INSTITUTE OF RADIOELECTRONICS

WARSAW UNIVERSITY OF TECHNOLOGY

FACULTY OF ELECTRONICS AND INFORMATION TECHNOLOGY

ANNUAL REPORT

2012

Warsaw, February 2013

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From the Director

Welcome to the 2012 edition of our Annual Report!

The last year has been very successful for the Institute practically in all the fields of its activity, but particularly in the staff advancement and promotion, research projects and building of the laboratory infrastructure. The main areas of research and development, in which the Institute has had a high position for several years and noted significant progress include: radiocommunications and radionavigations, multimedia techniques as well as biomedical engineering.

2012 was another successful year in both research and teaching activities – with 149 academic courses, 207 B.Sc. and M.Sc. theses (defended), 168 publications and 44 research projects with the budget of over 1,3 million Euros.

All the achievements that we were able to attain in the previous year, ought to be attributed to our excellent, highly-motivated staff. Currently, most of our Professors, are universally recognized as authorities in their domains, including electromagnetic simulations, intelligent multimedia systems, smart antennas, signal theory and signal processing, biomedical engineering and the design of the apparatus for the experiments in high energy physics. Moreover, many of them have recently taken up appreciable positions in the world of science – they have become leaders of the world-famous conferences, professional associations as well as scientific projects. Professor Krzysztof Zaremba received the title of the professor of technical sciences and Doctor Piotr Bogorodzki defended his habilitation, what resulted in increasing the number of professors to 15 (with professor titles to 9 ones). Professor Roman Morawski received a prestigious Distinguished Service Award of the International Measurement Confederation IMEKO. Professor Modelski was elected to the IEEE Board of Directors. Apart from the above-mentioned details regarding our senior staff, it is worth paying special attention to the young crew and their scientific achievements. The past year will be remembered as the year of seven successful Ph.D. dissertations defenses and many in their finishing phases. Moreover, most of these works are characterized by their strictly applicable contents. Such a trend gives a fair promise that next years will prove to be even more productive. Furthermore, a great deal of scientific notabilities have emerged from among our young assistant professors, who engage themselves in carrying out of various national and international projects.

Particular spotlight and significance should be given to new investments in our infrastructure. The former antenna laboratory has been replaced by the new *Antenna and Sub-Terahertz* one, equipped with a unique test set consisting of a PNA-X Vector Network Analyzer and frequency extenders up to 500 GHz. It has been funded from the FOTEH project for the sum of about one million Euros. The main part of the laboratory is an anechoic chamber with the relevant devices for measurements up to 26 GHz. The new *Preclinical Magnetic Resonance Research Laboratory* (PMRL) was funded in the frame of two projects – CePT and FSPT by the sum of over one million Euros. The PMRL is equipped with two low field 0.25 T body scanners, prototype system for hyperpolarization of the noble gases (He3 and Xe129) and specialized microwave network analyzers.

I would like to sincerely thank all the co-workers of the Institute of Radioelectronics for their deep involvement, hard work and dedicated service as well as express a special gratitude to our Grantors, Sponsors, all the Co-operators and Friends of the Institute, without whom we would have not been able to achieve our aims.

Warsaw, January 2013 Professor Józef Modelski

Classification of publications presented in this Report
is in accordance with the rules in force in 2012

Contents

1. GENERAL INFORMATION

1.1. Mission of the Institute

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

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

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

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

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

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

1 .2. Board of Directors

Director of the Institute:

Józef Modelski, Prof. D.Sc., Tenured Professor
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Secretariat:

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Deputy Director for Research

Wiesław Winiecki, Prof. D.Sc., Professor
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Secretariat:

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Deputy Director for Academic Affairs:

Piotr Brzeski, Ph.D., Reader (till Aug. 2012)
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Jacek Cichocki, Ph.D., Reader (from Sept. 2012)
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1.3. Organisation of the Institute

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

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

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

1.3.1. Electroacoustics Division

Head of Division:

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

Wiesław Winiecki, Prof. D.Sc., Professor

Jan Żera, D.Sc., Professor

Piotr Bilski, Ph.D., Assistant Professor (0.5 till Mar., 0.75 from Apr. 2012)

Piotr Bobiński, Ph.D., Assistant Professor

Ewa Kotarbińska, Ph.D., Assistant Professor (0.5 till Apr., 0.25 from May 2012)

Robert Łukaszewski, Ph.D., Assistant Professor

Krzysztof Mroczek, Ph.D., Assistant Professor

Maria Tajchert, Ph.D., Assistant Professor (0.75 till Feb., 0.4 from Mar., 2012)

Junior academic staff

Marcin Lewandowski, M.Sc. Assistant (0.75)

Technical staff

Andrzej Leszczyński, Ph.D., Senior R&D Eng. (0.5 till Dec. 2012)

Piotr Nykiel, M.Sc., Senior Development Engineer

Ph.D. Students

Paweł Czernik, M.Sc., from Oct. 2008

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

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

Agata Rogowska, M.Sc., from Oct. 2012

Aneta Świercz, M.Sc., from Feb. 2008

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

The activities of the Division concern electroacoustics and digital audio techniques, including investigations, measurements and applications. They are focused on:
foundamentals of acoustics;
- electroacoustics;
- psychoacoustics;
- digital audio;
- design and measurements of electroacoustic transducers;
- investigation and modeling of acoustic field distribution;
- noise control and active noise reduction;
- architectural and industrial acoustics;
- sound studio techniques;
- hearing protection.

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

The other field of interest concerns fundamental and applied research associated with metrology, instrumentation and measuring systems. It is focused on design of automated computer-based measuring systems. Current research topics include:
- modern information technologies, e.g. LabVIEW, Java, XML, and modern communication technologies, e.g. the Internet, GSM, Bluetooth, ZigBee in distributed control and measuring systems;
- information security of distributed measuring systems;
- virtual instrumentation, plug-in boards for data acquisition, IEEE-488 equipment;
- modern real-time systems, eg.: cRIO, ETX, RTX.

