-'05); Member of the Circuit Theory and Signal Processing Section of the Electronics and Telecommunications Committee of the Polish Academy of Sciences ('97-); Member of the Scientific Committees of: the International Conference on Signals and Electronic Systems ('97-), Conference on Evolutionary Algorithms and Global Optimization ('97-); 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-), and WUT and Ohio University, USA ('97-); Adviser of Wydawnictwo Komunikacji i Łączności – a publishing house ('97-);
[Edu31], [Edu33], [Edu47], [Edu59], [Edu71], [Edu146];
[MSc3], [MSc8], [MSc41];
[Pro22];

[Pub60]; [Pub78], [Pub79], [Pub80], [Pub180], [Pub186], [Pub206].

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M.Sc. ('84), Ph.D. ('98); microwave technique; **Assistant Professor**, Microwave and Radiolocation Engineering Division;
[Edu2], [Edu70], [Edu140];
[MSc32], [MSc47];
[BSc5], [BSc54];
[Pro5], [Pro19], [Pro29], [Pro35], [Pro43], [Pro46];
[Pub61], [Pub62].

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M.Sc. ('79), Ph.D. ('86); antennae and antenna array; **Assistant Professor**, Radiocommunications Division;
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[Edu62], [Edu90], [Edu156];
[MSc34];
[BSc40], [BSc45];
[Pro12], [Pro24];
[Pub1], [Pub64], [Pub65], [Pub66], [Pub67], [Pub73], [Pub84], [Pub107], [Pub120], [Pub133], [Pub171], [Pub172], [Pub195], [Pub196], [Pub197].

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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-);
Head of the Warsaw Branch of Polish Society of Medical Physics ('01-); Head of the Dean's Financial Committee ('02-); Member of CERN ('89-); Member of the Faculty Council Committee on Faculty Organization ('05-); Member of the Senate Committee on Property and Finances ('05-); Member of the Board and Treasurer of the Polish Society of Medical Physics ('05-); Chairman of the Organizing Committee and Member of the Scientific Committee of the XIIIth Congress of the Polish Society of Medical Physics ('05-);
[Edu18], [Edu30], [Edu39];
[BSc31], [BSc35];
[Pro1], [Pro20], [Pro23], [Pro41], [Pro42];
[Pub7], [Pub8], [Pub9], [Pub18], [Pub32], [Pub55], [Pub121], [Pub122], [Pub181], [Pub182], [Pub183], [Pub208].

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

[Pro5], [Pro19];
[Pub2], [Pub20], [Pub21], [Pub40], [Pub90], [Pub91], [Pub92], [Pub139].

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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-);
[Edu35];
[Pro13];
[Pub68].

2.2 Junior academic staff and graduate trainees

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Aleksandra Młyńska, M.Sc., Assistant (0.5)
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Robert Łukaszewski, M.Sc., Assistant (to Sept. 2005)

Katarzyna Skrajnowska, M.Sc., Assistant (0.5)
(to Sept. 2005)

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

Ph.D. Student	*(tutor)*
Stanisław Badura, M.Sc.	*(W. Skarbek)*
Paweł Bajurko, M.Sc.	*(J. Modelski)*
Paweł Bargieł, M.Sc.*	*(A. Przelaskowski)*
Grzegorz Bernatek, M.Sc.*	*(J. Wojciechowski)*
Piotr Bilski, M.Sc.* (to Sept. 2005)	*(J. Wojciechowski)*
Piotr Boniński, M.Sc.	*(A. Przelaskowski)*
Marek Bury, M.Sc.	*(T. Morawski)*
Andrzej Dominik, M.Sc.	*(J. Wojciechowski)*
Michał Dziewiecki, M.Sc.	*(J. Marzec)*
Damian Kolmas, M.Sc.*	*(J. Modelski)*
Paweł Kopyt, M.Sc.*	*(W. Gwarek)*
Michał Kostrzewa, M.Sc.*	*(Z. Kulka)*
Wojciech Kozerski, M.Sc. (to Sept. 2005)	*(K. Zaremba)*
Sebastian Kozłowski, M.Sc.	*(T. Morawski)*
Krzysztof Kucharski, M.Sc.	*(W. Skarbek)*
Arkadiusz Kurek, M.Sc.	*(J. Modelski)*
Robert Kurjata, M.Sc. (to Sept. 2005)	*(Z. Pawłowski)*
Grzegorz Kustra, M.Sc. (to Sept. 2005)	*(Z. Kulka)*
Mariusz Leszczyński, M.Sc.*	*(W. Skarbek)*
Piotr Majchrzak, M.Sc.*	*(J. Modelski)*

Mariusz Mikołowicz, M.Sc.*	(Z. Kulka)
Aleksandra Młyńska, M.Sc.*	(Z. Kulka)
Artur Moryc, M.Sc.	(W. Gwarek)
Cezary Mróz, M.Sc.*	(A. Przelaskowski)
Mateusz Orzechowski, M.Sc. (to Sept. 2005)	(K. Zaremba)
Adam Padée, M.Sc.	(K. Zaremba)
Wojciech Padée, M.Sc.*	(K. Zaremba)
Grzegorz Pastuszak, M.Sc.	(W. Skarbek)
Dawid Rosołowski, M.Sc.	(T. Morawski)
Tymon Rubel, M.Sc.	(K. Zaremba)
Sławomir Rzeszowski, M.Sc.*	(J. Wojciechowski)
Marcin Stolarski, M.Sc.*	(W. Winiecki)
Robert Sulej, M.Sc.	(K. Zaremba)
Rafał Szumny, M.Sc.*	(J. Modelski)
Aneta Świercz, M.Sc.	(J. Żera)
Michał Tomaszewski, M.Sc.	(W. Skarbek)
Arkadiusz Trojanowski, M.Sc.	(J. Wojciechowski)
Artur Trybuła, M.Sc.	(J. Marzec)
Konrad Wojdan, M.Sc.	(J. Modelski)
Anna Wróblewska, M.Sc.	(A. Przelaskowski)
Sebastian Wydra, M.Sc.	(J. Wojciechowski)
Marcin Ziembicki, M.Sc.	(J. Marzec)

- without scholarship

2.4 Technical and administrative staff

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Jacek Jarkowski, Ph.D., Senior R&D Engineer (0.5)
to Apr. 2005

Maciej Konwicki, M.Sc., Head R&D Engineer (0.5)
to Dec. 2005
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Andrzej Laskowski, Worker
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Mirosław Lubiejewski, Foreman
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from Oct. 2005
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Ryszard Michnowski, M.Sc., Senior Devel. Eng. (0.5)
to Apr. 2005

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3   TEACHING ACTIVITIES (academic year 2004/2005)

3.1   Regular studies – Areas of Concentrations:

Radiocommunications and Multimedia Technologies

Head

Tadeusz Morawski, Prof. D.Sc., Tenured Professor
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Biomedical Engineering

Head

Zdzisław Pawłowski, Prof. D.Sc., Tenured Professor
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e-mail: Z.Pawlowski@ire.pw.edu.pl

3.1.1   Basic Courses

[Edu1]   *Basics of Electroacoustics* (Podstawy elektroakustyki – PEL); 3h/week; semester 6; A. Leszczyński.

[Edu2]   *Basics of High-Frequency Technique – Lab.* (Podstawy techniki w.cz. lab. – TWCZ); 2h/week; semester 4; W. Wojtasiak

[Edu3]   *Basics of Medical Imaging Techniques* (Podstawy technik obrazowania w medycynie – PTOM); 4h/week; elective; P. Brzeski.

[Edu4]   *Basics of Microelectronics* (Podstawy Mikroelektroniki – PMK); 2h/week; semester 6; T. Olszewski.

[Edu5]   *Basics of Microprocessor Technique* (Podstawy techniki mikroprocesorowej – TMIK); 4h/week; semester 5; K. Czerwiński, B. Konarzewski.

[Edu6]   *Basics of Multimedia Techniques* (Podstawy technik multimedialnych – PTMU); 3h/week; elective; W. Skarbek.

[Edu7]   *Basics of Programming I* (Podstawy programowania – PRM); 4h/week; semester 1; A. Podgórski.

[Edu8]   *Basics of Programming M* (Podstawy programowania – PRM); 4h/week; semester 1; A. Podgórski.

[Edu9]   *Basics of Radiocommunications* (Podstawy radiokomunikacji – PR); 2h/week; semester 4; T. Kosiło.

[Edu10]   *Basics of Radiolocation and Navigation* (Podstawy radiolokacji i radionawigacji – PRIR); 3h/week; elective; S. Rosłoniec.

[Edu11]   *Basics of Television* (Podstawy telewizji – POTE); 3h/week; semester 6; M. Rusin.

[Edu12]   *Broadcasting Systems* (Systemy radiofoniczne – SYR); 3h/week; semester 4; H. Chaciński.

[Edu13]   *Cable Television* (Telewizja przewodowa – TVP); 3h/week; elective; T. Krzymień.

[Edu14]   *Computer Systems* (Systemy komputerowe – SYKO); 3h/week; elective; T. Jamrógiewicz.

[Edu15]   *Detection of Nuclear and Biomedical Signals* (Detekcja sygnałów biomedycznych i jądrowych – DSBJ); 4h/week; semester 6; Z. Pawłowski.

[Edu16]   *Digital Audio Systems* (Foniczna technika cyfrowa – CSF); 3h/week; elective; Z. Kulka.

[Edu17]   *Digital Cellular Systems* (Cyfrowe systemy komórkowe – CSK); 3h/week; semester 6; J. Cichocki, J. Kołakowski.

[Edu18]   *Digital Circuits – Laboratory* (Układy logiczne; laboratorium – ULOGE); 2h/week; laboratory; semester 4; B. Konarzewski, K. Zaremba.

[Edu19]   *Digital Systems* (Układy cyfrowe – UCYF); 1h/week; semester 4; K. Mroczek.

[Edu20]   *Event Driven Programming* (Programowanie zdarzeniowe – PZDT); 3h/week; semester 4; K. Ignasiak.

[Edu21]   *Fields and Waves* (Pola i fale – POFA); 3h/week; semester 4; T. Morawski, W. Gwarek.

[Edu22]   *Introduction to Electronics, Informatics and Telecommunications* (Wstęp do elektroniki, informatyki i telekomunikacji – WEIT); 1h/week; semester 1; W. Gwarek.

[Edu23]   *Medical Electronic Instrumentation* (Elektroniczna aparatura medyczna – EAME); 4h/week; semester 5 – 6; L. Padée.

[Edu24]   *Multimedia Standards and Algorithms* (Algorytmy i standardy multimedialne – ASM); 3h/week; semester 6; G. Galiński.

[Edu25]   *Numerical Methods (*Metody numeryczne – MNM); 3h/week; semester 3; R. Z. Morawski.

[Edu26]   Numerical Methods – ENUME; 4h/week; semester 4; R. Z. Morawski (English-medium studies).

[Edu27]   *Object Oriented Programming M* (Programowanie obiektowe M – PROBI); 4h/week; semester 2; W. Smolik.

[Edu28]   *Operating Systems E* (Systemy operacyjne E – SOP); 1h/week; semester 5; M. Sypniewski, A. Więckowski.

[Edu29]   *Radiocommunication Systems* (Systemy radiokomunikacyjne – SRKO); 3h/week; semester 5; T. Kosiło.

[Edu30]   *Radiology and Nucleonics* (Radiologia z nukleoniką – RN); 3h/week; semester 5; K. Zaremba.

[Edu31]   *Signals and Systems* (Sygnały i Systemy – SYST); 4h/week; semester 3; J. Wojciechowski.

[Edu32]   *Sound Recording and Forming* (Odbiór i kształtowanie dźwięku – OKD); 3h/week; elective; M. Tajchert.

[Edu33] *Signals and Modulations* (Sygnały i modulacje – SYGM); 3h/week; semester 4; J. Wojciechowski, K. Radecki.

3.1.2 Advanced Courses

[Edu34] *Acoustic Protection of Environment* (Akustyczna ochrona środowiska – AOS); 3h/week; elective; E. Kotarbińska.

[Edu35] *Acoustics for Music* (Akustyka muzyczna – AM); 2h/week; elective; J. Żera.

[Edu36] *Adaptive Image Recognition* – EADIR; 4h/week; semester 6; W. Skarbek (English-medium studies).

[Edu37] *Analysis and Synthesis of Microwave Circuits* (Analiza i synteza układów mikrofalowych – ASUM); 3h/week; elective; S. Rosłoniec.

[Edu38] *Antennae and Radiowave Propagation* (Anteny i propagacja fal – AIPF); 3h/week; elective; J. Jarkowski.

[Edu39] *Artificial Neural Networks in Medicine* (Sztuczne sieci neuronowe w medycynie – SESN); 3h/week; elective; K. Zaremba.

[Edu40] *Basic Radio-frequency Circuits* (Podstawowe układy radioelektroniczne – PURAD); 3h/week; elective; J. Modzelewski, W. Kazubski.

[Edu41] *Computed Tomography* (Tomografia komputerowa – TOM); 4h/week; elective; W. Smolik.

[Edu42] *Computer Aided Medical Image Diagnostics* (Komputerowe wspomaganie obrazowej diagnostyki medycznej – KWOD); 3h/week; elective; A. Przelaskowski.

[Edu43] *Control and Measurement System Equipment* (Systemowe urządzenia pomiarowe i sterujące – SUPS); 4h/week; elective; K. Mroczek.

[Edu44] *Data Compression* (Kompresja danych – KODA); 3h/week; elective; A. Przelaskowski.

[Edu45] *Digital and Interactive Television* (Telewizja cyfrowa i interaktywna – TCI); 4h/week; elective; A. Buchowicz.

[Edu46] *Digital Audio Signal Processing* (Cyfrowe przetwarzanie sygnałów fonicznych – CPSF); 3h/week; elective; Z. Kulka.

[Edu47] *Digital Communications A* – EDICO; 4h/week; semester 5; J. Wojciechowski (English-medium studies).

[Edu48] *Digital Circuits* – EDC1; 2h/week; elective; P. Miazga (English-medium studies).

[Edu49] *Digital Image Processing* (Cyfrowe przetwarzanie obrazów – CPO); 4h/week; elective; M. Kazubek.

[Edu50] *Digital Processing of Measurement Signals* (Cyfrowe przetwarzanie sygnałów pomiarowych – CPSP); 3h/week; R. Z. Morawski.

[Edu51] *Digital Transmission of Information (Cyfrowa transmisja informacji – CTIN); 3h/week; elective; T. Buczkowski.*

[Edu52] *Diploma Seminar for Graduate Students* (Seminarium dyplomowe magisterskie – SDM1); 2h/week; P. Brzeski.

[Edu53] *Diploma Seminar for Graduate Students* (Seminarium dyplomowe magisterskie – SDM2); 2h/week; P. Brzeski.

[Edu54] *Diploma Seminar for Undergraduate Students* (Seminarium dyplomowe inżynierskie – SDI); 2h/week; P. Brzeski.

[Edu55] *Electromagnetic Compatibility* (Kompatybilność elektromagnetyczna – KE); 2h/week; elective; W. Gwarek.

[Edu56] *Electromagnetic Field Theory* (Teoria pola elektromagnetycznego – TPE); 4h/week; elective; T. Morawski.

[Edu57] *Evolutionary Algorithms* – EEVAL; 4h/week; elective; P. Miazga (English-medium studies).

[Edu58] *Fields, Waves and Antennae* – EFWA; 4h/week; elective; M. Celuch-Marcysiak (English-medium studies).

[Edu59] *Graphs and Networks* (Grafy i sieci – GIS); 2h/week; elective; J. Wojciechowski.

[Edu60] *High Quality Audio Equipment Construction* (Konstrukcja urządzeń audio wysokiej jakości – KUA); 2h/week; elective; Z. Kulka.

[Edu61] *Image and Audio Semantic Analysis (*Analiza semantyczna obrazu i dźwięku – ASOD); 3h/week; elective; W. Skarbek.

[Edu62] *Influence of Electromagnetic Waves on Living Organisms* (Oddziaływanie fal elektromagnetycznych na organizmy żywe – OFE); 2h/week; elective; Y. Yashchyshyn, M. Celuch-Marcysiak, T. Buczkowski.

[Edu63] *Information Techniques in Medical Image Diagnostics* (Techniki informacyjne w medycznej diagnostyce obrazowej – TIM); 4h/week; elective; P. Bogorodzki.

[Edu64] *Introduction to Medical Science* (Propedeutyka nauk medycznych – PNMED); 3h/week; elective; G. Pawlicki.

[Edu65] *Laboratory of Studial Audio Techniques* (Laboratorium dźwiękowej techniki studyjnej – LDTS); 1h/week; elective; M. Moraszczyk.

[Edu66] *Magnetic Resonance Imaging* (Tomografia rezonansu magnetycznego – TRM); 3h/week; elective; P. Bogorodzki.

[Edu67] *Measurement and Control Distributed Systems (Rozproszone systemy pomiarowo-kontrolne – RSPK); 3h/week; elective;* W. Winiecki.

[Edu68] *Measurement Data Analysis in Medicine* (Analiza danych pomiarowych w medycynie – ADP); 3h/week; elective; Z. Pawłowski.

[Edu69] *Methods and Algorithms for Processing of Measurement Signals* (Metody i algorytmy przetwarzania sygnałów pomiarowych – MAP); 3h/week; elective; A. Miękina.

[Edu70] *Microwave Technique* (Technika mikrofalowa – TMO); 4h/week; elective; W. Wojtasiak.

[Edu71] *Modern Heuristic Techniques* (Współczesne techniki heurystyczne – WMH); 4h/week; elective; Z. Walczak, J. Wojciechowski.

[Edu72] *Modern Microwave Applications* (Współczesne zastosowania mikrofal – WZM); 3h/week; elective; J. Modelski.

[Edu73] *Multimedia Indexing* (Indeksowanie multimediów – INM); 4h/week; elective; W. Skarbek.

[Edu74] *Multi-service and Multimedia Networks* – EMSMN; 4h/week; elective; T. Keller (English-medium studies).

[Edu75] *Noise and Electromagnetic Interference in Electronic Devices* (Szumy i zakłócenia w aparaturze elektronicznej – SZAE); 2h/week; elective; J. Marzec.