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

1.3.2. Microwave and Radiolocation Engineering Division

Microwave and Radiolocation Engineering Division

Head of Division

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Senior academic staff

Tadeusz Morawski, Prof. D.Sc., Tenured Professor (0.5)

Stanisław Rosłoniec, Prof. D.Sc., Professor

Małgorzata Celuch, Ph.D., Assistant Professor

Daniel Gryglewski, Ph.D., Assist. Professor

Paweł Kopyt, Ph.D., Assistant Professor

Sebastian Kozłowski, Ph.D., Assistant Professor

Przemysław Miazga, Ph.D., Assistant Professor

Dawid Rosołowski, Ph.D., Assistant Professor (from Apr. 2012)

Bartłomiej Salski, Ph.D., Research Assist. Prof. (0.4 till Sept. 2012), Assist. Prof. (1 from Oct. 2012)

Maciej Sypniewski, Ph.D., Assistant Professor

Andrzej Więckowski, Ph.D., Assistant Professor (1 till Jun. 2012, 0.5 from Jul. 2012 till Sept. 2012)

Wojciech Wojtasiak, Ph.D., Assistant Professor

Research staff of the HEECS, ENIAC JU Project

Andrzej Więckowski, Ph.D., Senior R&D Eng. (0.5 from Nov. 2012)

Technical staff

Mirosław Lubiejewski, Foreman

Ph.D. students

Michał Gasztold, M.Sc., from Oct. 2012

Łukasz Gotszald, M.Sc., from Oct. 2011

Przemysław Korpas, M.Sc., from Feb. 2010

Marzena Olszewska, M.Sc., from Feb. 2010

Przemysław Probola, M.Sc., from Oct. 2012

The Microwave and Radiolocation Engineering Division conducts scientific and applied research in the area of electromagnetic field theory, microwave theory and techniques, and measurement techniques for very high frequency ranges. This includes the subjects of computer-aided design, data acquisition and data processing. Specific research topics in 2012 included: design of high-frequency systems for radiocommunication and radar applications (oscillators, synthesizers, modulators, amplifiers, transmitter/receiver modules); methods of synthesis and computer-aided design of passive and active microwave circuits (couplers, power combiners and dividers, switches, transistor circuits); analysis and design of multi-element planar in-phase radar antenna arrays intended to work at high power level; numerical electromagnetic compatibility analysis; methods for measurements of electric and magnetic properties of materials at microwave frequencies; development of numerical methods and implementation of computer programs for full-wave analysis and design of two- and three-dimensional microwave circuits (filters, periodic guiding structures, matching circuits, structures incorporating dispersive and anisotropic media, antennae); methods of coupled electromagnetic-thermodynamic simulations, design of microwave heating applicators for material science applications; methods of coupled electromagnetic-optical modeling; radio-frequency identification and wireless sensing; development of multithread and distributed programming techniques, non-linear programming, and artificial intelligence methods for application in automated design of microwave circuits.

1.3.3. Nuclear and Medical Electronics Division

Head of Division

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Senior academic staff

Janusz Marzec, D.Sc., Professor

Piotr Brzeski, Ph.D., Reader

Roman Szabatin, Ph.D., Reader (1 till Sept., Assistant Professor, 0.75 from Oct. 2012)

Piotr Bogorodzki, D.Sc., Associate Professor

Grzegorz Domański, Ph.D., Assistant Professor

Bogumił Konarzewski, Ph.D., Assistant Professor

Robert Kurjata, Ph.D., Assistant Professor

Ewa Piątkowska-Janko, Ph.D., Assistant Professor

Dariusz Radomski, Ph.D., Research Assistant Professor

Tymon Rubel, Ph.D., Assistant Professor

Błażej Sawionek, Ph.D., Assistant Professor (0.5), Senior R&D Eng. (0.5)

Waldemar Smolik, Ph.D., Assistant Professor

Tomasz Jamrógiewicz, M.Sc., Senior Lecturer

Tomasz Olszewski, M.Sc., Senior Lecturer

Junior academic staff

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

Technical staff

Andrzej Wasilewski, Worker (0.75)

Joanna Witkowska, Specialist

Ph.D. students

Stanisław Adaszewski, M.Sc., from Feb. 2009

Krzysztof Chojnowski, M.Sc., from Feb. 2012

Wojciech Gradkowski, M.Sc., from Oct. 2010

Łukasz Kołaszewski, M.Sc., from Feb. 2009

Jacek Kryszyn, M.Sc., from Oct. 2012

Wojciech Obrębski, M.Sc., from Oct. 2008

Piotr Płoński, M.Sc., from Oct. 2010

Andrzej Rychter, M.Sc., from Oct. 2011

Konrad Werys, M.Sc., from Feb. 2011

Retired:

Zdzisław Pawłowski, Prof. D.Sc., Tenured 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 high energy physics experiments. The Division's research is focused on the following topics:

- nuclear medicine (emission tomography: SPECT, PET);
- magnetic resonance imaging (MRI), functional MRI, advanced applications of MRI;
- optical tomography;

- quantitative computer-aided tomography;
- tomographic dynamic studies;
- process tomography, impedance tomography;
- analogue and digital radiography;
- medical image processing and recognition;
- methods and instrumentation for electrocardiography;
- medical applications of isotope techniques;
- telemedicine;
- design of apparatus and software for high energy physics experiments;
- data analysis in genetics and proteomics;
- mathematical modeling of physiological and disease processes.

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

1.3.4 Radiocommunications Division

Head of Division

Yevhen Yashchyshyn, D.Sc., Professor
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Senior academic staff

Józef Modelski, Prof. D.Sc., Tenured Professor

Jacek Wojciechowski, Prof. D.Sc., Tenured Professor

Jacek Cichocki, Ph.D., Reader

Tomasz Kosiło, Ph.D., Reader (1 till Sept., 0.75 from Oct., 2012)

Paweł Bajurko, Ph.D., Assist. Professor (from Oct. 2012)

Tomasz Buczkowski, Ph.D., Assist. Professor (till Sept. 2012)

Marek Bury, Ph.D., Assistant Professor

Krzysztof Czerwiński, Ph.D., Assist. Prof. (0.5 till Dec. 2012')

Krzysztof Derzakowski, Ph.D., Assistant Professor

Wojciech Kazubski, Ph.D., Assistant Professor

Tomasz Keller, Ph.D., Assistant Professor

Jerzy Kołakowski, Ph.D., Assistant Professor

Sebastian Kozłowski, Ph.D., Assistant Professor

Krzysztof Kurek, Ph.D., Assistant Professor

Ryszard Michnowski, Ph.D., Assistant Professor

Mirosław Mikołajewski, Ph.D., Assistant Professor

Juliusz Modzelewski, Ph.D., Assistant Professor

Karol Radecki, Ph.D., Assistant Professor (1 till Jul., 0,75 from Oct. 2012)

Kajetana Snopek, Ph.D., Assistant Professor

Henryk Chaciński, M.Sc., Senior Lecturer

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

Marcin Piasecki, Ph.D., Research Assistant Prof. (0.5 from. Nov. 2012)

Paweł Bajurko, M.Sc., Research Assistant (0.95 from Jan. till Jun. 2012), Ph.D., Research Assistant Prof. (0.5 from Aug. 2012 till Sept. 2012)

Technical staff

Anna Czarnecka, M.Sc., Senior Admin. Specialist

Jacek Jarkowski, Ph.D., Senior R&D Engineer (0.25)

Marek Marcinkowski, Senior Foreman (0.75)

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

Ph.D. students

Adrian Bilski, M.Sc., from Feb. 2011

Marcin Darmetko M.Sc., from Feb. 2012

Tomasz Filipek, M.Sc., from Oct. 2012

Konrad Godziszewski, M.Sc., from Feb. 2011

Piotr Grabowski, M.Sc., from Feb. 2011

Anna Łysiuk (Urzędowska), M.Sc., from Oct. 2010

Bartosz Majewski, M.Sc., from Oct. 2010

Piotr Makal, M.Sc., from Feb. 2008

Wojciech Pieńkowski, M.Sc., from Oct. 2010

Retired

Jan Ebert, Prof. D.Sc., Tenured Professor

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

Waldemar Kiełek, D.Sc.

Tomasz Buczkowski, Ph.D., Assistant Professor

The research and teaching activities of the Radiocommunications Division are related to radiocommunication systems and networks, including antennas, signal processing and measurement techniques. The research is focused on analog and digital radio transmission. It includes system design with advanced CAD software, particularly cellular and short range systems, as well as some aspects of electromagnetic compatibility, numerous measurements issues and deep insight into antenna techniques.
The most important research topics include analysis, development and investigation of:
- radiocommunication systems and networks – cellular networks (3G and beyond 3G), short range systems, ad-hoc networks, satellite systems and broadband access networks, MIMO systems;
- wireless ultra-wideband systems (UWB) – methods and systems for communication and localization, systems for road safety, microwave imaging systems;
- antennas and radio channel – electrodynamic modeling and design of various types of microwave, millimeter, submillimeters and terahertz antennas, including electronically controlled and reconfigurable antennas, photonic antennas, integrated antennas; channel modeling and simulation for MIMO, UWB and cellular systems;
- measurements – spectrum monitoring methods and systems; channel and antenna including automatic far and near-field measurements of antennas

characteristics in time and frequency domain, antenna and channel pulse response, transfer functions of UWB antennas, transient states in reconfigurable antennas;
- RF circuits and microwave devices – high-efficiency resonant power amplifiers (class D, DE, E, F and G), linear wide-band HF amplifiers, high-power amplitude modulators, high-efficiency power supplies, power factor correctors, LNA, microwave filters and phase shifters and their applications in radio transmitters, receivers, and industrial electronics;
- digital radio broadcasting systems – MF and HF DRM transmitters and receivers;
- theory of signals and modulations – multidimensional Hilbert transform and its applications, "time-frequency" transformations for RF signal processing, applications of "time-frequency" techniques in audio watermarking;
- environmental, biological and social problems – the influence of radiocommunication systems on a human health and environment as well as on electronic equipment, protection zones planning, radio systems for aid and support of disabled persons;
- design of large-scale telecommunication networks, designing of the topology of access and aggregation networks, localization of: Content Delivery Network nodes, gateway nodes in sensor networks. Routing in wireless sensor networks;
- fault diagnosis – detection and localization of faults in analog systems of different physical nature, e.g. electronic, mechanical;
- data exploration – large data basis is searched with the aid of graph models. Classification of graphs can be done on the basis of the graph structural patterns, e.g. contrast subgraphs and common subgraphs, Coulomb excitation data analysis – analysis of the data from nuclear physics experiments to approximate the shape of nuclei.

1.3.5. Television Division

Head of Division

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Senior academic staff

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Artur Przelaskowski, D.Sc., Professor

Andrzej Buchowicz, Ph.D., Assistant Professor

Grzegorz Galiński, Ph.D., Assistant Professor

Krystian Ignasiak, Ph.D., Assistant Professor

Andrzej Miękina, Ph.D., Assistant Professor

Jacek Naruniec, Ph.D., Assist. Professor

Grzegorz Pastuszak, Ph.D., Assistant Professor

Andrzej Podgórski, Ph.D., Assistant Professor

Marek Rusin, Ph.D., Reader (0.25)

Tomasz Krzymień, M.Sc., Senior Lecturer (1 till Sept., 0.5 from Oct. 2012)

Junior academic staff

Rafał Jóźwiak, M.Sc., Assistant (0.9)
Grzegorz Ostrek, M.Sc., Assistant (0.5 from Jun. 2012)

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

Andrzej Abramowski, M.Sc., Research Assistant (0.95 from Jan. 2010 till Dec. 2012)