[Edu76] *Nuclear Medicine Techniques* (Techniki medycyny nuklearnej – TMN); 4h/week; elective; R. Szabatin.

[Edu77] *Object Oriented Programming of Distributed and Multimedia Applications in Java* (Java – obiektowe programowanie aplikacji rozproszonych i multimedialnych – OPA); 3h/week; elective; K. Ignasiak.

[Edu78] *Power Supply in Electronic Equipment* (Zasilanie urządzeń elektronicznych – ZUE); 3h/week; elective; M. Mikołajewski.

[Edu79] *Radioelectronic Measurements* (Miernictwo radioelektroniczne – MR); 3h/week; elective; J. Cichocki.

[Edu80] *Radio Networks and Systems* (Systemy i sieci radiowe – SISR); 3h/week; elective; T. Keller.

[Edu81] *Radio Transmitting Technique and its Applications* (Technika nadawania radiowego i jej aplikacje – TNR); 4h/week; elective; J. Modzelewski.

[Edu82] *Radiological Apparatus in Diagnostics* (Aparatura radiologiczna w diagnostyce – ARDM); 2h/week; elective; G. Domański.

[Edu83] *Satellite Communications* (Łączność satelitarna – ŁS); 3h/week; elective; J. Modelski, K. Kurek.

[Edu84] *Selected Problems of Modern Television* (Wybrane zagadnienia współczesnej telewizji – WZWT); 2h/week; elective; M. Rusin.

[Edu85] *Signal Processors and their Applications in Radiocommunications* (Procesory sygnałowe i ich zastosowanie w radiokomunikacji – PSZR); 4h/week; elective; K. Czerwiński.

[Edu86] *Signal Processors in Audio Techniques* (Procesory sygnałowe w technice audio – PSTA); 3h/week; elective; P. Bobiński.

[Edu87] *Software for Measuring Systems* (Oprogramowanie systemów pomiarowych – OSP); 4h/week; elective; W. Winiecki.

[Edu88] *Software for Medical Systems* (Oprogramowanie systemów medycznych – OSM); 3h/week; elective; W. Smolik.

[Edu89] *Technique of a Radio Signals Receiving* (Technika odbioru radiowego – TOR); 3h/week; elective; W. Kazubski.

[Edu90] *Theory and Designing of Antennae* (Teoria i projektowanie anten – TPA); 4h/week; elective; Y. Yashchyshyn.

[Edu91] *Ultrasonography Instrumentation* (Aparatura ultrasonograficzna – AUS); 3h/week; elective; L. Padée.

[Edu92] UMTS System (System UMTS – UMTS); 3h/week; elective; J. Kołakowski, J. Cichocki, S. Maszczyk.

3.2 Special courses

3.2.1 B.Sc. Evening Studies on Radiocommunications

[Edu93] *Acoustic Techniques* (Techniki dźwiękowe – TDRM); 30h/sem.; semester 7; Z. Kulka.

[Edu94] *Antennae* (Anteny – ANM); 30h/sem.; semester 4; H. Chaciński.

[Edu95] *Basics of Computer Techniques* (Podstawy techniki komputerowej – PTKRM); 70h/sem.; semester 1; T. Jamrógiewicz, J. Marzec.

[Edu96] *Basics of Fiberglass Technique* (Podstawy techniki światłowodowej – PTSRM); 45h/sem.; semester 3; L. Lewandowski.

[Edu97] *Basics of High-Frequency Techniques* (Podstawy techniki w.cz. – PTWM); 65h/sem.; semester 3; K. Robaczyński.

[Edu98] *Basics of Metrology* (Podstawy metrologii – PMEM); 40h/sem.; semester 1; J. Olędzki.

[Edu99] *Basics of Satellite Communications* (Podstawy łączności satelitarnej – SATM); 30h/sem.; semester 4; K. Kurek.

[Edu100] *Computer Control and Data Processing* (Komputerowe sterowanie i przetwarzanie danych – KSTR); 41h/sem.; semester 5; W. Winiecki.

[Edu101] *Circuits and Signals* (Obwody i sygnały – OSRM); 45h/sem.; semester 2; K. Czerwiński.

[Edu102] *Digital Signals Processing* (Cyfrowe przetwarzanie sygnałów – CPSWM); 42h/sem.; semester 4; J. Misiurewicz.

[Edu103] *Digital Signals Transmission* (Cyfrowa transmisja sygnałów – CTSM); 43h/sem.; semester 5; T. Kosiło.

[Edu104] *Diploma Seminar* (Seminarium dyplomowe – SDM); 10h/sem.; semester 6; J. Ebert.

[Edu105] *Diploma Seminar 2* (Seminarium dyplomowe 2 – SD2M); 20h/sem.; semester 7; J. Ebert.

[Edu106] *Economics and Accountancy* (Ekonomika i rachunkowość – ERM); 15h/sem.; semester 5; M. Holko.

[Edu107] *Electronic Circuits* (Układy elektroniczne – UEM); 42h/sem.; semester 3; D. Gryglewski.

[Edu108] *Emission and Receiving Technique* (Technika emisji i odbioru – TEM); 30h/sem.; semester 4; J. Modzelewski.

[Edu109] *English Language 1* (Język angielski 1 – JA1WR); 30h/sem., semester 6; W. Wanacki.

[Edu110] *English Language 2* (Język angielski 2 – JA1WR); 30h/sem., semester 6; W. Wanacki.

[Edu111] *Fields and Waves* (Pola i fale – PFRM); 72h/sem.; semester 2; T. Morawski.

[Edu112] *Imaging Techniques* (Techniki obrazowe – TORM); 30h/sem.; semester 7; M. Kazubek.

[Edu113] *Internet Techniques* (Techniki internetowe – TINM); 30h/sem.; semester 7; K. Ignasiak.

[Edu114] *Law in Telecommunications* (Prawo w telekomunikacji – PTR); 15h/sem.; semester 4; C. Woźniak

[Edu115] *Logical Circuits and Basics of Microprocessor Technique* (Układy logiczne i podstawy techniki mikroprocesorowej – PULM); 55h/sem.; semester 4; K. Czerwiński.

[Edu116] *Management and Marketing* (Zarządzanie i marketing – ZMR); 15h/sem.; semester 6; J. Szumigaj.

[Edu117] *Materials and Elements* (Materiały i elementy – MEM); 16h/sem.; semester 4; K. Radecki.

[Edu118] *Mathematics 1* (Matematyka 1 – MAT1M); 90h/sem.; semester 1; E. Stankiewicz-Wiechno.

[Edu119] *Mathematics 2* (Matematyka 2 – MAT2M); 90h/sem.; semester 2; G. Decewicz.

[Edu120] *Multimedia Applications* (Aplikacje multimedialne – AMRM); 15h/sem.; semester 5; K. Ignasiak.

[Edu121] *Multimedia Computer Systems* (Multimedialne systemy komputerowe – MSKM); 15h/sem.; semester 4; T. Jamrógiewicz, G. Galiński.

[Edu122] *Numerical Methods* (Metody numeryczne – MNRM); 35h/sem.; semester 3; A. Miękina.

[Edu123] *Programmable Digital Devices* (Programowalne układy cyfrowe – PUCM); 32h/sem.; semester 5; T. Buczkowski.

[Edu124] *Programming* (Programowanie – PMRM); 32h/sem.; semester 3; R.Kurjata.

[Edu125] *Project 1* (Projekt 1 – PJUM); 30h/sem.; semester 5; P. Brzeski.

[Edu126] *Project 2* (Projekt 2 – PSM); 60h/sem.; semester 6; P. Brzeski.

[Edu127] *Propagation of Waves* (Propagacja fal – PFAM); 16h/sem.; semester 4; J. Jarkowski.

[Edu128] *Psychology of Management* (Psychologia zarządzania – PZM); 15h/sem.; semester 7; T. Wojtowicz.

[Edu129] *Radiocommunication Systems 1* (Systemy radiokomunikacyjne 1 – SRKM); 54h/sem.; semester 6; T. Kosiło.

[Edu130] *Radiocommunication Systems 2* (Systemy radiokomunikacyjne 2 – SRK2M); 32h/sem.; semester 7; T. Kosiło.

[Edu131] *Radiodiffusion Systems* (Systemy radiodyfuzyjne – SRDM); 67h/sem.; semester 6; A. Buchowicz, H. Chaciński.

[Edu132] *Radioelectronic Measurements* (Miernictwo radioelektroniczne – MRM); 42h/sem.; semester 5; J. Cichocki.

[Edu133] *Semiconductor Devices* (Przyrządy półprzewodnikowe – PPRM); 45h/sem.; semester 2, A. Siennicki.

[Edu134] *Signals and Modulations* (Sygnały i modulacje – SMRM); 45h/sem.; semester 3; K. Snopek, K. Radecki.

[Edu135] *Solid State Physics* (Fizyka ciała stałego – FCSM); 42h/sem.; semester 1; J. Szmidt.

[Edu136] *Subscriber Access Systems* (Systemy dostępu abonenckiego – SDAM); 15h/sem.; semester 5; A. Kalinowski.

[Edu137] *Technique of Emission and Receiving* (Technika emisji i odbioru – TEM); 42h/sem.; semester 4; J. Modzelewski, W. Kazubski.

[Edu138] *Teletransmission Systems* (Systemy teletransmisyjne – SYTM); 30h/sem.; semester 5; S. Kula.

[Edu139] *Transmitters and Receivers Measurements* (Pomiary nadajników i odbiorników – PNOM); 32h/sem.; semester 7; J. Cichocki.

3.2.2 M.Sc. Evening Studies on Radiocommunications

[Edu140] *Analysis and Synthesis of Microwave Units* (Analiza i synteza układów mikrofalowych – ASUMW); 60h/sem.; semester 2; W. Wojtasiak.

[Edu141] *Computer Networks* (Sieci komputerowe – SCKW); 60h/sem.; semester 2; E. Śliwa.

[Edu142] *Computer Systems* (Systemy komputerowe – SMKW); 30h/sem.; semester 2; T. Jamrógiewicz.

[Edu143] *Data Bases* (Bazy danych – BDW); 45h/sem.; semester 3; R. Nowak.

[Edu144] *Designing of Radiocommunication Systems* (Projektowanie systemów radiokomunikacyjnych – PSRW); 60h/sem.; semester 3; T. Kosiło

[Edu145] *Designing of Telecommunication Networks* (Projektowanie sieci telekomunikacyjnych – PSTW); 60h/sem.; semester 3; P. Łubkowski.

[Edu146] *Digital Signals Processing* (Cyfrowe przetwarzanie sygnałów – CPSW); 75h/sem.; semester 1; J. Wojciechowski.

[Edu147] *Digital Transmission of Information* (Cyfrowa transmisja informacji – CTIW); 75h/sem.; semester 2; T. Buczkowski.

[Edu148] *Legal Regulations in Telecommunications* (Regulacje prawne w telekomunikacji – RPTW); 30h/sem.; semester 1; C. Woźniak.

[Edu149] *Noise and Electromagnetic Interference in Radioelectronics Devices* (Szumy i zakłócenia w aparaturze radioelektronicznej – SZRW); 30h/sem.; semester 1; J. Marzec.

[Edu150] *Problems with the Efficiency of Enterprise* (Problemy efektywności przedsiębiorczości – PEFW); 30h/sem.; semester 2; M. Holko.

[Edu151] *Programming in Java Language* (Programowanie w języku Java – PJJW); 45h/sem.; semester 1; K. Ignasiak.

[Edu152] *Radiocommunication Systems Design* (Projektowanie systemów radiokomunikacyjnych – PSRW); 60h/sem.; semester 3; T. Kosiło.

[Edu153] *Selected Branches of Mathematics* (Wybrane działy matematyki – WDMW); 75h/sem.; semester 1; W. Domitrz.

[Edu154] *Synchronization in Digital Radiocommunication Systems* (Synchronizacja w cyfrowych systemach radiokomunikacyjnych – SCRW); 30h/sem.; semester 3; K. Radecki, T. Buczkowski.

[Edu155] *Telecommunication Networks Design* (Projektowanie sieci telekomunikacyjnych – PSTW); 60h/sem.; semester 3; P. Łubkowski.

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

[Edu156] *Antenna Technologies* (Techniki antenowe); 6h, once a year, Y. Yashchyshyn.

[Edu157] *Digital Radiocommunication* (Radiokomunikacja cyfrowa); 14h, once a year, T. Kosiło, W. Kazubski, H. Chaciński.

[Edu158] *Digital TV* (Telewizja cyfrowa); 21h, once a year, A. Buchowicz, T. Keller.

[Edu159] *New Generation Networks NGN* (Sieci nowej generacji NGN); 12h; once a year, M. Bromirski, S. Kula.

[Edu160] *NGN Networks: Services and Applications* (Usługi i aplikacje sieci NGN); 18h, once a year, M. Bromirski.

[Edu161] *UMTS System* (System UMTS); 16h, twice a year, J. Cichocki, J. Kołakowski.

3.2.4 Studies on Audiological Techniques

The Studies on Audiological Techniques represent a series of courses: 187h, twice a year.

[Edu162] *Anatomy and Physiology of Hearing* (Anatomia i fizjologia słyszenia); 12h.

[Edu163] *Audiometry* (Audiometria); 32h.

[Edu164] *Aural Rehabilitation* (Rehabilitacja); 7h.

[Edu165] *Earmold Technics* (Wkładki douszne); 8h.

[Edu166] *Ear Pathology* (Patologia ucha); 9h.

[Edu167] *Elements of Psychology* (Elementy psychologii); 6h.

[Edu168] *Fundamentals of Acoustics* (Podstawy akustyki); 20h.

[Edu169] *Gesture Language* (Język gestów); 8h.

[Edu170] *Hearing Aid Fitting* (Dobór aparatów słuchowych); 41h.

[Edu171] *Hearing Aid Measurements* (Miernictwo aparatów słuchowych); 14h.

[Edu172] *Hearing Aid Technology and Elements of Electronics* (Technika aparatów słuchowych i elementy elektroniki); 30h.

[Edu173] *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)

[Edu174] *Fundamentals of Sound Technique* (Podstawy techniki dźwiękowej); 30h/semester; Z. Kulka, A. Leszczyński, M. Tajchert.

[Edu175] *Systems and Devices of Sound Technique* (Urządzenia i systemy techniki dźwiękowej); 30h/semester; Z. Kulka, A. Leszczyński, M. Tajchert.

3.3 International co-operation

[Edu176] **SOCRATES Programme: Higher Education, T. Kosiło**, T. Buczkowski,
1999 – 2005
In the frame of SOCRATES Institutional Contract two bilateral programs were realized: 1st – between the Institute of Radioelectronics of the Warsaw University of Technology and Katholieke Hogeschool Sint-Lieven, Gent, Belgium; 2nd – between the Institute of Radioelectronics of the Warsaw University of Technology and Insti-

tuto Superior Tecnico, Universidade Tecnica de Lisboa, Lisboa, Portugal.

In both cases Student Mobility actions were realized in the frame of Electronics and Telecommunication Engineering (Socrates code 06.05). The objective 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 (H. Kokoszkiewicz, R. Zubała); Poland – Belgium; two students for 4 months (J. Malesa, T. Tenderenda); In the Institute of Radioelectronics two students from Belgium (Sam Vandekerckhove and Thomas De Muynck) have presented the B.Sc. thesis: *"PC controlled 20 MHz direct digital synthesis module"*, tutors: Assist. Prof. W. Kazubski, Prof. P. Coussens (Sint-Lieven Hogeschool, Belgium).

[Edu177] **European Student Earth Orbiter (ESEO), K. Kurek**, Space Technology Student Group, 2004 – 2006

ESEO (European Student Earth Orbiter) is educational project of SSETI (Student Space Exploration and Technology Initiative). ESEO is a micro-satellite to Earth observation, designed, built and operated by students from European Universities, and it will be launched in 2006. Students from Space Technology Student Group joined to the project in 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 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.

[Edu178] In February 2005 prof. W. Gwarek and assistant prof. M. Celuch-Marcysiak run 20 hours graduate course on electromagnetic modeling at the ITESO University in Guadalajara, Mexico.

4 RESEARCH PROJECTS

4.1 Projects granted by the University

4.1.1 Statutory projects

[Pro1] **Modern Techniques in Nuclear and Medical Electronics** (Nowoczesne techniki elektroniki jądrowej i medycznej)
Krzysztof Zaremba, P. Bogorodzki, P. Brzeski, G. Domański, T. Jamrógiewicz, D. Janusek, M. Kazubek, B. Konarzewski, J. Marzec, T. Olszewski, Z. Pawłowski, E. Piątkowska-Janko, A. Przelaskowski, L. Padée, W. Smolik, R. Szabatin, P. Bargieł, R. Kurjata, M. Orzechowski, A. Trybuła, P. Boniński, T. Wolak, A. Wróblewska;
Jun. 17, 2004 – Sept. 30, 2005

Detection of ventricular arrhythmia threat indicators in ECG signal

Heart arrhythmia is one of the main reasons of death of patient with circulatory diseases. The investigation of T-wave alternans and late potentials are used for detection of ventricular arrhythmia threat. The properties of T-wave variability with attempt of its mechanism explanation were presented. The new method of arrhythmogenic non-concordant T-waves alternans detection (exploiting generalized likelihood ratio test and matched filters) were proposed. The diagnostic usefulness of this method was confirmed by simulation tests. For detection of ventricular late potentials the simple vector transformation of ECG signal were proposed. During tests the diagnostic usefulness of this method were comparable to Simson technique.

Sound delivery instrumentation for functional Magnetic Resonance Imaging of human auditory system

This work covers design and prototyping of sound delivery system for auditory stimulation in functional Magnetic Resonance Imaging. The whole system consist of the following parts: audio amplifier and "spdif" converter, dynamic audio converters Telephonic TDH-39N and pneumatic tubing (8mm) delivering sound to standard noise defenders (Husqvarna) made of all nonmagnetic parts and having excellent MRI scanner noise attenuation. A frequency attenuation characteristics was measured in International Center of Hearing with the aid of Universal Serial Bus (USB) connected SoundBlaster PC card. Prototype system was tested and evaluated in II Radiology Department of Warsaw Medical Academy on 1.5 T PHILIPS Gyroscan NT scanner.

Computer aided diagnosis in mammography: the influence of lossy compression on automatic pathology detection

The goal of our research was to optimize compression methods used in digital radiology. The verification of lossless compression methods for mammograms and other medical images (CT, USG, MRI, radiograms, scintigrams – about 1000 images) was performed. Performance of CALIC, JPEG2000, JPEG-LS, SPIHT, APT, JBIG, JB2 and other coders was evaluated. There was developed a new lossless compression method, dedicated to mammographic images (radiologic in general). We introduced different from classical compression paradigm, linking serialization, contextual binary modeling and binary coding. We found that, for archiving purposes, the best results were obtained with universal data coder featured by data model dependent on data characteristic (including image data). Moreover, the influence of loss compression on automatic micro-calcification detection effectiveness using JPEG-2000 coder and custom detection algorithm was evaluated. The experiments were in preliminary stage and got average acceptable bit rate ratio as 0.3 bpp.

Electrical tomography techniques in medicine and industry

The aim of the project was to elaborate, test and verify new measuring methods for Capacitance Tomography. Static and dynamic phantoms were constructed and appropriate measurements have been conducted. Software created enables modeling and counting of electric field distribution on the basis of finite elements technique.

[Pro2] **Design and Investigation of Electro-acoustics Measuring Systems and Digital Audio Signal Processing Systems** (Projektowanie i badania systemów elektroakustycznych oraz systemów cyfrowego przetwarzania sygnałów fonicznych)
Zbigniew Kulka, A. Leszczyński, M. Tajchert, P. Bobiński, E. Kotarbińska;
Jun. 17, 2004 – Sept. 30, 2005

The main aim of this project was to investigate the noise attenuation of hearing protectors in real world situations. The acoustic properties of ear-muffs were tested in laboratory conditions, according to standards requirements (PN-EN 24869-1, PN-EN 24869-3,) during the certification process of the product. In real world situation the noise attenuation of hearing protectors is lower than measured in diffused field in the laboratory. The investigations were carried on for ten popular models of ear-muffs. Four samples of each model were tested on four various noisy work-stands at Warsaw industrial plant. The measured data proved significant impact of the acoustic field on noise attenuation of ear-muffs. The highest observed difference between measured values for the tested ear-muffs at the various noisy work-stands was about 13 dB.

[Pro3] **Selected Problems of Local Wireless Networks** (Wybrane problemy sieci krótkiego zasięgu)
Tomasz Kosiło, S. Hahn, T. Buczkowski, J. Jarkowski, K. Czerwiński, W. Kazubski, K. Snopek;
Jun. 17, 2004 – Sept. 30, 2005

The work "Selected problems of local wireless networks" realized in Radiocommunications Division of Institute of Radioelectronics, WUT, contains study and analysis of up-today wireless local networks. The WiFi, WiMax and Bluetooth systems are developed and widely promoted. The need for new telecommunication services, new components and algorithms is growing fast. The study covers the following areas:
- new methods of theoretical description of signals in radio communication;
- review of new components and preparation of sample developments;
- selected problems of microwave part and antenna design.

[Pro4] **Ultra-wideband Signals – Sources and Methods of Testing** (Źródła sygnałów ultra-szerokopasmowych i metody ich badania)
Jacek Cichocki, J. Kołakowski, K. Radecki, S. Maszczyk, S. Żmudzin, D. Kolmas;
Jun. 17, 2004 – Sept. 30, 2005

The project covered several tasks concerning ultra-wideband technology. The analysis of standards issued in the USA and legal aspects of UWB introduction in Europe has been performed. Requirements concerning the source of ultra-wideband test signals have been established. A project resulted in development of two test sources. The first one can be used for generation of signals with pseudo-random spreading of the pulse position, The second source is able to generate signals with PPM modulation and TH-UWB multiple access. Signals from both sources have been investigated in time and frequency domains.

[Pro5] **Modeling Electromagnetic Fields and Design of Microwave Circuits** (Modelowanie pól i projektowanie wybranych układów mikrofalowych)
Tadeusz Morawski, W. Gwarek, M. Celuch-Marcysiak, T. Ciamulski, D. Gryglewski, M. Sypniewski, A. Więckowski, W. Wojtasiak, J. Zborowska, R. Michnowski, P. Kopyt, J. Rudnicki;
Jun. 17, 2004 – Sept. 30, 2005

Within this subject three tasks have been completed. The first one includes design of microwave system for scattering parameter measurements. The second one concerns extension of FDTD algorithms for lossy circuits and problems of cross-talks. The third one includes methods of microwave transistor power amplifiers. The results have been presented in 10 publications, including 2 IEEE papers and 2 IEEE conferences.

[Pro6] **Implementation and Investigation of Selected Algorithms for Interpretation of Measurement Data** (Realizacja i badanie wybranych algorytmów interpretacji danych pomiarowych)
Roman Z. Morawski, A. Miękina, A. Podgórski;
Jun. 17, 2004 – Sept. 30, 2005

The primary objective of the project is related to the methodology of design and implementation of algorithms for calibration of measurement channels and reconstruction of measurands (i.e. generalized quantities to be measured); the project is also aimed at upgrading the corresponding research infrastructure. The results of the project include: a systematic review of the design-and-implementation procedures of digital signal processing when applied to the measurement micro-systems; a new family of global-optimization-based algorithms for reconstruction of spectrum on the basis of data acquired by means of a mini-spectrophotometer, and some new algorithms and procedures for frequency-domain analysis of acoustic-range signals. The results of the research accomplished have been partially published in 3 papers.

[Pro7] **Optimization of h.f. Resonant Power Class DE Amplifier in Induction Heaters** (Optymalizacja rezonansowego wzmacniacza mocy wielkiej częstotliwości klasy DE do pracy w nagrzewnicy indukcyjnej)
Juliusz Modzelewski, J. Ebert, M. Mikołajewski;
Jun. 17, 2004 – Sept. 30, 2005

Induction heating is one of most commonly used technologies applied in metal foundries and the metal casting industry. One of the development directions in modern induction heaters relies on improving efficiency of transistorized h.f. power sources by introducing novel circuits and new semiconductors as well as by "fine-tuning" parameters of induction heaters to required characteristics of heating process. The main purpose of the grant was optimization of a transistorized h.f. resonant Class DE power amplifier for applications in induction heaters. Obtained theoretical results were utilized to create effective design procedures for Class DE amplifiers used in induction heating instruments. This enabled to design and successfully build an experimental induction heater delivering 1kW of output power. Selected problems of this research were presented at IVth National Conference of Electronics (KKE'05), Darłowo, Poland. Obtained results can be utilized to design and build circuits with higher output power (up to several kW), which will broaden the scope of their applications.

[Pro8] **Modern Methods of Computer Measuring Systems Designing** (Nowoczesne metody projektowania rozproszonych systemów pomiarowych)
Wiesław Winiecki, K. Mroczek, R. Łukaszewski, P. Bilski, T. Daniluk;
Jun. 17, 2004 – Sept. 30, 2005

The project concerns distributed measuring systems (DMS). The results of the project include: a systematic review of formal and non-formal methods of DMS designing; a new method of integration of platform-dependent instrument software drivers with platform-dependent measurement environments; a new adaptive method of data transmission with low-power AM-transmitters; new prospects of DMS using J2ME Mobile Phones; a new method of time optimization of soft real-time virtual instrumentation. The results of the research have been published in 11 papers.

[Pro9] **New Systems for Radio-navigation and Environment Monitoring** (Nowe systemy radionawigacyjne oraz monitoringu środowiska)
Józef Modelski, T. Keller, A. Kurek, R. Szumny, K. Kurek ;
Jun. 17, 2004 – Sept. 30, 2005

The work is concerned about analysis of modern radio-navigation systems designed for ensuring proper localization and navigation globally or within the network. Analysis of different radio- and satellite communication based systems were prepared with special attention paid on possibilities of using them for designing systems dedicated for blind people. There are also two localization and navigation systems based on GPS and dedicated for GSM network proposed with special features for blind users moving within the network.

[Pro10] **Network Multimedia Applications – Analysis and Design** (Multimedialne aplikacje sieciowe - analiza i projektowanie)
Władysław Skarbek, A. Buchowicz, K. Ignasiak, G. Galiński, K. Wnukowicz, S. Pastuszak, K. Kucharski, M. Tomaszewski;
Jun. 17, 2004 – Sept. 30, 2005

The multimedia search and retrieval application based on the J2EE architecture has been created in our previous project. The application uses MPEG-7 descriptors as a similarity measure in an image database search. The

database search time depends highly on the type of the descriptor. It is relatively short in the case of the Color Temperature descriptors for which database indexes can be used. However in the case of other descriptors, e.g. Dominant Color, such indexes can not be created be the database server and time consuming full search method must be used. The goal of the presented work is to create an index structure for the vector data, like Dominant Color descriptor. The literature studies have been conducted and the M-tree has been selected for the Dominant Color descriptor. The index structure based on the M-tree has been created for the existing application. The database search time has been reduced by approximately 50%. However the modified application requires more memory for and the number of concurrent queries processed be the application has been reduced.

4.1.2 Projects granted by the Rector

[Pro11] **Web-service and Interface for Remote Control of the CPLEX Solver on 64 bit Platform. Application of the Software for Simulation of Energy Market Behavior** (Opracowanie Web-serwisu oraz iterfejsów umożliwiających zdalny dostęp do programu optymalizacji (solvera) CPLEX firmy ILOG na platformie 64-bitowej. Wykorzystanie opracowanego oprogramowania do symulacji mechanizmów rynkowych rynku energii elektrycznej, w oparciu o dostępne modele)
Przemysław Miazga;
Mar. 3 – Dec. 31, 2005

The aim of the project was to design a web-service which may grant remote access to the linear/nonlinear optimization package (solver) Cplex from ILOG Ltd. The service consist of a client application with ASP interface and a server link. All parts had been designed with .NET technology (VS.NET 2003) on 64 bit platform. The grant had been worked out by the students from Innovative Information Technologies Group

4.1.3 Projects granted by the Dean

[Pro12] **Electrically Controlled Beam-steering Antennae** (Anteny z elektrycznym kształtowaniem charakterystyki kierunkowej – nowe możliwości)
Yevhen Yashchyshyn, J. Modelski, P. Bajurko;
May 6 – Dec. 31, 2005

Results of the investigation of the electrically controlled beam-steering antennae, which do not employ phase-shifters but developed new ferroelectric materials, surface PIN diodes and other electronic devices, have been summarized. The survey of the most important beam-steering antennae as well as the estimate of their usefulness has been done. There have been proposed concepts of a new type of the scanning antenna and electrically controlled antenna with reconfigurable aperture as well as methods of analysis and design. Very useful method of multi-null steering without using the phase-shifters has been also presented. Correctness of the presented concepts has been fully confirmed on the many experimentally developed models. Particularly attractive topics: the first known in the literature microwave scanning antennae on the developed ferroelectric ceramic-polymer composite substrate, antennae on the developed ferroelectric ceramic-polymer composite substrate, antennae with electrically

reconfigurable aperture on a semiconductor substrate as well as antennae with very effective multi-null steering. These antennae have been developed for different frequency bands, e.g. microwave and millimeter waves. Presented results permit to significantly extend the class of the electrically controlled beam-steering antennae. Especially important is, that the presented solutions do not need to employ relative expensive phase shifters.

[Pro13] **New Designing Methods of the Digital Interpolation Filters for the Musical Signals Playback Systems** (Nowe metody projektowania interpolacyjnych filtrów cyfrowych przeznaczonych do systemów odtwarzania sygnałów muzycznych)
Zbigniew Kulka, J. Żera, P. Nykiel;
May 6 – Dec. 31, 2005

The main goal of this project was to investigate how the performance of the low-pass digital interpolation filters influences the sound quality. Certain listening experience has shown that filters implemented as the poly-phase structures may not be time-invariant and may deteriorate perceived sound quality. Therefore, the emphasis will be placed on the time properties of these filters. Testing of interpolation filters used in playback systems will be conducted using the objective and subjective methods of assessment. As an outcome of the project new designing methods of interpolation filters and new test procedures will be proposed

[Pro14] **Facial Image Indexing by Face Components Method** (Indeksowanie obrazu twarzy metodą komponentów)
Władysław Skarbek, K. Kucharski;
May 6 – Dec. 31, 2005

In this research project a novel 2D face recognition method based on Dual LDA components is proposed and verified. Its main application concerns face indexing, hence the performance of face image retrieval, high speed of both the feature extraction and face descriptors matching and the compact size of the descriptor are the primary objectives. The output structure of the proposed method is shown to match MPEG-7 Advanced Face Recognition descriptor which is the state-of-the-art solution in face recognition aimed at face indexing. The usefulness of the Dual LDA component-based method is confirmed by embedding it into real-time face recognition system whose all relevant stages are also designed within this work.

[Pro15] **Electro-thermal Model of LDMOS Transistor** (Model elektrotermiczny tranzystora LDMOS)
Tadeusz Morawski, R. Michnowski;
May 6 – Dec. 31, 2005

A complete electro-thermal model for a high power microwave LDMOSFET has been developed. The temperature dependencies of the electro-thermal describing long-term as well as short-term thermal effects have been taken into consideration. The proposed model concept is based on solution of HCE equation by means of the 3D-FDTD (Finite Difference in Time Domain) thermal method. The thermal problem is solved in a thermal structure consisting of three regions: chip, flange and radiator, with thermal excitation inside the silicon beneath the metal top layer including gate, source and drain metalization. To excite the thermal structure, the dissipation power in the transistor determined by operating conditions of LDMOS-FET in power amplifier, which follow from DC-bias and RF

signal envelope, is applied. As a result, it obtains a transient temperature distribution in an active area of the transistor. The calculated transient temperature of the FET channel is substituted into the electrical part of the E-T model. The results of this work were be issued in some some research national and international conferences.

4.2 Projects granted by the Ministry of Science and Informatization (MNiI)

[Pro16] **The Use of Modern IT Technologies in Designing of Distributed Measurement Systems (DMS)** (Wykorzystanie nowoczesnych technologii komunikacyjnych i programowych w projektowaniu przewodowych i bezprzewodowych rozproszonych systemów pomiarowych)
Wiesław Winiecki, P. Bilski, P. Bobiński, T. Daniluk, H. Chaciński, R. Łukaszewski, M. Karkowski, T. Mielcarz, K. Mroczek;
Apr. 7, 2004 – Jul. 6, 2006

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 resolving such hardware and software problems as:

- making 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 of installation of dedicated measurement application on the client computer,
- expansion of measurement systems' application resulting from the usage of wireless communication,
- improvement of DMS reliability resulting from the correction of timing parameters specific to network and wireless systems.

Scientific target of this project was to develop a network/wireless DMS and to analyze methods taking advantage of modern wired and wireless communication technologies as well as software technologies. Engineering target 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 scientific and R&D laboratories.

[Pro17] **Methods and Algorithms for Interpretation of Signals Spectrum, Dedicated to Applications in Technological and Ecological Monitoring** (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

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.

[Pro18] **Capacitance Process Tomograph** (Pojemnościowy tomograf procesowy)
Roman Szabatin, P. Brzeski, J. Mirkowski, T. Olszewski, W. Smolik;
Oct. 15, 2003 – Oct. 14, 2005

The aim of the project was to elaborate, construct and verify an Electrical Capacitance Tomograph, of very high position resolution, which will be working in real time. As a result, images (2D or 3D) of gas and liquid flow will be presented.

[Pro19] **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

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 included in 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.

[Pro20] **New Methods of Imaging Quality Improvement in Applications of Optical Tomography for Anatomical and Functional Examinations** (Nowe metody poprawy jakości obrazowania w zastosowaniach tomografii optycznej do badań anatomicznych i czynnościowych)
Grzegorz Domański, Z. Pawłowski, K. Zaremba, J. Marzec, B. Konarzewski, A. Trybuła, R. Kurjata;
Oct. 22, 2003 – Oct. 21, 2005

The goal of the project was to elaborate the new methods of imaging quality improvement in medical applications of optical tomography. The methods of improvement are based on using anatomical and morphological a-priori information taken from other modalities (MRI, CT, USG). The further research contains designing of an model of optical tomograph dedicated to small organs and tissue perfusion examination.

[Pro21] **Hierarchical Statistics Modeling of Disease Process with Multiple Etiology** (Hierarchiczne modelowanie statystyczne procesu chorobowego o złożonej etiologii)
Dariusz Radomski, A. Jakubiak, M. Kazubek, J. Malejczyk, P. Roszkowski;
Nov. 5, 2003 – May 4, 2006

The goal of the realized grant was preparing 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 elaborated 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 was elaborated.

[Pro22] **Automatic System for the Technical Systems Diagnostics** (Automatyczny system diagnostyki systemów technicznych), Ph.D. Grant.
Jacek Wojciechowski, Piotr Bilski;
Apr. 1, 2005 – Apr. 1, 2006

The subject of the grant is to design of 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 tough sets, fuzzy logic and decision trees.

[Pro23] **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)
K. 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

Partially funded by the Establishment for Nuclear Equipment ZdAJ IPJ (grant celowy).

The aim of the project is to design and build a small-scale model of the measurement system which is intended to use 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.

[Pro24] **New Types 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

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).

[Pro25] **A 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. Gołębiewski, J. Walecki, W. Szeszkowski, M. Kazubek, E. Piątkowska-Janko, T. Wolak, T. Jamrógiewicz, M. Orzechowski, R. Kurjata;
May 24, 2005 – May 23, 2007

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

- Design of the new preprocessing algorithms for 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 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). Based 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 existing ones and with the gold standard provided by metabolic mapping, which is an order of magnitude more sensitive.
- 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.

[Pro26] **Wavelet-based Modeling of Diagnostic Information for Digital Radiography** (Modelowanie informacji istotnej diagnostycznie w dziedzinie przekształceń falkowych do zastosowań radiologii cyfrowej)
Artur Przelaskowski, P. Wojtaszczyk, J. Walecki, M. Biesiadko-Matuszewska, R. Sikora, E. Wesołowska, P. Surowski, A. Wróblewska, P. Bargieł, P. Boniński, M. Skaliński, E. Fabiszewska, A. Kukuła, K. Durasiewicz;
Mar. 17, 2005 – Dec. 16, 2006

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.