Grzegorz Brzuchalski, M.Sc., Research Assistant (0.95 from Jul. 2009 till Dec. 2012)

Mikołaj Roszkowski, M.Sc., Research Assistant (0.95 from Jan. 2010 till Dec. 2012)

Radosław Sikora, Ph.D., Research Assist. Prof.(0.95 from Jul. 2009 till Jul. 2012)

Michał Wieczorek, Resear. Assistant (0.95 from Jul. 2010 till Dec. 2012)

Technical staff

Tomasz Smakuszewski, M.Sc., R&D Eng. (0.35 till Sept. 2012)

Ph.D. students

Andrzej Abramowski, M.Sc, from Feb. 2011

Grzegorz Brzuchalski, M.Sc., from Feb. 2011

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

Rafał Jóźwiak, M.Sc., from Oct. 2006 till Oct. 2012

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

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

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

Maciej Trochimiuk, M.Sc., from Oct. 2012

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

Television Division conducts scientific and applied research in multimedia technologies. The Division is also experienced in multimedia standards and platforms with a special emphasis on tools for collaborative e-learning using media streaming and searching techniques. Recently, important topic of the research is implementation of standard multimedia algorithms in heterogeneous architectures. The Division continues its efforts in the development of MPEG-4 and MPEG 7. The staff actively works in Multimedia Technical Committee no. 288 at Polish National Committee for Standardization (hosted at the Institute of Radioelectronics).
Specific research topics include:
- video and audio compression;
- multicamera systems and 3D modeling;
- image semantic analysis;
- indexing and searching;
- intelligent multimedia systems.

Telemedicine Group extends the area of image theory and information processing to teleradiology, e-health and computer-aided diagnosis systems. Fundamentals of medical imaging, image analysis and processing, soft computing for decision support, information theory and codes are used for the following research topics:
- image-based teleconsultations and telediagnosis;
- computer-assisted diagnosis for mammography, chest radiography;
- brain imaging and computer assistance of stroke diagnosis;
- computer assistance of abdominal CT examinations;
- ultrasound imaging and 3D visualization systems;
- medical information systems (HIS/RIS/PACS);
- medical image and data codecs;
- sparse data representation and compressive sensing for disease extraction.

Digital Processing of Measurement Signals Group is active in the field of measurement science and technology. Its research activities are focused on improving the quality of measurements by means of digital signal processing. The current research topics include:
- general-purpose algorithms for reconstruction of measurands and for calibration of measuring channels;
- spectrophotometric analyzers of food;
- portable sound-and-vibration analyzers for applications in technical diagnostics and in the environmental monitoring;
- ethical aspects of measururement-based empirical research.

1.4. Evening Studies and Continuing Education

1.4.1. M.Sc. Evening Studies on Radio-communications and Multimedia Technologies

Head

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Secretariat

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1.4.2. Engineer Degree Evening Studies on Radiocommunications and Multimedia Technologies

Head

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1.4.3. Studies on Radiocommunications, Multimedia Technologies and Biomedical Engineering "RADEM"

Head

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Secretariat

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Program Board

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

1.4.4. Environmental Noise Course

Head

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Secretariat

Joanna Witkowska
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[Edu34], [Edu74]; [Pro3], [Pro25]; [BSc76]; [Pub29], [Pub98], [Pub100], [Pub101], [Pub111], [Pub122], [Pub134], [Pub135], [Pub136], [Pub164], [Pub166], [Pub168].

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[Edu50], [Edu53], [Edu111], [Edu124], [Edu125], [Edu129]; [Pro29], [Pro38]; [MSc11], [MSc26], [MSc61].

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[Edu33], [Edu50], [Edu85]; [Pro2], [Pro3], [Pro9], [Pro18], [Pro25]; [BSc84]; [Pub42], [Pub47], [Pub58], [Pub87], [Pub94], [Pub95], [Pub97], [Pub107], [Pub120], [Pub121], [Pub122], [Pub142].

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[Edu22], [Edu68], [Edu103]; [Pro29], [Pro38]; [MSc23], [MSc41], [MSc44], [MSc63]; [BSc108]; [Pub39], [Pub55], [Pub159].

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[Edu25], [Edu26], [Edu57], [Edu159], [Edu160], [Edu 161]; [Pro1], [Pro14], [Pro15], [Pro19], [Pro27], [Pro39]; [PhD4]; [Pub45], [Pub60], [Pub109], [Pub110], [Pub115], [Pub156], [Pub159].

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[Edu71]; [Pro1], [Pro35], [Pro40]; [BSc40], [BSc83], [BSc91], [BSc96].

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[Edu28], [Edu39]; [Pro11], [Pro26], [Pro41]; [BSc101], [BSc116]; [Pub144].

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[Edu87]; [Pro1], [Pro7], [Pro35]; [MSc48], [MSc58]; [BSc12], [BSc15], [BSc118]; [Pub4], [Pub67], [Pub128], [Pub139].

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Tutorial assistance of Biomedical and Nuclear Engineering Students Scientific Group ('06-), and Beskid Mountain Guides Student Circle (-99'); qualification levels PRINCE2 Foundation ('09).
[Edu39]; [Pro26]; [MSc2], [MSc28], [MSc29]; [Pub172].

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[Edu14], [Edu37], [Edu45], [Edu46]; [Pro12], [Pro34]; [BSc93], [BSc135].

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[Edu9], [Edu19], [Edu76], [Edu79], [Edu92]; [Pro16], [Pro20], [Pro31]; [MSc25], [MSc42], [MSc65]; [BSc26], [BSc52], [BSc70], [BSc74], [BSc81], [BSc92], [BSc117], [BSc132]; [Pub89], [Pub126], [Pub131], [Pub132].

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[Edu117], [Edu131], [Edu140]; [Pro29]; [MSc8], [MSc56]; [BSc106]; [Pub34], [Pub54].