4.3 Other projects

[Pro27] **A Wireless Module Dedicated 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 goal 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.

[Pro28] **Elaboration of 32-channel Capacitance Tomograph** (Opracowanie 32-kanałowego tomografu pojemnościowego)
Roman Szabatin, P. Brzeski, J. Mirkowski, T. Olszewski, W. Smolik;
Dec. 1, 2004 – Mar. 15, 2005

Funded by the Technical University of Lodz (Politechnika Łódzka).

The aim of the project was to elaborate a new version of the capacitance tomograph. It can operate with the probes with different numbers of electrodes and different numbers of the planes e.g. 1x32, 2x16, 4x8, 1x12, 2x12 etc. Programming of the parameters as a time constant, amplification factor and configuration of the tomograph are possible on line.

[Pro29] **Elaboration and Construction of 4 Models of Switched Phase Shifter on Varactor Diodes** (Opracowanie i wykonanie 4 modeli przełączanego przesuwnika fazy na diodach waraktorowych)
Daniel Gryglewski, W. Wojtasiak, M. Lubiejewski;
Apr. 5, 2005 – Nov. 15, 2005

Funded by Telecommunications Research Institute (Przemysłowy Instytut Telekomunikacji).

The new version of switched phase shifter has been elaborated. The device was elaborated on varactor diodes. The goal of the work is to develop the main electronics modules of the shifter.

[Pro30] **Acoustic and Electroacoustic Measurements of Noise Emitted by Computer Systems** (Pomiary akustyczne i elektroakustyczne dźwiękowych urządzeń komputerowych)
Zbigniew Kulka, R. Smoliński;
Aug. 1, 2004 – May. 30, 2005

Funded by Axel Springer Ltd.

The aim of the work was to use advanced electroacoustic measuring systems to the evaluation of the noise level, which was emitted by different computer systems.

[Pro31] **Expertise of Radio Networks for Vision Monitoring System to Data Transmission in the Area of Town Districts** (Ekspertyza sieci radiowej dla potrzeb systemu monitoringu wizyjnego która umożliwia transmisję danych na terenie dzielnic)
Tomasz Kosiło, H. Chaciński, W. Kazubski;
Jun. 14 – Jun. 24, 2005

Funded by the municipal city of Warsaw (Miasto Stołeczne Warszawa)

In the frames of this work a project of wireless access network for the local administration was prepared. The network will be an addition to the existing internal network serving the telecommunication needs of local administration.

[Pro32] **Electroacoustic Measurements of Noise Emitted by Helicopter during its Starts and Landing on the Landing Field of the National Security Office** (Wykonanie pomiarów środowiskowych hałasu powodowanego przez start i lądowanie śmigłowca na lądowisku na dachu Biura Bezpieczeństwa Narodowego)
Zbigniew Kulka;
Jun. 14 – Jun. 25, 2005

Funded by Administrative – Economic Office of the Chancellery of the President of the Republic of Poland (Biuro Administracyjno-Gospodarcze Kancelarii Prezydenta RP).

The electroacoustic measurements of noise emitted by bell 412 HP helicopter during his starts and landings on the landing field of the National Security Office have been made. The purpose of the noise measurements was verification of compatibility with the requirements of the Disposition of Minister of Environment regarding admissible levels of noise in environment.

[Pro33] **Future Generation Radiocommunication Systems** (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 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)

[Pro34] **Methodology of CDMA 2000 and GSM 900 Stations Compatibility Investigations** (Opracowanie metodyki badania kompatybilności stacji systemu CDMA 2000 i GSM 900)
Jacek Cichocki;
Aug. 13 – Aug. 31, 2005

Funded by the Office of Telecommunications and Post Regulation (Urząd Regulacji Telekomunikacji i Poczty.)

The Institute of Radioelectronics has no responsibility for obtaining any intellectual property rights of issued results to be performed.

[Pro35] **IRT 2000 System Conversion from 2.4 GHz to 3.5 GHz** (Wykonanie konwersji systemu IRT 2000 z pasma 2,4 GHz do pasma 3,5 GHz)
Wojciech Wojtasiak;
Oct. 20 – Dec. 14, 2005

Funded by the Regional Telecommunications Networks (Regionalne Sieci Telekomunikacyjne "EL-Net" S.A.).

Details of the project cannot be published due to non-disclosure agreement with contractor.

4.4 International co-operation

In the year 2005 Prof. W. Gwarek, acting as a Distinguished Lecturer of IEEE, has run several lectures in cities around the world. This included: Guadalajara (Mexico), Houston (TX, USA), Bergen (Norway), Montreal (Canada), Halifax (Canada), Toronto (Canada), Wrocław (Poland) and Nanjing (China).

[Pro36] **Optimization of Image Flow Geometry Based on 3D Blood Vessels Image** (Optymalizacja geometrii obrazowania przepływu krwi na podstawie obrazu 3D naczyń krwionośnych)
Ewa Piątkowska-Janko, P. Bogorodzki, P. Bargieł, M. Orzechowski,
POLONIUM 2003, Polish – French Integrated Activities (Polsko – Francuskie Działania Zintegrowane);
Jan. 1, 2003 – Jan. 1, 2005

The purpose of this scientific project was to study the feasibility of automated 3D image-based determination of a plane perpendicular to one or several blood vessels (co-operation with group from CREATIS, CNRS 5515 and INSERM U630 Research Unit, Lyon, France).

[Pro37] **Characterization of Microwave Cavities with Closely Spaced Modes** (Problem wielokrotnego rezonansu w czasie grzania mikrofalowego małych pakietów żywności)
Małgorzata Celuch-Marcysiak, M. Żukociński,
Funded by Industrial Partner, USA;
Mar. 30, 2004 – Jul. 1, 2005

Details of the project cannot be published due to non-disclosure agreement with contractor.

[Pro38] **Screening of Cardiovascular Systems Based on Multi-Parameter Analysis** (System do badań przesiewowych układu sercowo-naczyniowego bazujący na wieloparametrowej analizie hemodynamiki serca i perfuzji naczyniowej w wybranych obszarach ciała)
Ewa Piątkowska-Janko, P. Bogorodzki, T. Wolak, M. Orzechowski;
EUREKA – CAVASCREEN, Project No. 2939 – SPUB (Partially funded by MNiI); ;
Jan. 1, 2003 – Jan. 1, 2006

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.

[Pro39] **Electrical Tomography for Biotechnological Applications** (Tomografia pojemnościowa w zastosowaniach biotechnologicznych)
Roman Szabatin, A. Pląskowski, P. Brzeski, J. Mirkowski, W. Smolik, T. Olszewski, D. Radomski, A. Przelaskowski;
British-Polish Research Partnership Programme (Partially funded by MNiI);
Jan. 1, 2003 – Jan. 1, 2005

Collaboration between UMIST (University of Manchester, Institute of Science and Technology) and the Institute of Radioelectronics of the Warsaw University of Technology has been established on the basis of common interest in biotechnological applications of Electrical Tomography. Results of research projects conducted separately have been presented. The exchange of young scientists between two centers, as well as the main thesis of the common project were suggested.

[Pro40] **Networked Audiovisual Media Technologies** (Audiowizualne sieciowe systemy hybrydowe)
Władysław Skarbek, K. Ignasiak, A. Buchowicz, G. Galiński, K. Kucharski, K. Wnukowicz, M. Tomaszewski, M. Morgoś, S. Badura, M. Leszczyński;
Network of Excellence, VISNET, 6th Framework Programme (Partially funded by MNiI);
Dec. 1, 2003 – Nov. 11, 2005

The aim of the project is the creation and coding of audiovisual material taking into regard hybrid character of the mentioned material, as well as to their storage and transmission in heterogeneous networks.

[Pro41] **COMPASS Experiment at CERN – Development of the Spectrometer and the Data Acquisition and Analysis** (Eksperyment COMPASS w CERN – rozbudowa spektrometru oraz zbieranie i analiza danych doświadczalnych)
Krzysztof Zaremba, J. Marzec, Z. Pawłowski, G. Domański, B. Konarzewski, A. Padée, R. Sulej, M. Ziembicki;
Funded by MNiI;
Jan. 1, 2004 – Dec. 31, 2006

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. In the frames of a new programme the team from the Institute of Radioelectronics is responsible (together with the Sołtan Institute of Nuclear Studies) for the design and production of a new plane, based on the scintillating fibers, for the Beam Momentum Station. The Institute is also involved in the applications of the "soft computing" methods (neural networks, genetic algorithms, etc.) in the experimental data analysis.

[Pro42] **Design and Construction of a Prototype of a Transition Radiation Detector for the Compressed Baryonic Matter Experiment at GSI Darmstadt** (Projekt i konstrukcja prototypu detektora promieniowania przejścia dla eksperymentu "Compressed Baryonic Matter" w GSI Darmstadt)
Krzysztof Zaremba, J. Marzec, Z. Pawłowski, G. Domański, B. Konarzewski, M. Ziembicki, W. Padée;
INTAS – SPUB;
Jan. 1, 2004 – Apr. 30, 2005

The main objectives of the project are related to the design of the detector for the Transition Radiation Tracker for the CBM (Compressed Baryonic Matter) experiment, which is being prepared in the frames of the challenging FUTURE project in GSI (Gesellschaft für Schwerionenforschung): an international accelerator facility for beams of ions and antiprotons. The team from the Institute of Radioelectronics has prepared and submitted, together with few other laboratories from Russia and Germany, a proposal of the detector based on the straw tubes, as well as the appropriate read-out electronics.

[Pro43] **Integrating and Strengthening the European Research Area** (Integrowanie i wzmacnianie europejskiej przestrzeni badawczej)
Jacek Jarkowski, W. Wojtasiak, D. Gryglewski, R. Michnowski;
Network of Excellence, TARGET, 6th Framework Programme (Partially funded by MNiI);
Jan. 1, 2004 – Jan. 1, 2008

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, of the characterization and simulation of materials and devices, of amplifier design and linearisation, and in the field of broadband transmitter system design shall attain a leading role in the world.

[Pro44] **Development and Implementation of Advanced Face Recognition and Certain Image Processing Techniques** (Opracowanie i implementacja zaawansowanych technik rozpoznawania twarzy i wybranych technik przetwarzania obrazów)
Władysław Skarbek, G. Galiński, S. Badura, K. Kucharski, K. Wnukowicz;
Founded bu Mitsubishi Electric Information Technology Center Europe;
Dec. 1, 2004 – Mar. 25, 2005

The key objective of the project that started on 1st December 2004 is to develop and implement a set of tools and algorithms in the fields of face recognition and image processing.

[Pro45] **Wireless Data Collecting** (Bezprzewodowe zbieranie danych)
Wojciech Gwarek, P. Kopyt, P. Węgrzyniak, M. Krok;
WISE, 6th Framework Programme (Partially funded by MNiI);
Jan. 1, 2005 – Dec. 31, 2007

Integrated Wireless Sensing (WISE) is an 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 concerned with 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.

[Pro46] **Industrial Project for Partner from Sweden** (Projekt przemysłowy dla partnera ze Szwecji)
Wojciech Gwarek, W. Wojtasiak, R. Michnowski, D. Gryglewski, P. Kopyt;
Funded by Industrial Partner, Sweden
Dec. 15, 2004 – Jun. 30, 2005

Details of the project cannot be published due to non-disclosure agreement with contractor.

5 TITLES AND DEGREES AWARDED

5.1 Ph.D. Degrees

[PhD1] Tomasz Ciamulski: "*Eliminacja przesłuchów w wieloprzewodowych liniach transmisyjnych*" (Elimination of cross-talk in multi-conductor transmission lines), Prof. **W. Gwarek** (tutor), Warsaw, Jun. 28, 2005.

[PhD2] Dariusz Janusek: "*Optymalizacja aparatury, metod rejestracji i wykrywania zmienności załamka T w elektrokardiogramach*" (Optimization of the measurement apparatus, recording methods and T wave alternans detection in ECG), Tenured Prof. **Z. Pawłowski** (tutor), Warsaw, Dec. 6, 2005.

[PhD3] Marian Oziewicz: "*Metoda estymacji parametrów ścieżek sygnału OFDM z podnośnymi pilotowymi w bezprzewodowym kanale wielodrogowym*" (Method of estimation for OFDM signal trace parameters with pilot lifts in wireless multi-road channel), Tenured Prof. **J. Modelski** (tutor), Warsaw, May 17, 2005.

[PhD4] Marcin Piasecki: "*Badanie systemu anteny inteligentnej sterowanej z wykorzystaniem algorytmu genetycznego*" (Improved model of adaptive antenna controlled by means of genetic algorithm), Tenured Prof. **J. Modelski** (tutor), Warsaw, May 10, 2005.

[PhD5] Karol Wnukowicz: "*Indeksowanie obrazów techniką temperatury barwowej*" (Image indexing by color temperature technology), Prof. **W. Skarbek** (tutor), Warsaw, Jun. 7, 2005.

5.2 M.Sc. Degrees

[MSc1] Jarosław Antoniuk: "*Integration of micro-strip patch antennae into laptop computer*", Prof. **W. Gwarek** (tutor), (5).

[MSc2] Jakub Piotr Antoszewski: "*Realizacja efektów dźwiękowych z wykorzystaniem procesora SHARC*" (Implementation of sound effects on SHARC ADSP-21065L digital signal processor), Prof. **Z. Kulka** (tutor), (4.5).

[MSc3] Sławomir Bednarczyk (co-author: Tomasz Ciosek): "*Analiza struktury sieci bezskalowej na podstawie sieci www*" (The analysis of scale-free network based on world-wide web), Prof. **J. Wojciechowski** / Assist. Prof. **Z. Walczak** (tutors), (5).

[MSc4] Przemysław Bilski: "*Telemedyczna opieka domowa – aplikacja sieciowa*" (Tele-home-care system – network application), Senior Lecturer **T. Jamrógiewicz** (tutor), (4,5).

[MSc5] Marcin Bochyński: "*Opracowanie oprogramowania do analizy sygnalizacji GSM w systemie PICONODE*" (Software for analysis of GSM signaling in PICONODE system), Assist. Prof. **J. Cichocki** (tutor), (5).

[MSc6] Albert Brzozowski: "*Wpływ emisji ultraszerokopasmowych (UWB) na jakość odbioru sygnałów z cyfrowymi modulacjami fazy*" (Influence of ultra-wideband signals on the quality of reception of signals with digital modulation), Assist. Prof. **J. Kołakowski** (tutor), (4.5).

[MSc7] Marcin Bugaj: "*System monitorowania procesu produkcji sklejki drukarskiej*" (System for monitoring the glue hardening process in plywood), Assist. Prof. **P. Bogorodzki** (tutor), (4).

[MSc8] Tomasz Ciosek (co-author: Sławomir Bednarczyk): "*Analiza struktury sieci bezskalowej na podstawie sieci www*" (The analysis of scale-free network based on world-wide web), Assist. Prof. **Z. Walczak** / Prof. **J. Wojciechowski** (tutors), (5).

[MSc9] Marcin Czubaszek: "*Miernik wysterowania sygnałów fonicznych*" (Peak programme level meter), Assist. Prof. **M. Tajchert** (tutor), (5).

[MSc10] Marcin Dubyk (co-author: Arkadiusz Włodarczyk): "*Java w zastosowaniach internetowych. Serwer aplikacyjny – kontener serwletów – implementacja*" (JAVA in web applications – application server – server container – implementation), Assist. Prof. **K. Ignasiak** (tutor), (4.5).

[MSc11] Michał Dziewiecki: "*Komory proporcjonalne z odczytem padowym*" (Proportional chambers with pad readout), Assoc. Prof. **J. Marzec** (tutor), (5).

[MSc12] Andrzej Gładkowski: "*Metody optymalizacji i zwiększenia wydajności aplikacji bazujących na technologii I2EE*" (Optimization and efficiency increasing methods of Internet applications based on I2EE technology), Assist. Prof. **A. Buchowicz** (tutor), (4).

[MSc13] Michał Grabowski: "*Wieloelementowa szczelinowa antena do urządzeń nadawczo-odbiorczych wykorzystywanych w lokalnych systemach łączności (DECT)*" (Multi-slot array antenna for broadcasting devices using in local communication systems), Prof. **S. Rosłoniec** (tutor), (5).

[MSc14] Michał Gronowski: "*System wizualizujący pracę radiokomunikacyjnych obiektów nadawczych*" (System for visualization of radiocommunication transmitting objects), Assist. Prof. **K. Ignasiak** (tutor), (5).

[MSc15] Paweł Gronowski: "*Aplikacja do wyznaczania miar jakości obrazów i sekwencji obrazów*" (Software application for image quality assessment), Assist. Prof. **A. Buchowicz** (tutor), (4.5).

[MSc16] Przemysław Iskrzak: "*Pomiary sygnałów łącza radiowego systemu UMTS – tryb FDD*" (Measurements of air-interface signals in UMTS system (FDD Mode)), Assist. Prof. **J. Cichocki** (tutor), (5).

[MSc17] Robert Daniel Jakubowski: "*Metody selekcji genów w badaniach z użyciem mikromacierzy DNA*"

(Gene selection methods for experiments with DNA microarrays), Tenured Prof. **Z. Pawłowski** (tutor), (5).

[MSc18] Konrad Karpowicz (co-author: Radosław Waśkie-wicz): "*Modelowanie systemów pomiarowych z wykorzystaniem sieci Petriego*" (Measurement systems modeling using Petri nets), Prof. **W. Winiecki** (tutor), (5).

[MSc19] Paweł Wojciech Kiliszek: "*Telefon GSM z funkcją korekcji mowy*" (GSM telephone with the speech correction function), Assist. Prof. **T. Buczkowski** (tutor), (5).

[MSc20] Grzegorz Kłos: "*Generator sygnału CDMA na pasmo 700 MHz ÷ 3 GHz*" (The design of a lab CDMA generator (IS-95 standard) in range of frequency from 700 MHz to 3 GHz), Assist. Prof. **D. Gryglewski** (tutor), (5).

[MSc21] Hubert Kokoszkiewicz: "*MIMO geometrically based channel model*", Prof. **L. Correia**, Assist. Prof. **J. Kołakowski** (tutors), (5). M.Sc. thesis has been elaborated in Instituto Superior Tecnico, Lisboa, Portugal.

[MSc22] Radosław Kordziukiewicz: "*Oprogramowanie narzędziowe do testowania algorytmów rekonstrukcji w tomografii emisyjnej*" (The software tool for testing reconstruction algorithms in emission tomography), Assist. Prof. **P. Brzeski** (tutor), (4.5).

[MSc23] Marcin Kowalik: "*Analiza wydajności dostępu do relacyjnych baz danych w aplikacjach I2EE*" (Performance analysis of access to relational databases in I2EE applications), Assist. Prof. **K. Ignasiak** (tutor), (5).

[MSc24] Paweł Kozioł: "*Wyznaczanie parametrów przebiegu elektrokardiograficznego przy zastosowaniu transformaty falkowej*" (Detection of high-resolution ECG characteristic points using wavelet transforms), Assist. Prof. **E. Piątkowska-Janko** (tutor), (4.5).

[MSc25] Dorota Monika Krzemińska: "*Miary jakości sekwencji obrazów cyfrowych – implementacja wybranych metod w środowisku Java*" (Digital image sequences quality measurement software implementation of chosen methods), Assist. Prof. **A. Buchowicz** (tutor), (4).

[MSc26] Sebastian Kupsz: "*Pulsoksymetr reflektancyjny*" (Reflectance pulse oximeter), Assist. Prof. **G. Domański** (tutor), (5).

[MSc27] Agata Latała: "*Weryfikacja systemu do planowania leczenia posługującego się techniką IMRT*" (The verification of the IMRT treatment planning system), Assist. Prof. **A. Miękina** (tutor), (5).

[MSc28] Tomasz Lemiech: "*Sieć dystrybucji treści jako metoda poprawy jakości dostępu do zasobów www*" (Content delivery network – a method for improving www access performance), Assist. Prof. **K. Ignasiak** (tutor), (5).

[MSc29] Artur Łaszczych: "*Rozproszony system pomiarowy z wykorzystaniem Microsoft.NET*" (Distributed measuring system with the use Microsoft.NET), Prof. **W. Winiecki** (tutor), (5).

[MSc30] Andrzej Malec: "*Pomiary parametrów strumienia transportowego MPEG-2/DVB*" (The measurement of transport stream MPEG-2/DVB parameters), Assist. Prof. **A. Buchowicz** (tutor), (4.5).

[MSc31] Leszek Moszczyński: "*Analiza wpływu sieci na routing w bezprzewodowych sieciach ad hoc*" (Analysis of network models influence on routing in wireless ad hoc networks), Assist. Prof. **Z. Walczak** (tutor), (5).

[MSc32] Adam Nikiciuk: "*Quasi-nieliniowy model tranzystora MESFET dużej mocy*" (Quasi-nonlinear high power MESFET transistor model), Assist. Prof. **W. Wojtasiak** (tutor), (4.5).

[MSc33] Robert Nowak: "*Układ nadawczy i odbiorczy ASK w paśmie 433 MHz do systemu informacji dla osób niewidomych*" (433 MHz ASK transmitter/receiver for the blind people information system), Assist. Prof. **K. Radecki** (tutor), (4.5).

[MSc34] Szymon Błażej Panasewicz: "*Opracowanie i badania miniaturowej anteny szerokopasmowej*" (Study and research of miniature broadband antenna), Assist. Prof. **Y. Yashchyshyn** (tutor), (4.5).

[MSc35] Arkadiusz Prus: "*Rozproszony system pomiarowy z transmisją bezprzewodową WIFI i GSM z wykorzystaniem modułu FIELDPOINT oraz bazy danych MYSQL*" (Distributed measuring system with the GSM and wireless broadcast based on the field point module and MYSQL data base), Assist. **R. Łukaszewski** / Prof. **W. Winiecki** (tutors), (4.5).

[MSc36] Marcin Przymus: "*Badanie anteny logarytmicznie periodycznej (LPDA)*" (Research of logarithmic periodic (LPDA) dipole antenna), Assist. Prof. **J. Jarkowski** (tutor), (4.5).

[MSc37] Tomasz Radzicki: "*System zdalnego nadzoru pacjenta wykorzystujący technologię GPRS*" (Patient's supervisory system using GPRS technology), Senior Lecturer **T. Jamrógiewicz** (tutor), (5).

[MSc38] Arkadiusz Rogalski: "*Łącze radiowe w paśmie ISM. Budowa i oprogramowanie*" (Radio link connection in ISM band. Software and development), Assist. Prof. **T. Kosiło** (tutor), (5).

[MSc39] Dawid Wilhelm Rosołowski: "*Konwersja pasm 2,4 – 3,5 GHz w systemach bezprzewodowych pętli abonenckich (A9800 i IRT2000)*" (2.4 – 3.5 GHz conversion for FDD A9800 and IRT2000 systems), Assist. Prof. **D. Gryglewski** (tutor), (5).

[MSc40] Piotr Sitek: "*System lokalizacji kapsuły kosmicznej. Podsystem odbiorczy*" (System for localization of satellite capsule. Receiving subsystem), Assist. Prof. **K. Kurek** (tutor), (5).

[MSc41] Katarzyna Szkup: "*Modelowanie i analiza sieci bezskalowych*" (Analysis and modeling of scale-

free networks), Prof. **J. Wojciechowski** (tutor), (4.5).

[MSc42] Artur Toczyłowski: "*Układ do pomiaru charakterystyk termicznych mikrofalowych tranzystorów mocy typu MESFET*" (Thermal response measurement system for microwave MESFET transistors), Assist. Prof. **D. Gryglewski** (tutor), (5).

[MSc43] Radosław Waśkiewicz (co-author: Konrad Karpowicz): "*Modelowanie systemów pomiarowych z wykorzystaniem sieci Petriego*" (Measurement system modeling using Perti nets), Prof. **W. Winiecki** (tutor), (5).

[MSc44] Arkadiusz Włodarczyk (co-author: Marcin Dubyk): "*Java w zastosowaniem internetowych. Serwer aplikacyjny – kontener serwerów – implementacja*" (Java in web applications. Application server – server container – implementation), Assist. Prof. **K. Ignasiak** (tutor), (4.5).

[MSc45] Karol Woźniak: "*Badanie właściwości pochłaniających niskoczęstotliwościowych ustrojów dźwiękochłonnych*" (Research on absorbing properties of low frequency absorbers), Assist. Prof. **M. Tajchert** (tutor), (4.5).

[MSc46] Przemysław Zambrzycki: "*Rozpoznawanie znaków pisma ręcznego*" (Recognition of handwritten characters), Assist. Prof. **K. Ignasiak** (tutor), (3.5).

[MSc47] Piotr Zarobkiewicz: "*Development of a switched beam array antenna for a local positioning radar system*", Assist. Prof. **W. Wojtasiak** (tutor), (5), English-medium studies.

[MSc48] Łukasz Zdunek (co-author: Andrzej Zieliński): "*Technologia OFDM w sieciach bezprzewodowych*" (OFDM in wireless network), Assist. Prof. **T. Kosiło** (tutor), (4.5).

[MSc49] Andrzej Zieliński (co-author: Łukasz Zdunek): "*Technologia OFDM w sieciach bezprzewodowych*" (OFDM in wireless network), Assist. Prof. **T. Kosiło** (tutor), (4.5).

[MSc50] Rafał Zubała: "*Multiuser geometrically based channel model*", Prof. L. Correia / Assist. Prof. **J. Kołakowski** (tutors), (5).

5.3 B.Sc. Degrees

[BSc1] Paweł Bachanek: "*The system of measurement and control with the use of Internet and VEE PRO*" Prof. **W. Winiecki** (tutor), (3.5), English-medium-studies.

[BSc2] Michał Białowąs; "*Miernik napięcia lampy rentgenowskiej*" (X-ray tube voltage meter), Assoc. Prof. **J. Marzec** (tutor), (4).

[BSc3] Michał Bartkowicz: "*Serwer udostępniający prawdziwe liczby losowe*" (Server application distributing true random numbers), Assoc. Prof. **J. Marzec** (tutor), (4.5).

[BSc4] Artur Cieszkowski: "*Konwerter transmisji DRM*" (DRM converter), Assist. Prof. **W. Kazubski** (tutor), (4).

[BSc5] Krystian Cieślik: "*Wzmacniacz o mocy 80 W do nadajnika systemu WLL*" (80W power amplifier for WLL system), Assist. Prof. **W. Wojtasiak** (tutor), (5).

[BSc6] Paweł Cyrta (co-author: Rafał Paluch): "*Acoustic measurements studio-dedicated software for computer aided acoustic measurements*", Assist. Prof. **A. Leszczyński** (tutor), (4.5), English-medium-studies.

[BSc7] Łukasz Engel: "*Multimedialny system monitoringu*" (Multimedia monitoring system), Assist. Prof. **G. Galiński** (tutor), (5).

[BSc8] Łukasz Filipiuk: "*System powiadamiania wykorzystujący transmisję wiadomości SMS w systemie GSM*" (The notifying system using SMS transmission), Senior Assist. **H. Chaciński** (tutor), (5).

[BSc9] Paweł Gałecki: "*Remote control of Linux firewall mechanism via web browser*" Assist. Prof. **K. Ignasiak** (tutor), (4.5), English-medium-studies.

[BSc10] Zbigniew Grabowicz: "*Detektor cząstek wysokoenergetycznych wykorzystujący światłowody scyntylacyjne*" (High energy particle detector based on scintillating optical fibers), Assoc. Prof. **J. Marzec** (tutor), (4).

[BSc11] Paweł Gronowski: "*Aplikacja do wyznaczania miar jakości obrazów i sekwencji obrazów*" (Software application for image quality assesment), Assist. Prof. **A. Buchowicz** (tutor), (4.5).

[BSc12] Mariusz Grzegorczyk: "*Sterownik mikroprocesorowy przyrządu pomiarowego z interfejsem SCPI IEC-625 zrealizowany w układzie FPGA firmy Altera*" (Microprocessor controller of measuring instrument with SCPI IEC-625 interface designed in Altera's FPGA technology), Assist. Prof. **K. Mroczek** (tutor), (4.5).

[BSc13] Łukasz Gurmiński (co-author: Łukasz Włostowski) : "*Moduł akwizycji danych z bezprzewodowym interfejsem radiowym*" (The data acquisition module with wireless interface), Assist. Prof. **K. Mroczek** (tutor), (4.5).

[BSc14] Marek Piotr Hewelke: "*Stereowizja rentgenowska*" (Roentgen stereo-vision), Senior Lecturer **T. Jamrógiewicz** (tutor), (4.5).

[BSc15] Bartosz Mikołaj Hrehoruk: "*Konwerter WLAN 2.4 GHz – 410 MHz*" (Frequency converter 2,4 GHz – 410 MHz), Assist. Prof. **D. Gryglewski** (tutor), (5).

[BSc16] Piotr Maciej Jabłoński: "*Konwerter formatów obrazowych*" (Image formats converter), Assoc. Prof. **A. Przelaskowski** (tutor), (4.5).

[BSc17] Ziemowit Jagodziński: "*Monitorowanie linii głośnikowych w dźwiękowych systemach ostrzegawczych*" (Monitoring loudspeaker lines in

sound alarm system), Assist. Prof. **T. Fidecki** (tutor), (4.5).

[BSc18] Alicja Janiec: "*Internetowy system obsługi konferencji*" (Internet conference supporting system), Assist. Prof. **G. Galiński** (tutor), (4.5).

[BSc19] Piotr Jaros: "*Automatyzacja pomiaru charakterystyk anten*" (Automatic measurement of antennae' radiation pattern), Senior Assist. **H. Chaciński** (tutor), (4.5).

[BSc20] Krzysztof Kajkowski: "*System zdalnego monitoringu Seanux*" (Seanux remote monitoring system), Senior Lecturer **T. Jamrógiewicz** (tutor), (4.5).

[BSc21] Tomasz Kasjaniuk: "*Transformata Karhunena-Loève i filtr Widrowa w badaniach zmienności załamka T w sygnale EKG*" (Karhunen-Loève transform (KLT) and Widrow adaptive filtering (WF) in T-wave alternans (TWA) changes in ECG signal), Prof. **Z. Pawłowski** (tutor), (4.5).

[BSc22] Jan Kienig: "*Wirtualny analizator widma czasu rzeczywistego*" (Real time virtual spectrum analyzer), Prof. **W. Winiecki** (tutor), (4.5).

[BSc23] Krzysztof Artur Kostrzębski: "*Dyfuzyjny tomograf optyczny o geometrii walcowej*" (Optical diffusion tomograph with a cylindrical geometry), Assist. Prof. **G. Domański** (tutor), (4.5).

[BSc24] Grzegorz Krośnicki: "*Badanie możliwości odbioru dalekich emisji sygnału sterowania w energetyce*" (Study of receiving a long distance control signals in energetics), Assist. Prof. **K. Czerwiński** (tutor), (4).

[BSc25] Maciej Krysa: "*Wpływ właściwości kierunkowych i położenia mikrofonu na brzmienie nagrania*" (The influence of directivity and placing of microphone on sound of recording), Assist. Prof. **M. Tajchert** (tutor), (5).

[BSc26] Przemysław Kulesza: "*Wyważanie wirujących mas za pomocą przenośnego analizatora drgań SVAN 946A*" (Balancing of rotating mass using SVAN 946A – the vibration analyzer), Assist. Prof. **A. Podgórski** (tutor), (5).

[BSc27] Teresa Kuran-Madej: "*Symulator densytometru do badania tkanki kostnej metodą trójenergetyczną*" (Simulator of the triple-photon energy absorptiometer in the measurement of bone minerals), Assist. Prof. **B. Konarzewski** (tutor), (4.5).

[BSc28] Łukasz Łukomski: "*Czujnik odbicia w falowodzie*" (Sensor of reflections in waveguide), Assist. Prof. **A. Więckowski** (tutor), (4).

[BSc29] Michał Mąkosza: "*Steganografia z zastosowaniem kodeka fraktalnego*" (Steganography based on fractal codec), Prof. **W. Skarbek** (tutor), (5).

[BSc30] Piotr Konrad Mierzwiński: "*Układ sygnalizacji źródeł dźwięku dla osób niesłyszących*" (Signal-ing system for the deaf people), Assist. Prof. **K. Radecki** (tutor), (5).

[BSc31] Marcin Kamil Nowik: "*System weryfikacji mówcy z wykorzystaniem sztucznych sieci neuronowych*" (Artificial neural networks for speaker verification system), Prof. **K. Zaremba** (tutor), (5).

[BSc32] Marcin Jan Ohrysko: "*Biblioteka procedur do modelowania metodą Monte Carlo oddziaływania światła z materią*" (Library of procedures for modeling light propagation in tissue using Monte Carlo method), Assist. Prof. **B. Konarzewski** (tutor), (4).

[BSc33] Witold Oleksak: "*Pomiary i oceny poziomu dźwięku w czasie projekcji filmowej w kinach*" (Measurements of evaluation of sound levels during movie projection in cinema halls), Assist. Prof. **E. Kotarbińska** (tutor), (5).

[BSc34] Rafał Paluch (co-author: Paweł Cyrta): "*Acoustic measurements studio-dedicated software for computer aided acoustic measurements*", Assist. Prof. **A. Leszczyński** (tutor), (4.5), English-medium-studies.

[BSc35] Lech Raczyński: "*Algorytm detekcji torów cząstek w eksperymencie ICARUS*" (Tracks detection algorithm for the ICARUS experiment), Prof. **K. Zaremba** (tutor), (5).

[BSc36] Andrzej Władysław Rakow: "*Stock and sales distributed management system*" Assist. Prof. **K. Ignasiak** (tutor), (4), English-medium-studies.

[BSc37] Paweł Rzymkowski: "*System do automatycznej analizy widm spektrometrycznych rentgenowskiej analizy fluorescencyjnej*" (System for automatic analysis of X-ray fluorescence spectra), Assist. Prof. **B. Konarzewski** (tutor), (5).

[BSc38] Andrzej Semeniuk: "*Badanie możliwości odbioru dalekich emisji sygnału DGPS*" (Study of receiving a long distance DGPS signals), Assist. Prof. **K. Czerwiński** (tutor), (4).

[BSc39] Sebastian Strzelak: "*The Internet system of on-line conference management*", Assist. Prof. **K. Ignasiak** (tutor), (4), English-medium-studies.

[BSc40] Bartosz Sułek: "*Paskowy szyk antenowy na częstotliwości 2,4 GHz*" (Microstrip patch antenna array for the 2.4 GHz), Assist. Prof. **Y. Yashchyshyn** (tutor), (5).

[BSc41] Łukasz Szandecki: "*Przeglądarka obrazów*" (Image viewer), Assist. Prof. **A. Przelaskowski** (tutor), (4).

[BSc42] Cezary Szmurło: "*Emulator serwera wydruku w standardzie DICOM 3.0*" (Server emulator compatible with DICOM 3.0 standard), Assist. Prof. **W. Smolik** (tutor), (4.5).

[BSc43] Łukasz Tybulewicz: "*Iteracyjny algorytm rekonstrukcji obrazu w elektrycznej tomografii pojemnościowej*" (Iterative image reconstruction tech-

nique in electrical capacitance tomography), Assist. Prof. **W. Smolik** (tutor), (5).

[BSc44] Maciej Urbański: "*Analysis and optimization of arbitrary geometry, low-profile, wide band patch antennae*", Assist. Prof. **M. Sypniewski** (tutor), (3.5), English-medium-studies.

[BSc45] Piotr Wacholski: "*Wprowadzenie analizy trójwymiarowej do programu SWRCA (the system of wireless radio channel analysis) pracującego w warunkach quasi-trójwymiarowych*" (Modification made in SWRCA computer application to obtain transition from quasi-3D to three dimensional analysis), Assist. Prof. **Y. Yashchyshyn** (tutor), (5).

[BSc46] Maciej Wais: "*Antena o polaryzacji kołowej na częstotliwości 2.4 GHz*" (Circularly polarized antenna working on 2.4 GHz frequency), Senior Lecturer **H. Chaciński** (tutor), (5).