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[Pro13], [Pro26].

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[Edu16], [Edu80]; [Pro25]; [PhD2]; [Pub50], [Pub51], [Pub52].

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[Pro25]; [PhD7]; [Pub137].

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[Edu93], [Edu118]; [BSc62], [BSc97], [BSc109], [BSc124]; [Pub18], [Pub23], [Pub133].

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[Edu17], [Edu58], [Edu66].

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[Edu158]; [Pro4], [Pro25], [Pro36]; [Pub5], [Pub21], [Pub27], [Pub28], [Pub29], [Pub98], [Pub107],

[Pub111], [Pub122], [Pub142], [Pub164], [Pub167], [Pub168], [Pub169].

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[Pro1], [Pro26]; [Pub172].

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[Edu69], [Edu70], [Edu71], [Edu91], [Edu95]; [Pro35], [Pro40]; [PhD3]; [MSc9], [MSc18], [MSc30], [MSc49]; [BSc10], [BSc50], [BSc73]; [Pub79], [Pub143].

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[Edu47], [Edu51], [Edu75]; [Pro11], [Pro16], [Pro26], [Pro41]; [MSc3], [MSc39]; [BSc111], [BSc126]; [Pub106], [Pub144], [Pub145].

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[Edu59], [Edu60], [Edu131], [Edu138]; [Pro33]; [MSc68]; [BSc18], [BSc47], [BSc104], [BSc132]; [Pub30].

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[Edu47], [Edu49]; [Pro25]; [BSc61]; [Pub140].

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[Edu39], [Edu44], [Edu98]; [Pro11], [Pro26], [Pro41]; [MSc32], [MSc38]; [BSc35]; [Pub106], [Pub144].

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[Edu1], [Edu141], [Edu142], [Edu155], [Edu156]; [Pro23]; [MSc55], [MSc57]; [BSc2].

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[Edu49]; [Pro3], [Pro25]; [MSc16]; [Pub100], [Pub101], [Pub111], [Pub134], [Pub135], [Pub136], [Pub166], [Pub168].

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[Edu2], [Edu38], [Edu62], [Edu84], [Edu108]; [Pro24]; [MSc35]; [Pub16], [Pub36], [Pub41], [Pub48], [Pub49], [Pub75], [Pub83], [Pub92], [Pub125].

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Member of the Scientific Committees of: International Conference on Signals and Electronics Systems ('97-), Conference on Evolutionary Algorithms and Global Optimization ('97-); Coordinator of the cooperation agreement between WUT and University of Waterloo, Canada ('93-); Adviser to Wydawnictwo Komunikacji i Łączności – a publishing house in engineering ('97-); Associate Editor of *Journal of the Franklin Institute* ('07-).
[Edu24], [Edu26], [Edu60], [Edu89], [Edu136]; [Pro33]; [Pub76].

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[Edu40], [Edu80]; [Pro10], [Pro17], [Pro25], [Pro42]; [MSc34], [MSc69]; [BSc39], [BSc43], [BSc94]; [Pub2], [Pub17], [Pub42], [Pub85], [Pub86], [Pub94], [Pub95], [Pub97], [Pub98], [Pub99], [Pub137], [Pub164].

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[Edu4], [Edu72], [Edu96]; [Pro1], [Pro14], [Pro15], [Pro28]; [PhD1]; [MSc33]; [BSc7], [BSc69] [BSc114]; [Pub53], [Pub57], [Pub59], [Pub115], [Pub146], [Pub148], [Pub149], [Pub154], [Pub155], [Pub156], [Pub157], [Pub158].

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Member of CERN ('89-); Head of the Warsaw Branch of Polish Society of Medical Physics ('01-); Head of the Dean's Financial Committee ('02-); Member of the Faculty Accreditation Board ('07-); Member ('05-) and Vice-chairman of the University Council Committee on Property and Finances ('12-); Member of the Scientific Board of the PhD Students and Young Scientists Conference *Young scientists towards the challenges of modern technology* ('08-); Member of the Scientific Board of Inter. Forum on Innovative Technologies for Medicine ITMED ('07-), Chairman of the Scientific Committee ITMED, Member of the Scientific Committee of the Symposium *New Trends in Audio and Video* ('08-); Member of the Editorial Advisory Board of the *Polish Journal of Medical Physics and Engineering* ('07-), Head of the Area of Concentration Electronics and Information Technology in Medicine ('06-); Deputy Chairman of the Board of the Center for Imaging and Biomedical Research ('06-); Member of the Board of Polish Eastern Medical Cluster ('08-), Member of the Coordinating Committee ('10-); Faculty Coordinator of Faculty Development ('08-'12); Faculty Coordinator of Area of Studies Biomedical Engineering ('08-); University Coordinator of Area of Studies Biomedical Engineering ('09-'12); Member of the Programme Committee of the 3rd International Conference "Computers in Biomedicine 2012".
[Edu56], [Edu97], [Edu101]; [Pro5], [Pro6], [Pro22], [Pro26]; [Prof1]; [PhD6]; [MSc21]; [BSc33], [BSc64], [BSc86], [BSc128]; [Pub6], [Pub7], [Pub8], [Pub9], [Pub10], [Pub11], [Pub12], [Pub13], [Pub14], [Pub15], [Pub69], [Pub130], [Pub133], [Pub171].

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[Edu8], [Edu42], [Edu90]; [Pro21], [Pro23]; [MSc45], [MSc53]; [BSc27], [BSc37], [BSc60], [BSc75]; [Pub104], [Pub105].