[BSc47] Piotr Wieczorek: "*Biblioteka narzędziowa do przetwarzania plików AVI*" (AVI toolbox), Assist. Prof. **A. Buchowicz** (tutor), (5).

[BSc48] Marek Stanisław Wlazło: "*Bezdotykowy termometr z bezprzewodową transmisją danych*" (Pyrometry with wireless connectivity data transmission), Senior Lecturer **T. Jamrógiewicz** (tutor), (4.5).

[BSc49] Łukasz Włostowski (co-author: Łukasz Gurmiński): "*Moduł akwizycji danych z bezprzewodowym interfejsem radiowym*" (Data acquisition module with a wireless radio interface), Assist. Prof. **K. Mroczek** (tutor), (4.5).

[BSc50] Tomasz Wójcik: "*Stacja do pomiarów warunków meteorologicznych oparta na mikroserwerze www*" (Metrology measurement station based on www micro-server), Assist. **R. Łukaszewski** (tutor), (5).

[BSc51] Sebastian Zdunek: "*Ośmiokanałowy system do badania ukrwienia tkanek metodą optyczną*" (Eight-channel system for tissue blood volume content measurement by optical technique), Assist Prof. **G. Domański** (tutor), (4.5).

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

[BSc52] Krzysztof Błaszków: "*Zdalny sterownik urządzeniami elektrycznymi z wykorzystaniem linii telefonicznej*" (Remote driver for electric devices with the usage of telephone line), Assist. Prof. **M. Rusin** (tutor), (3,5).

[BSc53] Jarosław Czapski: "*Mikroprocesorowy układ kształtowania sygnału o zadanym kształcie*" (Microprocessor signal shaping system), Assist. Prof. **K. Derzakowski** (tutor), (5).

[BSc54] Sławomir Guzek: "*Dwukierunkowy konwerter częstotliwości pomiędzy pasmami 2,400 – 2,500 GHz a 4,400 – 5,850 GHz*" (The design of 2.400 – 2.500 GHz to 5.400 – 5.800 GHz fre-

quency converter), Assist. Prof. **W. Wojtasiak** (tutor), (5).

[BSc55] Marian Hyska: "*Modernizacja odbiornika radiowego stacji EFR*" (Redesign of EFR radio station receiver), Assist. Prof. **T. Buczkowski** (tutor), (4,5).

[BSc56] Patryk Jędrzejczak: "*Bezprzewodowy pulsometr optyczny*" (Wireless optical pulsometer), Assist. Prof. **G. Domański** (tutor), (5).

[BSc57] Anna Ługowska: "*Wybór i dopasowanie modułu odbiornika GPS do komputera przenośnego (Psion)*" (A GPS receiver module for a handhold Psion computer – type selection and interface design), Assist. Prof. **T. Kosiło** (tutor), (5).

[BSc58] Albin Majewski (co-author: Piotr Czachorowski): "*Technologie xDSL. Praktyczne zastosowanie techniki ADSL*" (xDSL technologies. Practical use of ADSL techniques), Prof. **J. Siuzdak** (tutor), (4).

[BSc59] Jerzy Benedykt Olczak: "*Opracowanie oprogramowania do monitorowania emisji nadajników radiofonicznych i telewizyjnych z wykorzystaniem analizatora widma FSP-30*" (Software for monitoring of radio and TV emissions using spectrum analyzer FSP-30), Assist. Prof. **J. Kołakowski** (tutor), (4).

[BSc60] Dariusz Raźniak: "*Symulacja komputerowa toru transmisji cyfrowej PSK w środowisku MATLAB 6 dla potrzeb laboratorium studenckiego*" (The computer simulation of digital modulations in MATLAB 6 environment for students' laboratory), Assist. Prof. **K. Radecki** (tutor), (4).

[BSc61] Adam Smulski: "*Standardowy blok wzmacniacza mocy klasy DE*" (A standardized module of class DE power amplifier), Assist. Prof. **M. Mikołajewski** (tutor), (5).

[BSc62] Robert Stańczak: „*Analiza systemów zarządzania współczesnych węzłów komutacyjnych*" (Contemporary switching junctions management systems analysis), Assist. Prof. **W. Radzikowski** (tutor), (3.5).

[BSc63] Kamil Krzysztof Urbaś: "*Analiza gotowości systemu radiowego dostępu abonenckiego typu PMP*" (Availability analysis of radio access network system within the point to multi-point architecture), Assist. Prof. **T. Buczkowski** (tutor), (4).

[BSc64] Grzegorz Więckowski: "*Dzwonek do telefonu komórkowego dla osób słabosłyszących*" (Cellular phone ring for the deaf people), Senior Lecturer **H. Chaciński** (tutor), (4).

[BSc65] Andrzej Wójcicki: "*Modernizacja aparatury służącej do cyfrowej rejestracji wyników obserwacji przejść gwiazd*" (Modernization of instrumentation service for digital registration regarding results of observation connected with the stars' conversion), Assist. Prof. **K. Czerwiński** (tutor), (5).

6 PUBLICATIONS

6.1 Scientific and technical books, chapters in books

[Pub1] M. Kłymasz, Y. Yashchyshyn: "Radiowe sieci łączności komórkowej" (Cellular Communication Radio Networks), *Wydawnictwo Politechniki Lwowskiej* (Lwów, 2005), ISBN 966-322-034-1, 352 pp., printed in Ukrainian.

[Pub2] T. Morawski, J. Zborowska: "Pola i fale elektromagnetyczne" (Electromagnetic Fields and Waves), *Oficyna Wydawnicza PW*, ISBN 83-7207-508-5, 198 pp.

[Pub3] M. Piket-May, W. Gwarek, T. L. Wu, B. Houshmand, T. Itoh, J. Simpson: "High-Speed Electronic Circuits with Active and Nonlinear Components", Chapter 15 (pp. 677-742), in: A. Taflove, S. Hagness (Ed.), "Computational Electrodynamics. The Finite-Difference Time-Domain Method", Third edition, *Artech House Inc.* (Boston/London, 2005), ISBN 1-58053-832-0, 997 pp.

[Pub4] A. Przelaskowski: "Kompresja danych: podstawy, metody bezstratne, kodery obrazów" (Data Compression: Basics, Lossless Methods, Image Coders), *Wydawnictwo BTC* (2005), ISBN 83-60233-05-5, 258 pp.

[Pub5] A. Taflove, S. Hagness, W. Gwarek, M. Fujii, S. H. Chang: "Dispersive, Nonlinear, and Gain Materials", Chapter 9 (pp. 353-406), in: A. Taflove, S. Hagness (Ed.), "Computational Electrodynamics. The Finite-Difference Time-Domain Method", Third edition, *Artech House Inc.* (Boston/London, 2005), ISBN 1-58053-832-0, 997 pp.

[Pub6] A. Taflove, M. Celuch-Marcysiak, S. Hagness: "Local Subcell Models of Finite Geometrical Features", Chapter 10 (pp. 407-462), in: A. Taflove, S. Hagness (Ed.), "Computational Electrodynamics. The Finite-Difference Time-Domain Method", Third edition, *Artech House Inc.* (Boston/London, 2005), ISBN 1-58053-832-0, 997 pp.

6.2 Scientific and technical papers in journals

[Pub7] E. S. Ageev, J. Marzec, A. Padée, R. Sulej, K. Zaremba, et al.: "Search for the Φ (1860) Pentaquark at COMPASS", *The European Physical Journal C*, No. 41 (2005), pp. 469-474.

[Pub8] E. S. Ageev, J. Marzec, A. Padée, R. Sulej, K. Zaremba, et al.: "Measurement of the Spin Structure of the Deuteron in the DIS Region", *Physics Letters B, Elsevier*, No. 612 (2005), pp. 154-164.

[Pub9] V. Yu. Alexakhin, J. Marzec, A. Padée, R. Sulej, K. Zaremba, et al.: "First Measurement of the Transverse Spin Asymmetries of the Deuteron in Semi-inclusive Deep Inelastic Scattering", *Physical Review Letters*, No. 94 (2005), pp. 202002-1 - 202002-6.

[Pub10] P. Bargieł, M. Orkisz, A. Przelaskowski, E. Piątkowska-Janko, P. Bogorodzki, T. Wolak: "Optimal Plane Search Method in Blood Flow Measurement by Magnetic Resonance Imaging", *SPIE, Proc. Optical Methods, Sensors, Image Processing, and Visualization in Medicine*, No. 5505, pp. 135-138.

[Pub11] P. Bargieł, P. Boniński, A. Wróblewska, A. Przelaskowski: "The Improvement of Perception of Chosen Pathological Changes in Mammography Images", *Biomedizinische Technik, Medical Physics, Proc. ICMP* 2005 (Nuremberg, Germany, 2005), Vol. 50, Suppl. Vol., pp. 64-65.

[Pub12] P. Bilski, W. Winiecki: "Time Optimization of Soft Real-time Virtual Instrument Design", *IEEE Transactions on Instrumentation and Measurement*, Vol. 54, No. 4 (Aug. 2005), pp. 1412-1417.

[Pub13] P. Bogorodzki, J. Rogowska, D. A. Yurgelun-Todd: "Structural Group Classification Technique Based on Regional fMRI BOLD Response", *IEEE Transactions on Medical Imaging*, Vol. 24, No. 3 (Mar. 2005), pp. 389-398.

[Pub14] T. Chomiak, G. Jarmoszewicz, K. Świrski, K. Wojdan: "Sztuczny system immunologiczny jako optymalizator procesu spalania" (Optimization of Combustion in a Boiler Using Immunity System), *Prace Naukowe Konferencje*, z. 24, *Mat. VII Konferencji – Problemy Badawcze Energetyki Cieplnej* (Warszawa, Poland, Dec. 6-9, 2005), *Oficyna Wydawnicza PW* (2005), pp. 53-62.

[Pub15] J. Cichocki, J. Kołakowski: "Pomiary sygnałów systemów szerokopasmowych (UMTS, WLAN, UWB)" (Measurements of Signals for Broadband Systems (UMTS, WLAN, UWB)), *Przegląd Telekomunikacyjny*, No. 6 (2005), pp. 220-231.

[Pub16] M. Czarkowski, L. Hilgertner, T. Powałkowski, D. Radomski: "U chorych z nadczynnością tarczycy w przebiegu choroby Gravesa-Basedowa wielkość przepływu krwi zależy od stopnia nasilenia nadczynności tarczycy" (Mean Arterial Blood Flow Depends on the Intensity of Thyrotoxicosis in Patient's with Graves' Disease), *Polski Merkuriusz Lekarski*, Vol. XVIII, No. 108 (2005), pp. 667-670.

[Pub17] M. Czarkowski, L. Hilgertner, T. Powałkowski, D. Radomski, M. Mikulska: "Is the Resistance of Large Conduit Arteries Also Decreased in Thyrotoxic Patients with Graves' Disease", *Thyroid*, Vol. 15, No. 4 (2005), pp. 377-381.

[Pub18] G. Domański, B. Konarzewski, Z. Pawłowski, K. Zaremba, J. Marzec, R. Kurjata, A. Trybuła: "A Fast Nodal Method for Simulation of Light Propagation in Turbid Media", *Kwartalnik Ele-*

ktroniki i Telekomunikacji, Vol. 51 (2005), pp. 115-125.

[Pub19] M. Fereniec, U. Steinhoff, D. Janusek, A. Przybylski, R. Maniewski: "Spatial and Temporal Variability of ECG Waveforms Observed in Sinus Rhythm and During Artio-Ventricular Stimulation in a Patient with Implanted ICD: Case Study", *Computers in Cardiology*, No. 32 (2005), pp. 499-502.

[Pub20] D. Gryglewski, T. Morawski, E. Sędek, J. Zborowska: "Microwave 5-bit Phase Shifter", *Kwartalnik Elektroniki i Telekomunikacji*, Vol. 51 (2005), pp. 105-114.

[Pub21] D. Gryglewski, T. Morawski, J. Zborowska, E. Sędek; "Pięciobitowy mikrofalowy przesuwnik fazy z diodami waraktorowymi na pasmo L" (Five-bit Microwave Phase Shifter with Varactor Diodes at L Band), *Elektronika*, No. 11 (2005), pp. 29-32.

[Pub22] G. Hahn: "A Survey of Properties of Ambiguity Functions of Analytic, Quaternionic and Monogenic Signals", *Image Processing & Communications*, Vol. 10, No. 1 (2005), pp. 13-33.

[Pub23] S. L. Hahn: "Correlation Functions, Power Spectra and Wigner Distributions of Telecommunication Signals", *Kwartalnik Elektroniki i Telekomunikacji*, Vol. 51 (2005), pp. 23-50.

[Pub24] S. L. Hahn, K. M. Snopek: "Wigner Distributions and Ambiguity Functions of 2-D Quaternionic and Monogenic Signals", *IEEE Transactions on Signal Processing*, Vol. 53, No. 8 (2005), pp. 3111-3128.

[Pub25] M. Hernandez-Hoyos, P. Orłowski, E. Piątkowska-Janko, P. Bogorodzki, M. Orkisz: "Vascular Centreline Extraction in 3D MR Angiograms to Optimise Acquisition Plane for Blood Flow Measurement by Phase Contrast MRI", *Computer Assisted Radiology and Surgery*, *International Congress Series 1281* (Berlin, Germany, 2005), pp. 345-350.

[Pub26] D. Janusek, S. Karczmarewicz, Z. Pawłowski, A. Przybylski, K. Gościńska-Bis, A. Lubiński, T. Zając, D. Urbańczyk, A. Filipecki, B. Romanik, I. Kowalik: "Zależność pomiędzy czasem repolaryzacji a amplitudą załamka T dla pacjentów z pozytywnym i negatywnym wynikiem badania naprzemienności załamka T", (Correlation Between Time of Repolarization and T Wave Amplitude for the Patients with Positive and Negative Result of T Wave Alternans), *Kardiologia Polska*, No. 62 (2005), pp. 521-525.

[Pub27] T. Keller: "Analiza możliwości stosowania oraz warunków współistnienia radiowych systemów łączności pracujących w paśmie ISM" (Analysis of Application and Coexistence Conditions for Communication Systems in ISM Band), *Przegląd Telekomunikacyjny*, No. 12 (2005), pp. 451-456.

[Pub28] T. Knyziak, W. Winiecki: "The New Prospects of Distributed Measurement Systems Using Java™ 2 Micro Edition Mobile Phone", *Computer Standards & Interfaces*, *Elsevier*, Vol. 28, Issue 2 (2005), pp. 183-193.

[Pub29] E. Kotarbińska: "Zagadnienia ochrony przed hałasem w środowisku pracy" (Problems of Noise Protection in the Workplace), *Przegląd Telekomunikacyjny*, No. 10 (2005), pp. 386-389.

[Pub30] E. Kotarbińska: "The Influence of Aging on the Noise Attenuation of Ear-muffs", *An Inter-disciplinary International Journal Noise & Health*, No. 7/26 (2005), pp. 39-45.

[Pub31] K. Kucharski, W. Skarbek, M. Bober: "Feature Space Reduction for Face Recognition with Dual Linear Discriminant Analysis", *Lecture Notes in Computer Science,* Vol. 3691 (2005), pp. 587-595.

[Pub32] R. Kurjata, Z. Pawłowski, G. Domański, A. Trybuła, K. Zaremba, J. Marzec, B. Konarzewski: "Fixed Geometry Optical Scanner for Laboratory Use", *Biocybernetics and Biomedical Engineering*, Vol. 25, No. 1 (2005), pp. 59-64.

[Pub33] M. Leszczyński, W. Skarbek: "Viseme Classification for Talking Head Application", in: *Lecture Notes in Computer Science,* Vol. 3691 (2005), pp. 773-780.

[Pub34] M. Leszczyński, W. Skarbek, S. Badura: "Fast Viseme Recognition for Talking Head Application", in: *Lecture Notes in Computer Science,* Vol. 3656 (2005), pp. 516-523.

[Pub35] R. Łukaszewski, W. Winiecki: "Petri Nets in Measuring Systems", *Kwartalnik Elektroniki i Telekomunikacji*, Vol. 51 (2005), pp. 139-158.

[Pub36] S. Maszczyk, J. Kołakowski, J. Cichocki: "Techniki szybkiej transmisji danych w systemie UMTS HSDPA, HSUPA" (Fast Data Transmission Technologies HSDPA & HSUPA in UMTS System), *Przegląd Telekomunikacyjny*, No. 10 (2005), pp. 362-367.

[Pub37] J. Modelski, T Keller: "Szerokopasmowe radiowe systemy dostępowe" (Broadband Radio Access Systems), *Przegląd Telekomunikacyjny*, No. 12 (2005), pp. 125-134.

[Pub38] J. Modelski, K. Kurek: "Perspektywy rozwoju systemów łączności satelitarnej" (Future Trends in Satellite Communication Systems), *Przegląd Telekomunikacyjny i Wiadomości Telekomunikacyjne*, No. 1 (2005), pp. 3-12.

[Pub39] R. Z. Morawski, A. Miękina, A. Barwicz: "Curve-Fitting Algorithms Versus Neural Networks when Applied for Estimation of Wavelength and Power in DWDM Systems", *IEEE Transactions on Instrumentation and Measurement*, Vol. 54, No. 5 (2005), pp. 2027-2047.

[Pub40] T. Morawski, J. Zborowska, M. Bury, S. Kozłowski: "Mikrofalowe przesuwniki fazy do wielowrotowych systemów mierzących parametry roz-

proszenia" (Microwave Phase Shifters of Multi-port Systems for S-parameter Measurements), *Elektronika,* No 1 (2005), pp. 6-9.

[Pub41] A. Moryc, W. Gwarek: "FDTD Analysis of Magnetized Plasma Using an Equivalent Lumped Circuit", *Journal of Telecommunications and Information Technology*, No. 2 (2005), pp. 75-78.

[Pub42] K. Mroczek: "Podatność układów FPGA na promieniowanie jonizujące w warunkach ziemskich" (The Comparison of FPGA Technologies as Regards Radiation Inducted Failures in Terrestrial Environment), *Elektronika*, No. 5 (2005), pp. 48-51.

[Pub43] G. Pastuszak: "A High-performance Architecture for Embedded Block Coding in JPRG 2000", *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 15, No. 9 (2005), pp. 1182-1191.