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Adrian Bilski, M.Sc.*	*(J. Wojciechowski)*
Grzegorz Brzuchalski, M.Sc.	*(W. Skarbek)*
Krzysztof Chojnowski, M.Sc.	*(K. Zaremba)*
Paweł Czernik, M.Sc.*	*(W. Winiecki)*
Marcin Darmetko, M.Sc.	*(J. Modelski)*
Tomasz Filipek, M.Sc.	*(Y. Yashchyshyn)*
Michał Gasztold, M.Sc.*	*(S. Rosłoniec)*
Konrad Godziszewski, M.Sc.	*(Y. Yashchyshyn)*
Łukasz Gotszald, M.Sc.*	*(W. Gwarek)*
Piotr Grabowski, M.Sc.*	*(J. Wojciechowski)*
Wojciech Gradkowski, M.Sc.	*(P. Bogorodzki)*

Magdalena Jasionowska, M.Sc. *(A. Przelaskowski)*
Łukasz Kołaszewski, M.Sc. *(P. Bogorodzki)*
Przemysław Korpas, M.Sc. *(W. Gwarek)*
Jacek Kryszyn, M.Sc. (*K. Zaremba)*
Marcin Lewandowski, M.Sc.* *(Z. Kulka)*
Anna Łysiuk (Urzędowska), M.Sc.* *(Y. Yashchyshyn)*
Bartosz Majewski, M.Sc,* *(Y. Yashchyshyn)*
Piotr Makal, M.Sc.* *(J. Modelski)*
Wojciech Obrębski, M.Sc.* *(K. Zaremba)*
Marzena Olszewska, M.Sc. *(W. Gwarek)*
Jakub Olszyna, M.Sc.* (*W. Winiecki)*
Grzegorz Ostrek, M.Sc.* *(A. Przelaskowski)*
Wojciech Pieńkowski, M.Sc.* *(J. Modelski)*
Piotr Płoński, M.Sc. (*K. Zaremba)*
Przemysław Probola, M.Sc.* *(W. Gwarek)*
Agata Rogowska, M.Sc. *(J. Żera)*
Mikołaj Roszkowski, M.Sc. *(W. Skarbek)*
Aleksandra Rutczyńska, M.Sc.* *(A. Przelaskowski)*
Andrzej Rychter, M.Sc. *(J. Marzec)*
Aneta Świercz, M.Sc.* *(J. Żera)*
Maciej Trochimiuk, M.Sc. *(W. Skarbek)*
Konrad Werys, M.Sc.* *(P. Bogorodzki)*
Michał Wieczorek, M.Sc. *(W. Skarbek)*
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3. TEACHING ACTIVITIES

(the summer semester of the academic year 2011/2012 and the winter semester of the academic year 2012/2013)

3.1. Regular studies – Areas of Focus:

Radiocommunications and Multimedia Technologies

Head

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

Head

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3.1.1. Basic courses

[Edu1] *Acoustics in Architecture* (Akustyka w architekturze – AK); 15h/sem.; M. Tajchert, A. Leszczyński.

[Edu2] *Acquisition and Data Processing Using LabVIEW* (Akwizycja i przetwarzanie danych z wykorzystaniem LabVIEW – LABV); 30h/sem.; W. Winiecki, P.Bobiński.

[Edu3] *Analysis of Measurement Data in Medicine* (Analiza danych pomiarowych w medycynie – ADP); 45h/sem.; B. Konarzewski.

[Edu4] *Antennae and Radiowave Propagation* (Anteny i propagacja fal – AIPF); 45h/sem.; Y. Yashchyshyn.

[Edu5] *Basic Radio-frequency Circuits* (Podstawowe układy radioelektroniczne – PURAD); 45h/sem.; J. Modzelewski, W. Kazubski.

[Edu6] *Basics of Digital Technique* (Podstawy techniki cyfrowej – PTCY); 45h/sem.; L. Raczyński, K. Mroczek.

[Edu7] *Basics of Electroacoustic Techniques* (Podstawy elektroakustyki – PTD); 45h/sem.; P. Bobiński.

[Edu8] *Basics of Hearing and Sound Perception* (Podstawy słyszenia i percepcja dźwięku – PSPD); 30h/sem.; J. Żera.

[Edu9] *Basics of Image Diagnostics Engineering* (Podstawy inżynierii diagnostyki medycznej – PIDOM); 45h/sem.; A. Przelaskowski.

[Edu10] *Basics of Information Techniques* (Podstawy technik Informacyjnych – PTIB); 30h/sem.; R. Kurjata.

[Edu11] *Basics of Medical Imaging* (Podstawy obrazowania medycznego – POMED); 45h/sem.; P. Brzeski.

[Edu12] *Basics of Medical Imaging Techniques* (Podstawy technik obrazowania w medycynie – PTOM); 60h/sem.; P. Brzeski.

[Edu13] *Basics of Microprocessor Technique* (Podstawy techniki mikroprocesorowej – TMIK); 60h/sem.; K. Czerwiński, B. Konarzewski, K. Derzakowski, T. Krzymień.

[Edu14] *Basics of Programming* (Podstawy programowania – PRM); 60h/sem.; A. Podgórski.

[Edu15] *Basics of Radiocommunications* (Podstawy radiokomunikacji – PR); 45h/sem.; T. Kosiło.

[Edu16] *Basics of Radiolocation and Radionavigation* (Podstawy radiolokacji I radionawigacji – PRIR); 45h/sem.; S. Rosłoniec.

[Edu17] *Basics of Image Techniques* (Podstawy techniki obrazowej – PTO); 45h/sem.; G. Galiński, M. Rusin.

[Edu18] *Broadcasting Systems* (Systemy radiofoniczne – SYR); 45h/sem.; H. Chaciński.

[Edu19] *Computer Graphics* (Grafika komputerowa – GRK); 30h/sem.; A. Przelaskowski.

[Edu20] *Construction of High Quality Audio Equipment* (Konstrukcja urządzeń audio wysokiej jakości – KUA); 30h/sem.; P. Nykiel.

[Edu21] *Detection of Nuclear and Biomedical Signals* (Detekcja sygnałów biomedycznych i jądrowych – DSBJ); 60h/sem.; J. Marzec.

[Edu22] *Digital Cellular Systems* (Cyfrowe systemy komórkowe – CSK); 45h/sem.; J. Kołakowski.

[Edu23] *Digital Circuits* – EDC1; 30h/sem.; P. Miazga (English-medium studies).

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

[Edu25] *Diploma Seminar for Graduate Students 1* (Seminarium dyplomowe magisterskie 1 – SDM1); 30h/sem.; J. Modelski, P. Brzeski, Z. Kulka.

[Edu26] *Diploma Seminar for Graduate Students 2* (Seminarium dyplomowe magisterskie 2 – SDM2); 30h/sem.; Z. Kulka, J. Modelski, J. Marzec, J. Wojciechowski, P. Brzeski.

[Edu27] *Diploma Seminar for Undergraduate Students* (Seminarium dyplomowe inżynierskie – SDI); 30h/sem.; P. Brzeski, T. Morawski.

[Edu28] *Digital Systems* (Układy cyfrowe – UCYF); 15h/sem.; K. Mroczek, T. Olszewski.

[Edu29] *Electroacoustics* (Elektroakustyka – EL); 45h/sem., A. Leszczyński.

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

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

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

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

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

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

[Edu36] *Information Techniques in Image Medical Diagnostics* (Techniki informacyjne w medycznej diagnostyce obrazowej – TIM); 60h/sem.; P. Bogorodzki.

[Edu37] *Introduction to Numerical Methods* (Wstęp do metod numerycznych – WNUM); 45h/sem.; R. Z. Morawski, A. Miękina, A. Podgórski.

[Edu38] *Measurement Systems* (Systemy pomiarowe – SPOM); 30h/sem.; W. Winiecki.

[Edu39] *Medical Electronic Instrumentation* (Elektroniczna aparatura medyczna – EAME); 60h/sem.; T. Olszewski, R. Szabatin, T. Jamrógiewicz, E. Piątkowska-Janko.

[Edu40] *Microwave Technique (*Technika mikrofalowa – TMO); 60h/sem.; W. Wojtasiak.

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

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

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

[Edu44] *Nuclear Medicine Techniques* (Techniki medycyny nuklearnej – TMENU); 30h/ sem.; R. Szabatin.

[Edu45] *Numerical Methods* (Metody numeryczne – MNUB); 45h/sem.; R. Z. Morawski, A. Miękina, A. Podgórski.

[Edu46] *Numerical Methods* – ENUME; 60h/sem.; R. Z. Morawski, A. Miękina, A. Podgórski (English-medium studies).

[Edu47] *Object-oriented Programming M* (Programowanie obiektowe M – PROE); 60h/sem.; W. Smolik, M. Sypniewski.

[Edu48] *Object-oriented Programming of Multimedia Applications in Java (*Java – obiektowe programowanie aplikacji multimedialnych – OPA); 45h/sem.; K. Ignasiak.

[Edu49] *Operating Systems* (Systemy operacyjne – SOE); 15h/sem.; M. Sypniewski, A. Więckowski.

[Edu50] *Orientation* (Orientacja – ORM); 15h/sem.; W. Gwarek, J. Cichocki.

[Edu51] *Programming Languages* (Języki programowania - JP); 75h/sem.; W. Smolik.

[Edu52] *Radiocommunication Systems* (Systemy radiokomunikacyjne – SRKO); 45h/sem.; T. Kosiło.

[Edu53] *Radioelectronics Measurements (*Miernictwo radioelektroniczne – MR); 45h/sem.; J. Cichocki.

[Edu54] *Radio Networks and Systems* (Systemy i sieci radiowe – SISR); 45h/sem.; T. Keller.

[Edu55] *Radiological Apparatus in Medical Diagnostics* (Aparatura radiologiczna w diagnostyce medycznej – ARDM); 30h/sem.; G. Domański.

[Edu56] *Radiology and Nucleonics* (Radiologia z nukleoniką – RN); 45h/sem.; K. Zaremba.

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

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

[Edu59] *Signals and Systems* (Sygnały i systemy – SYGSY); 60h/sem.; K. Snopek.

[Edu60] *Signals, Modulations and Systems (*Sygnały, modulacje i systemy – SYMSE); 60h/sem.; J. Wojciechowski, K. Snopek.

[Edu61] *Simulations of Radioelectronics Circuits* (Symulacja układów radioelektronicznych – SUREL); 45h/sem.; D. Gryglewski.

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

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

[Edu64] *Sound Recording Technique* (Dźwiękowa technika studyjna – DTS); 45h/sem.; M. Lewandowski.

[Edu65] *Signal Processors in Audio Techniques* (Procesory sygnałowe w technice audio – PSTA); 45h/sem; P. Bobiński.

[Edu66] *Television Systems* (Systemy telewizyjne – SYTE); 45h/sem.; A. Buchowicz, T. Keller, T. Krzymień, M. Rusin.

[Edu67] *Ultrasonography Instrumentation* (Aparatura ultrasonograficzna – AUS); 45h/sem.; R. Jóźwiak.

[Edu68] *UMTS System (System UMTS – UMTS);* 45h/sem.; J. Kołakowski.

[Edu69] *Visualization and Modeling in Multimedia* (Wizualizacja i modelowanie w multimediach – WIM); 45h/sem.; W. Skarbek.

3.1.2 Advanced courses

[Edu70] *Adaptive Image Recognition* – EADIR; 60h/sem.; W. Skarbek (English-medium studies).

[Edu71] *Analysis and Multimedia Indexing* (Analiza i indeksowanie multimediów – AIM), 60h/sem.; W. Skarbek, J.Naruniec

[Edu72] *Antennae Theory and Design* (Teoria i projektowanie anten – TPA); 60h/sem.; Y. Yashchyshyn.

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

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

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

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

[Edu77] *Contemporary Heuristic Techniques* – ECOHT; 60h/sem.; P. Bilski (English-medium studies).

[Edu78] *Contemporary Heuristic Techniques* (Współczesne techniki heurystyczne – WMH); 60h/sem.; P. Bilski.