[Pub44] G. Pastuszak: "Efficient Hardware Architecture for EBCOT in JPEG 2000 Using a Feedback Loop from the Rate Controller to the Bit-Plane Coder", *Lecture Notes in Computer Science,* Vol. 3617 (2005), pp. 604-611.

[Pub45] A. Pietrowcew, A. Buchowicz, W. Skarbek: "Bit-Rate Control Algorithm for Video Coding with Regions of Interest", *Kwartalnik Elektroniki i Telekomunikacji*, Vol. 51 (2005), pp. 159-172.

[Pub46] A. Pietrowcew, A. Buchowicz, W. Skarbek: "Bit-Rate Control Algorithm for ROI Enabled Video Coding", in: *Lecture Notes in Computer Science*, *Springer-Verlag,* Vol. 3691 (2005), pp. 514-521.

[Pub47] A. Przelaskowski: "Metody kompresji obrazów – uwarunkowania dalszego rozwoju" (Tomorrow's Image Compression Today), *Przegląd Telekomunikacyjny*, No. 10 (2005), pp. 374-380.

[Pub48] A. Przelaskowski: "Multi-resolution Pathology Signatures in Mammograms", *Medical Physics*, *Proc. ICMP 2005* in *Biomedizinische Technik*, Vol.50, Suppl. Vol. 1, Part 1 (Nuremberg, Germany, 2005), pp. 62-63.

[Pub49] A. Przelaskowski, A. Wróblewska, P. Bargieł: "Wspomaganie decyzji diagnostycznych w mammografii" (Supporting of Diagnostic Decision in Mammography), *Structures-Waves-Human Health* in *Biomedical Engineering*, Vol. XIV, No. 2 (2005), pp. 127-134.

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[Pub204] T. Buczkowski: *"*Problemy ze zużytymi lampami fluorescencyjnymi (1)" (Problems Posed by Waste Fluorescent Lamps), *Radioelektronik Audio hi-fi Video*, No. 5 (2005), pp. 20-21.

[Pub205] T. Buczkowski: "Problemy ze zużytymi lampami fluorescencyjnymi (2)" (Problems Posed by Waste Fluorescent Lamps), *Radioelektronik Audio hi-fi Video*, No. 6 (2005), pp. 22-23.

[Pub206] A. Dominik, J. Wojciechowski: "Internet Marketplace", *INFOTEL*, No. 11 (2005), pp. 8-10.

[Pub207] J. Modelski: "Człowiek w świecie multimedialnym" (Man in the Multimedia World), *Przegląd Telekomunikacyjny*, No. 10 (2005), pp. 355-356.

[Pub208] J. Modelski, K. Zaremba: "Instytut Radioelektroniki – wczoraj, dziś, jutro" (Institute of Radioelectronics – Yesterday, Today, Tomorrow), *Przegląd Telekomunikacyjny*, No. 10 (2005), pp. 356-361.

6.6 Abstracts

[Pub209] P. Bogorodzki, T. Wolak, M. Orzechowski, E. Piątkowska-Janko, M. Gołębiowski, W. Szeszkowski, A . Cieszanowski: "Ilościowa ocena wpływu szumu skanera na obrazowanie fMRI układu słuchowego metodą średnich odpowiedzi z obszarów zainteresowań (MRR)" (A Quantitative Assessment of the Scanner Noise Influence on fMRI Auditory Activity Using Mean Regional Response Approach), *Mat. V Zjazdu Polskiego Medycznego Towarzystwa Rezonansu Magnetycznego – PMTRM* (Proc. V[th] Congress of Polish Magnetic Resonance Medical Society) (Szczyrk, Poland, Jun. 17-19, 2005), 1 pp.

[Pub210] P. Bogorodzki, T. Wolak, E. Piątkowska-Janko, M. Orzechowski, R. Kurjata, M. Gołębiowski, W. Szeszkowski, A. Cieszanowski: "Modeling Scanner Noise Influence on fMRI BOLD response Using Mean Regional Response Approach", *Proc. 8th International Conference – Advances in Diagnosis and Treatment of Auditory Disorder*s (Kajetany, Poland, May 19-21, 2005), in: *Audiofonologia* (2005), Supplement, 1 pp.

[Pub211] P. Bogorodzki, M. Gołębiowski, E. Piątkowska-Janko, T. Wolak, M. Orzechowski, R. Kurjata, W. Szeszkowski: "Primary and Secondary Human Auditory Cortex in fMRI", *Proc. 105th Annual Meeting of American Roentgen Ray Society* (New Orleans, USA, May 15-20, 2005), in: *Supplement to the American Journal of Roentgenology*, Vol. 184, No. 4, p. 123.

[Pub212] A. Oręziak, Z. Lewandowski, E. Piątkowska-Janko, K. A. Wardyn, G. Opolski: "Prediction of Serious Ventricular Arrhythmias In Hypertensive Patients with Different Forms of the Left Ventricular Geometry"; *Eu. Heart J.,* No. 46 (2005), Abstract Suppl, pp. 679.

[Pub213] A. Oręziak, Z. Lewandowski, E. Piątkowska-Janko, K. A. Wardyn, G. Opolski: "Komorowe zaburzenia rytmu serca u pacjentów z nadciśnieniem tętniczym i przerostem lewej komory" (Ventricular arrhythmias in hypertensive patients and the left ventricle hypertrophy), *Proc. IXth International Congress of the Polish Cardiac Society* (Katowice, 2005) in: *Kardiologia Polska,* Vol. 63, No. 3, Supl. 1, pp. 85.

[Pub214] A. Oręziak, Z. Lewandowski, E. Piątkowska-Janko, K. A. Wardyn, G. Opolski: "Predykcja nadkomorowych zaburzeń rytmu u pacjentów z nadciśnieniem tętniczym i różnymi formami geometrii lewej komory" (Prediction of of supraventricular arrhythmias in hypertensive patients with different forms of the left ventricular geometry), *Proc. IX International Congress of the Polish Cardiac Society* (Katowice, 2005) in: *Kardiologia Polska,* Vol. 63, No. 3, Supl. 1, pp. 47-48

[Pub215] M. Orzechowski, P. Bogorodzki, K. Kochanek, T. Wolak, E. Piątkowska-Janko, R. Kurjata, M. Gołębiowski, W. Szeszkowski, A. Cieszanowski: "fMRI Sound Delivery System for Auditory

Stimuli Presentation", *Proc. 8th International Conference – Advances in Diagnosis and Treatment of Auditory Disorders* (Kajetany, Poland, May 19-21, 2005), in: *Audiofonologia* (2005), Supplement, 1 pp.

[Pub216] A. Przelaskowski, P. Hałasa, D. Rives: "Progressive and Interactive Modes of Image Transmission; Optimized Wavelet-Based Image Representation", *Proc. 3rd International Conference on Telemedicine and Multimedia Communication,* Abstract Book (Kajetany, Poland, Oct. 21-22, 2005), pp. 65-66.

[Pub217] J. Rogowska, P. Bogorodzki, D. Yurgelun-Todd: "A New Method of Diagnostic Classification based on Differences in Regional fMRI Activation Patterns", *Proc. 22nd Annual Scientific Meeting – ESMRMB 2005*; (Basle, Switzerland Sept. 15-18, 2005), No. 365, 1 pp.

[Pub218] W. Szeszkowski, P. Bogorodzki, M. Orzechowski, T. Wolak, R. Kurjata, E. Piątkowska-Janko, M. Gołębiowski A. Cieszanowski: "Badanie hierarchiczności struktur kory słuchowej metodą czynnościowego rezonansu magnetycznego (fMRI)" (fMRI Study of the Hierarchical Organization of the Auditory Cortex), *Mat. V Zjazdu Polskiego Medycznego Towarzystwa Rezonansu Magnetycznego – PMTRM* (Proc. Vth Congress of Polish Magnetic Resonance Medical Society) (Szczyrk, Poland, Jun. 17-19, 2005),1 pp.

[Pub219] W. Szeszkowski, P. Bogorodzki, M. Orzechowski, T. Wolak, R. Kurjata, E. Piątkowska-Janko, M. Gołębiowski, A. Cieszanowski: "Differences in Regional BOLD Responses in the Primary and Secondary Auditory Cortex Induced by Mixed Noise and Speech Like Stimuli", *Proc. 8th International Conference – Advances in Diagnosis and Treatment of Auditory Disorders* (Kajetany, Poland, May 19-21, 2005), 1 pp.

[Pub220] W. Szeszkowski, P. Bogorodzki, M. Orzechowski, T. Wolak, R. Kurjata, E. Piątkowska-Janko, M. Gołębiowski, A. Cieszanowski: "An Evidence of the Hierarchical Organization within the Human Auditory Cortex: fMRI Study" *Proc. 22nd Annual Scientific Meeting – ESMRMB 2005*; (Basel, Switzerland Sept. 15-18, 2005), 1 pp.

[Pub221] T. Wolak, P. Bogorodzki, E. Piątkowska-Janko, M Orzechowski, R. Kurjata, M. Gołębiowski, W. Szeszkowski, A. Cieszanowski: "Analysis of the BOLD Responses from Human Primary Auditory Cortex Using Cytoarchitectonic Maximum Probability Maps"; *Proc. 22nd Annual Scientific Meeting – ESMRMB 2005*; (Basel, Switzerland, Sept. 15-18, 2005), No. 363, 1 pp.

6.7   Special issues edited by the staff

[Pub222] L. Finkelstein, R. Z. Morawski, L. Mari (guest editors): Special issue: The Logical and Philosophical Aspects of Measurement, *Measurement*, Elsevier, Vol. 38 (2005).

[Pub223] J. Modelski (guest editor): *Journal of Telecommunications and Information Technology,* Ed. National Institute of Telecommunications, Warsaw (2005), No. 2, ISSN 1509-4553, 79 pp.

7   RESEARCH REPORTS

[Rep1]   J. Cichocki,   J. Kołakowski,   S. Maszczyk, S. Żmudzin, D. Kolmas: "*Źródła sygnałów ultra-szerokopasmowych i metody ich badania*" (Ultra-wideband Signals – Sources and Methods of Testing), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Sept. 2005, 30 pp.

[Rep2]   J. Cichocki: "*Opracowanie metodyki badania kompatybilności stacji systemu CDMA 2000 i GSM 900*" (Methodology for CDMA 2000 and GSM 900 stations compatibility investigations), Final report for Office of Telecommunications and Post Regulation (Urząd Regulacji Komunikacji i Poczty), Warsaw, Aug. 2005, 44 pp.

[Rep3]   G. Domański, Z. Pawłowski, K. Zaremba, J. Marzec,   B. Konarzewski,   A. Trybuła,   R. Kurjata: "*Nowe metody poprawy jakości obrazowania w zastosowaniach tomografii optycznej do badań anatomicznych i czynnościowych*" (New Methods of Imaging Quality Improvement in Applications of Optical Tomography for Anatomical and Functional Examinations), Final report for the MNiI grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2005, 205 pp.

[Rep4]   D. Gryglewski: "*Opracowanie i wykonanie 4 modeli przełączanego przesuwnika fazy na diodach waraktorowych*" (Elaboration and Construction of 4 Models of Switched Phase Shifter on Varactor Diodes), Final report for PIT – Telecommunications Research Institute (Przemysłowy Instytut Telekomunikacji),   Warsaw, Oct. 2005, 10 pp.

[Rep5]   G. Hahn: "*Investigations of ambiguity functions of telecommunication signals*", Internal report (No. 2), Institute of Radioelectronics, WUT, Warsaw, Dec. 2005, 30 pp.

[Rep6]   S. Hahn, K. Snopek: "*Correlation functions and Wigner distributions of radio-frequency signals*", Internal report (No. 3), Institute of Radioelectronics, WUT, Warsaw, Nov. 2005, 13 pp.

[Rep7]   T. Kosiło: "*Wybrane problemy sieci krótkiego zasięgu*" (Selected Problems of Local Wireless Networks), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Sept. 2005, 50 pp.

[Rep8]   T. Kosiło: "*Ekspertyza sieci radiowej dla potrzeb systemu monitoringu wizyjnego, która umożliwia transmisję danych na terenie dzielnic*" (Expertise of Radio Networks for Vision Monitoring System to Data Transmission in the Area of Town Districts), Final report for Municipal City of Warsaw (Miasto   Stołeczne   Warszawa),   Warsaw, Jun. 2005, 42 pp.

[Rep9]   Z. Kulka: "*Nowe metody projektowania interpolacyjnych filtrów cyfrowych przeznaczonych do systemów odtwarzania sygnałów muzycznych*" (New Designing Methods of the Digital Interpolation Filters for the Musical Signals Playback Systems), Final report for the Dean grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2005, 16 pp.

[Rep10]   Z. Kulka: "*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, Sept. 2005, 32 pp.

[Rep11]   Z. Kulka: "*Pomiary akustyczne i elektroakustyczne dźwiękowych urządzeń komputerowych*" (Acoustic and Electroacoustic Measurements of Noise Emitted by Computer Systems), Final report for Axel Springer Ltd., Warsaw, May 2005, 15 pp.

[Rep12]   Z. Kulka: "*Wykonanie pomiarów środowiskowych hałasu powodowanego przez start i lądowanie śmigłowca na lądowiskach dachu Biura Bezpieczeństwa Narodowego*" (Electroacoustic Measurement of Noise Emitted by Helicopter during its Starts and Landing on the Landing Field of the National Security Office), Final report for Administrative-Economic Office of the Chancellery of the President of the Republic of Poland   (Biuro   Administracyjno-Gospodarcze Kancelarii Prezydenta RP), Warsaw, Jun. 2005, 20 pp.

[Rep13]   P. Miazga: "*Opracowanie Web-serwisu oraz interfejsów umożliwiających zdalny dostęp do programu optymalizacji (solvera) CPLEX firmy ILOG na platformie 64-bitowej. Wykorzystanie opracowanego oprogramowania do symulacji mechanizmów rynkowych rynku energii elektrycznej, w oparciu o dostępne modele*" (Webservice and Interface for Remote Control of the CPLEX Solver on 64 bit Platform. Application of the Software for Simulation of Energy Market Behavior), Final report for the Rector grant,   Institute of Radioelectronics,   WUT, Warsaw, Dec. 2005, 26 pp.

[Rep14]   J. Modelski,   T. Keller,   A. Kurek,   R. Szumny, K. Kurek: "*Nowe systemy radionawigacyjne oraz monitoringu środowiska*" (New Systems for Radionavigation and Environment Monitoring), Final report for the statutory grant, Institute of Radioelectronics,   WUT,   Warsaw,   Sept. 2005, 47 pp.

[Rep15]   J. Modelski: "*Systemy radiokomunikacyjne przyszłych generacji*" (Future Generation Radiocommunication Systems), Final report for the Foundation for Polish Science (Fundacja na Rzecz Nauki Polskiej), Warsaw, Jul. 2005

[Rep16]   J. Modzelewski: "*Optymalizacja rezonansowego wzmacniacza mocy wielkiej częstotliwości klasy DE do pracy w nagrzewnicy indukcyjnej*" (Optimization of h.f. Resonant Power Class DE Amplifier in Induction Heaters), Final report for the stat-

utory grant, Institute of Radioelectronics, WUT, Warsaw, Sept. 2005, 199 pp.

[Rep17] R. Z. Morawski, A. Miękina, A. Podgórski: "*Realizacja i badanie wybranych algorytmów interpretacji danych pomiarowych*" (Implementation and Investigation of Selected Algorithms for Interpretation of Measurement Data), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2005, 24 pp.

[Rep18] T. Morawski, M. Celuch-Marcysiak, T. Ciamulski, D. Gryglewski, M. Sypniewski, A. Więckowski, W. Wojtasiak, J. Zborowska, R. Michnowski, P. Kopyt, J. Rudnicki: "*Modelowanie pól i projektowanie wybranych układów mikrofalowych*" (Microwave Circuits Modeling and Design), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Sept. 2005, 25 pp.

[Rep19] T. Morawski, R. Michnowski: "*Model elektrotermiczny tranzystora LDMOS*" (Electro-thermal Model of LDMOS Transistor), Final report for the Dean grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2005, 15 pp.

[Rep20] W. Skarbek, K. Kucharski: "*Indeksowanie obrazu twarzy metodą komponentów*" (Facial Image Indexing by Face Components Method), Final report for the Dean grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2005, 7 pp.

[Rep21] W. Skarbek: "*Multimedialne aplikacje sieciowe – analiza i projektowanie*" (Network Multimedia Applications – Analysis and Design), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Sept. 2005, 12 pp.

[Rep22] R. Szabatin, P. Brzeski, J. Mirkowski, T. Olszewski, W. Smolik: "*Pojemnościowy tomograf procesowy*" (Capacitance Process Tomograph), Final report for the KBN grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2005, 120 pp.

[Rep23] R. Szabatin, P. Brzeski, J. Mirkowski, T. Olszewski, W. Smolik: "*Opracowanie 32-kanałowego tomografu pojemnościowego*" (Elaboration of 32-channel Capacitance Tomograph), Final report for the Technical University of Lodz (Politechnika Łódzka), Warsaw, Mar. 2005, 20 pp.

[Rep24] W. Winiecki, K. Mroczek, R. Łukaszewski, P. Bilski, T. Daniluk: "*Nowoczesne metody projektowania rozproszonych systemów pomiarowych*" (Modern Methods of Computer Measuring Systems Designing), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Sept. 2005, 62 pp.

[Rep25] W. Wojtasiak: "*Wykonanie konwersji systemu IRT 2000 z pasma 2,4 GHz do pasma 3,5 GHz*" (IRT 2000 System Conversion from 2.4 GHz to 3.5 GHz), Final report for the Regional Telecommunications Networks (Regionalne Sieci Telekomunikacyjne "EL-Net" S.A.), Warsaw, Dec. 2005, 24 pp.

[Rep26] Y. Yashchyshyn: "*Anteny z elektrycznym kształtowaniem charakterystyki kierunkowej – nowe możliwości*" (Electrically Controlled Beam-Steering Antennae), Final report for the Dean grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2005, 161 pp.

[Rep27] K. Zaremba, P. Bogorodzki, P. Brzeski, G. Domański, T. Jamrógiewicz, D. Janusek, 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, Sept. 2005, 78 pp.

8 CONFERENCES, SEMINARS AND MEETINGS

8.1 International conferences

[Con1]   *IEEE MTT-S International Microwave Symposium* (Los Angeles, USA, Jan. 7-11, 2005), J. Modelski (Member of the Scientific Committee).

[Con2]   *7th European Seminar on Personal Protective Equipment* (Helsinki, Finland, Jan. 19-21, 2005), E. Kotarbińska (speaker).

[Con3]   *CADSM 2005* (Lviv, Ukraine, Feb. 23-26, 2005), Y. Yashchyshyn, P. Bajurko (speaker).

[Con4]   *International Conference on Visual Information Engineering – VIE 2005* (Glasgow, Great Britain, Apr. 3-7, 2004), G. Pastuszak (speaker).

[Con5]   *JSTIM 2005* (Nancy, France, Mar. 19-24, 2005), E. Piątkowska-Janko, P. Orłowski (speakers).

[Con6]   *International Workshop on Image Analysis for Multimedia Interactive Services – WIAMIS 2005* (Montreux, Switzerland, Apr. 12-16, 2005), M. Morgoś, K. Wnukowicz, K. Kucharski (speakers).

[Con7]   *IEEE Instrumentation and Measurement Technology Conference – IMTC'05* (Ottawa, Canada, May 16-20, 2005), R. Z. Morawski (member of the Technical Programme Committee, session chairman, speaker), W. Winiecki (member of the Technical Programme Committee, speaker).

[Con8]   *ICATT Conference* (Kiev, Ukraine, May 22-25, 2005), J. Modelski (speaker).

[Con9]   *International Conference on Intelligent Information Systems: Intelligent Information Processing and Web Mining* (Gdańsk, Poland, Jun. 13-16, 2005), Z. Walczak (speaker).

[Con10] *IEEE MTT-S International Microwave Symposium* (Long Beach, USA, Jun. 14-19, 2005), J. Modelski, M. Celuch-Marcysiak (members of the Technical Programme Committee), W. Gwarek (speaker).

[Con11] *3rd International Conference on Personal Protective Equipment* (Moscow, Russia, Jun. 14-16, 2005), E. Kotarbińska (invited speaker).

[Con12] *12th International Conference: Mixed Design of Integrated Circuits and Systems* (Kraków, Poland, Jun. 22-25, 2005), P. Bilski (speaker).

[Con13] *XI Międzynarodowe Sympozjum Reżyserii i Inżynierii Dźwięku i Obrazu – ISSET 2005* (XIth International Symposium of Art of Sound Engineering), (Kraków, Poland, Jun. 23-25, 2005, P. Bobiński, R. Korycki, M. Kostrzewa, M. Moraszczyk, A. Sitkiewicz, A. Świercz, M. Tajchert, (speakers).

[Con14] *IEEE International Conference on Multimedia & Expo – ICME 2005* (Amsterdam, Netherlands, Jul. 6-8, 2005), G. Pastuszak (speaker).

[Con15] *4th World Congress on Industrial Process Tomography* (Aizu, Japan, Sept. 4-8, 2005), W. Smolik (speaker).

[Con16] *International Conference on Image Analysis and Processing – ICIAP 2005* (Cagliari, Italy, Sept. 6-8, 2005), G. Pastuszak (speaker).

[Con17] *14th International Symposium on Measurements for Research and Industry Applications – 10th Workshop on ADC Modeling and Testing* (Gdynia – Jurata, Poland, Sept. 12-15, 2005), W. Winiecki, P. Bilski (speakers).

[Con18] *European Conference on Circuit Theory and Design: ECCTD 2005* (Cork, Ireland, Aug. 28-Sept. 1, 2005), M. Mikołajewski, P. Bilski (speakers).

[Con19] *IEEE Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications: IDAACS 2005* (Sofia, Bulgaria, Sept. 3-9, 2005), W. Winiecki (member of the ITC, speaker), R. Łukaszewski (speaker).

[Con20] *11th International Conference on Computer Analysis of Images and Patterns – CAIP 2005* (Paris, France, Sept. 5-8, 2005), W. Skarbek, K. Kucharski (speakers).

[Con21] *14th International Conference of Medical Physics* (Nuremberg, Germany, Sept. 14-17, 2005), P. Boniński, A. Wróblewska, P. Bargieł (speakers).

[Con22] *IEEE International Conference on Advanced Video and Signal Based on Surveillance – AVSS 2005* (Como, Italy, Sept. 15-16, 2005), W. Skarbek (speaker).

[Con23] *22nd Annual ESMRMB Meeting* (Basle, Switzerland, Sept. 14-18, 2005), M. Orzechowski, T. Wolak (speakers).

[Con24] *Joint International IMEKO TC1 + TC7 Symposium* (Ilmenau, Germany, Sept. 20-24, 2005), R. Z. Morawski (chairman of TC7, speaker).

[Con25] *13th Conference on Microwave Techniques* (Praque, Czech Republic, Sept. 26-28, 2005), M. Bury, S. Kozłowski (speakers).

[Con26] *2nd International Conference on Image Analysis and Recognition – ICIAR 2005* (Toronto, Canada, Sept. 27 – Oct. 3, 2005), M. Leszczyński (speaker).

[Con27] *IEEE Workshop – Signal Processing 2005* (Poznań, Poland, Sept. 30, 2005), Z. Kulka (session chairman), M. Kostrzewa (participant).

[Con28] *European Microwave Conference* (Paris, France, Oct. 1-7, 2005), J. Modelski (member of the Programme Committee, session chairman), K. Kurek, Y. Yashchyshyn (speakers).

[Con29] *2nd International Conference on e-Business and Telecommunication Networks – ICETE 2005*

(London, Great Britain, Oct. 3-7, 2005), K. Wnukowicz (speaker).

[Con30] *XXVIIIth General Assembly of International Union of Radio Science (URSI)* (New Delhi, India, Oct. 23-29, 2005), T. Kosiło (participant).

[Con31] *2nd Workshop on Immersive Communication and Broadcast Systems – ICOB 2005* (Berlin, Germany, Oct. 26-28, 2005), K. Kucharski, G. Pastuszak (speakers).

[Con32] *International Conference: The Broadband Convergence* (Brussels, Belgium, 6-8 Nov. 2005), J. Wojciechowski (speaker).

[Con33] *IEEE EUROCON 2005 Conference – The International Conference on Computer as a Tool* (Belgrad, Serbia and Montenegro, Nov. 21-24, 2005), J. Modelski (member of the Programme Committee), R. Szumny (speaker).

[Con34] *Asia-Pacific Microwave Conference* (Suzhou, China, Dec. 1-14, 2005), W. Gwarek, M. Celuch-Marcysiak (speakers).

8.2 Local conferences

[Con35] *XI Krajowe Sympozjum Nauk Radiowych: URSI 2005* (XIth National Symposium of Radio Science), (Poznań, Poland, Apr. 7-8, 2005), S. Hahn (chairman of the Programme Committee), T. Kosiło, K. Radecki (members of the Programme Committee) D. Gryglewski, K. Snopek, T. Morawski, J. Zborowska, M. Żukociński (speakers).

[Con36] *VII Sympozjum Naukowe: Modelowanie i Pomiary w Medycynie* (7th Scientific Symposium on Modeling and Measurement in Medicine), (Krynica Górska, Poland, May 8-12, 2005), A. Trybuła (speaker).

[Con37] *Scientific-Technical Conference: Automation – Novations and Perspectives),* (Warsaw, Poland, Apr. 6-8, 2005), W. Winiecki (invited speaker).

[Con38] *Reprogramowalne Układy Cyfrowe: RUC'2005* (Reprogrammable Digital Units), (Szczecin, Poland, May 12-13, 2005), K. Mroczek (participant).

[Con39] *Krajowa Konferencja Radiokomunikacji, Radiofonii i Telewizji: KKRRiT'2005* (National Conference on Radiocommunications, Broadcasting and Television), (Kraków, Poland, Jun. 15-17, 2005), J. Modelski, W. Skarbek (members of the Programme Committee), S. Badura, A. Buchowicz, H. Chaciński J. Cichocki B. Dawidowicz, G. Galiński, K. Ignasiak, D. Gryglewski, J. Guterman, S. Hahn, J. Jarkowski, W. Kazubski, T. Keller, D. Kolmas, J. Kołakowski, G. Kondrak T. Kosiło, M. Kostrzewa, M. Kowalski, K. Kurek, K. Kucharski Z. Kulka, M. Leszczyński, S. Maszczyk, M. Morgoś, G. Pastuszak, A. Pietrowcew, D. Rosołowski, P. Sitek, K. Snopek, M. Stolarski,

R. Szumny, M. Tomaszewski, A. Trojanowski, M. Tymiński, K. Wnukowicz, S. Wydra, Y. Yashchyshyn (speakers).

[Con40] *VII Szkoła-Konferencja Metrologia Wspomagana Komputerowo – MWK'2005* (Waplewo, Poland, May 17-20, 2005), P. Bobiński, R. Łukaszewski (speakers).

[Con41] *IV Krajowa Konferencja Elektroniki: KKE 2005* (IVth National Conference on Electronics), (Darłówko Wschodnie, Poland, Jun. 12-15, 2005), J. Modzelewski, M. Mikołajewski, T. Morawski, J. Zborowska (speakers).

[Con42] *V Ogólnopolska Konferencja Naukowo-Techniczna: Postępy w Elektrotechnice Stosowanej* (V[th] National Conference: Advances in Applied Electrotechnics), (Kościelisko, Poland, Jun. 20-24, 2005), J. Modzelewski (speaker).

[Con43] *Krajowe Sympozjum Telekomunikacji: KST – 2005* (National Symposium on Radiocommunications), (Bydgoszcz, Poland, Sept. 7-9, 2005), J. Modelski (TPC and MC member), S. Wydra (speaker).

[Con44] *XIII Ogólnopolska Konferencja Polskiego Towarzystwa Fizyki Medycznej – Fizyka i Inżynieria we Współczesnej Medycynie i Ochronie Zdrowia* (XIIIth National Conference: Physics and Engineering in the Present Medicine and Health Care), (Warsaw, Poland, Sept. 29-30, 2005), K. Zaremba (chairman of the Organizing Committee), Z. Pawłowski, K. Zaremba (members of the Programme Committee), G. Domański, T. Jamrógiewicz, R. Kurjata, M. Orzechowski, R. Szabatin, T. Wolak (members of the Organizing Committee), D. Janusek, R. Kurjata, A. Przelaskowski, T. Rubel, A. Trybuła, A. Wróblewska (speakers).

[Con45] *II Konferencja: "Telemedycyna i Zastosowanie Nowoczesnych Technologii Informatycznych w Medycynie"* (II Conference: Telemedicine and Applications of Modern Information Technologies in Medicine), (Warsaw, Poland, Oct. 25, 2005), A. Przelaskowski (speaker).

8.3 Schools, seminars and meetings

[Con46] *V Zjazd Polskiego Medycznego Towarzystwa Rezonansu Magnetycznego* (V[th] Meeting of the Polish Society for Magnetic Resonance), (Szczyrk Poland, Jun. 17-19, 2005), P. Bogorodzki, E. Piątkowska-Janko (speakers).

[Con47] *Annual Meeting of the IMEKO General Council and Technical Board* (Brussels, Belgium, Nov. 7-9, 2005), R. Z. Morawski (Polish delegate).

[Con48] *VI Seminarium: Radiokomunikacja i Techniki Multimedialne* (VI Seminar: Radiocommunication and Multimedia Technologies), (Warsaw, Poland, Dec. 7, 2005), H. Kokoszkiewicz, G. Pastuszak, W. Smolik, R. Zubała (speakers).

9 THE PRIZES AND DISTINCTIONS RECEIVED BY THE STAFF

9.1 State Medals

Zbigniew Kulka, D.Sc.

Władysław Skarbek, Prof. D.Sc.

Złoty Krzyż Zasługi (Golden Order of Merit)

Ewa Piątkowska-Janko, Ph.D.

Srebrny Krzyż Zasługi (Silver Order of Merit)

9.2 Award of the Foundation for Polish Science

Józef Modelski, Prof. D.Sc.

The 3-year scholarship providing support to the young scientists being under tutorial assistance of Prof. J. Modelski.

9.3 Award of the Minister of Science and Informatization

Zdzisław Pawłowski, Prof. D.Sc.

Individual award for the outstanding achievements in the research and teaching activities.

9.4 Awards of the Rector

Józef Modelski, Prof. D.Sc.

Jacek Cichocki, Ph.D.,

Yevhen Yashchyshyn, Ph.D.,

Wojciech Kazubski, Ph.D.,

Krzysztof Kurek, Ph.D.,

Maria Tajchert, Ph.D.,

Team award (I^0) for elaboration of the conception and start-up the Laboratory of Basics of Radiocommunications.

Piotr Bogorodzki, Ph.D.,

Piotr Boniński, M.Sc.,

Robert Kurjata, M.Sc.,

Mateusz Orzechowski, M.Sc.,

Ewa Piątkowska-Janko, Ph.D.,

Waldemar Smolik, Ph.D.,

Tomasz Wolak, M.Sc.

Team award (I^0) for the research project: "*Development of a perfusion monitoring system for controlling of surgical, interventional and pharmacological treatments with application of the indicator dilution theory*" (Opracowanie systemu do monitorowania perfuzji podczas zabiegów chirurgicznych, interwencyjnych i farmakologicznych wykorzystującego metody rozcieńczania znacznika).

9.5 Walter Cox Award

Józef Modelski, Prof., D.Sc.

The N. Walter Cox Award has been established in recognition of the qualities of N. Walter Cox and his service to the MTT Society. It is given to a Society volunteer whose efforts on behalf of MTT-S best exemplify Walter's spirit and dedication. This year's recipient is Prof. J. Modelski.

9.6 54th World Exhibition of Innovation, Research and New Technology Award

Roman Szabatin, Ph.D.

Golden medal and diploma for the team involved in EUREKA project titled: *"Application of electrical capacitance tomography for analysis and diagnosis of the dynamic processes within a silo"* (Brussels, Belgium, Nov. 19, 2005).

9.7 Prof. M. Pożaryski Competition

Arkadiusz Kurek, M.Sc.

Individual award (III^0) for the article titled: "*Usage of the radio links and GPS system in devices for the blind people*" printed in "*Przegląd Telekomunikacyjny – Wiadomości Telekomunikacyjne*"

9.8 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.

Warsaw University of Technology, Person of Merit (Zasłużony dla Politechniki Warszawskiej).

9.9 Prizes granted by the Foundation for the Development of Radiocommunications and Multimedia Technologies

Tomasz Keller, Ph.D.

The second prize in the contest for the Best Ph.D. dissertation: "*Analiza możliwości stosowania oraz warunków współistnienia radiowych systemów łączności pracujących w pasmie ISM*" (Analysis of application possibilities and coexistence conditions for radiocommunication systems in ISM band).

Grzegorz Kondrak, M.Sc.

The second prize in the contest for the Young Scientists for the paper: "*Badania czteroelementowego szyku fazowego dla systemu łączności z satelitą na orbicie LEO*" (Investigations of four-element phase array for the communication system with a satellite on LEO orbit), *Mat. Krajowej Konferencji Radiokomunikacji, Radiofonii i Telewizji: KKRRiT 2005* (National Conference on Radiocommunication, Broadcasting and Television), (Kraków, Poland, Jun. 15-17, 2005).

10 STATISTICAL DATA (for Dec. 31st of each year, in full-time equivalents)

SPECIFICATION	2001	2002	2003	2004	2005
academic staff					
total	59.83	59.43	61.33	61.89	61.58
tenured professors	3.4	3.6	3.5	3.4	3.4
professors	7.6	6	5	6.6	7.6
associate professor	3	0	3	3	2.5
assistant professors	41.75	43	42	42.5	42.25
senior lecturers	4.83	4.83	4.83	4.83	4.83
lecturers	0	0	0	0	0
assistants	1	2	3	1.5	1
Ph.D. students					
total	50	49	39	43	37
regular	19	13	1	0	0
regular, the third level studies	17	26	26	24	23
without scholarship	14	10	12	19	14
technical and administrative staff					
total	23	20	19	22.65	20.4
R&D associates	12	9	9	11.15	8.9
administrative associates	9	9	8	8.5	8.5
librarian	1	1	1	1	1
service workers	2	2	2	2	2
space					
total [m^2]	2549.1	2549.1	2592.1	3308.1	3308.1
laboratories	1172.8	1172.8	1279.8	1342.0	1342.0
library	71.2	71.2	71.2	71.2	71.2
offices of academic staff	1305.6	1305.6	1241.1	1241.1	1241.1
library resources					
books (number of volumes)	14302	14543	14756	15133	15344
books (number of titles)	7894	8012	8107	8262	8353
journals (number of titles subscribed to)	125	125	125	125	126
teaching activities					
basic courses	26	28	35	37	33
advanced courses	47	49	47	48	59
other courses	70	58	57	59	80
international projects	1	1	1	1	3
research projects					
total	53	40	52	58	46
granted by the University	24	16	24	20	15
granted by the State institutions	14	15	16	12	11
other projects	15	9	12	26	20
titles and degrees awarded					
Prof. titles	2	1	1	0	0
D.Sc. degrees	0	0	3	2	0
Ph.D. degrees	5	5	1	6	5
M.Sc. degrees	72	83	91	85	50
B.Sc. degrees	56+77	53+29	54+32	58+54	51+14
B.Sc. degrees (English-medium-studies)	0	5	0	4	7
publications					
total	146	149	185	222	223
sci.-tech. books and chapters in books	4	2	3	1	6
sci.-tech. papers in journals	41	19	59	52	62
sci.-tech. papers in conf. proceedings	83	119	110	145	131
textbooks	1	0	0	5	3
other publications	17	9	13	19	21
research reports	44	38	37	43	27
patents granted	0	0	2	0	0
conferences					
conferences attended by the staff	34	41	47	39	48
participants from the Institute	88	93	107	143	138

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 three 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*;
- **Tenured Professor** – the holder of a *profesor* academic title in the post of *profesor zwyczajny*.