[Edu79] *Data Compression* (Kompresja danych – KODA); 45h/sem.; A. Przelaskowski.

[Edu80] *Design of Microwave Circuits* (Projektowanie układów mikrofalowych – PUM); 60h/sem.; W. Wojtasiak, S. Rosłoniec.

[Edu81] *Design of Radiocommunication Systems* (Projektowanie układów radiokomunikacyinych – PSRD); 60h/sem.; T. Kosiło.

[Edu82] *Digital Audio Signal Processing* (Cyfrowe przetwarzanie sygnałów fonicznych – CPSF); 45h/sem.; Z. Kulka.

[Edu83] *Digital Image Processing* (Cyfrowe przetwarzanie obrazów – CPOO); 30h/sem.; P. Brzeski.

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

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

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

[Edu87] *Architectures of Digital Multimedia Systems* (Architektury multimedialnych systemów cyfrowych – ARMU); 45h/sem.; G. Pastuszak.

[Edu88] *Evolutionary Algorithms (*Algorytmy ewolucyjne – AE); 45h/sem.; P. Miazga.

[Edu89] *Graphs and Networks* (Grafy i sieci – GIS); 60h/sem.; J. Wojciechowski.

[Edu90] *Hearing and Sound Perception* (Słyszenie i percepcja dźwięku – SPD); 30h/sem.; J. Żera.

[Edu91] *Image and Audio Semantic Analysis (*Analiza semantyczna obrazu i dźwięku – ASOD); 45h/sem; W. Skarbek.

[Edu92] *Informatics Systems in Medicine* (Systemy informatyczne w medycynie – SIM); 45h/sem.; A. Przelaskowski.

[Edu93] *Large-scale Measurement Methods in Molecular Biology* (Wielkoskalowe metody pomiarowe w biologii molekularnej – MPB); 45h/sem; T. Rubel.

[Edu94] *Magnetic Resonance Imaging* (Tomografia rezonansu magnetycznego – TRM); 45h/sem.; P. Bogorodzki.

[Edu95] *Mathematics in Multimedia* (Matematyka w multimediach – MATMU); 60h/sem.; W. Skarbek.

[Edu96] *Modern Radio Transmission Techniques* (Nowe techniki transmisji radiowej – NTTR); 45h/sem.; Y. Yashchyshyn, S. Kozłowski.

[Edu97] *Neural Networks in Biomedical Applications* (Sieci neuronowe w zastosowaniach biomedycznych – SNB); 45h/sem., K. Zaremba.

[Edu98] *Nuclear Medicine Techniques* (Techniki medycyny nuklearnej – TMN); 60h/sem.; R. Szabatin.

[Edu99] *Radiation Detection* (Detekcja promieniowania jonizującego – DEPIO); 30h/sem.; J. Marzec.

[Edu100] *Radio Receiving Technique* (Technika odbioru radiowego – TOR); 60h/sem.; W. Kazubski, J. Modzelewski.

[Edu101] *Selected Techniques of Medical Imaging* (Wybrane techniki obrazowania medycznego – PW-S5); 30h/sem.; Ph.D. studies, P. Brzeski, K. Zaremba.

[Edu102] *Telemedical Systems* (Systemy telemedyczne - TELM); 45h/sem., R. Kurjata.

[Edu103] *Ultrawideband Technologies* (Techniki ultraszerokopasmowe –TUSP); 45h/sem., J. Kołakowski.

3.2. Special courses

3.2.1 Engineer Degree Evening Studies on Radiocommunications and Multimedia Technologies

[Edu104] *Antennae* (Anteny – ANM); 30h/sem.; semester 4; H. Chaciński.

[Edu105] *Basics of Computer Techniques* (Podstawy techniki komputerowej – PKOM); 45h/sem.; semester 1; R. Kurjata.

[Edu106] *Basics of High-Frequency Techniques* (Podstawy techniki w.cz. – PTWM); 60h/sem.; semester 3; D. Gryglewski.

[Edu107] *Basics of Logical Circuits and Microprocessor Technique* (Układy logiczne i podstawy techniki mikroprocesorowej – PULM); 60h/sem.; semester 4; K. Czerwiński.

[Edu108] *Basics of Metrology* (Podstawy metrologii – PMEM); 45h/sem.; semester 1; W. Winiecki.

[Edu109] *Basics of Satellite Communications* (Podstawy łączności satelitarnej – SATM); 15h/sem.; semester 4; K. Kurek.

[Edu110] *Circuits and Signals* (Obwody i sygnały – OSRM); 45h/sem.; semester 2; M. Dziewiecki.

[Edu111] *Digital Cellular Systems* (Cyfrowe systemy komórkowe – CSKM); 36h/sem.; semester 7; J. Cichocki.

[Edu112] *Digital Signals Transmission* (Cyfrowa transmisja sygnałów – CTSM); 45h/sem.; semester 5; T. Kosiło.

[Edu113] *Electronic Circuits* (Układy elektroniczne – UEM); 45h/sem.; semester 3; D. Gryglewski.

[Edu114] *Fields and Waves* (Pola i fale – PFM); 60h/sem.; semester 2; T. Morawski.

[Edu115] *Internet Techniques* (Techniki Internetowe – TINM), 30h/sem.; semester 7; K. Ignasiak.

[Edu116] *Introduction to Programming* (Wstęp do programowania – WPRM); 15h/sem.; semester 2; R. Kurjata.

[Edu117] *Materials and Elements* (Materiały i elementy – MEM); 15h/sem.; semester 4; K. Radecki.

[Edu118] *Multimedia Applications* (Aplikacje multimedialne – AMRM); 15h/sem.; semester 5; T. Rubel.

[Edu119] *Multimedia Computer Systems* (Multimedialne systemy komputerowe – MSKM); 30h/sem.; semester 4; T. Jamrógiewicz.

[Edu120] *Multimedia Techniques* (Techniki Multimedialne – TMM); 30h/sem.; G. Galiński.

[Edu121] *Numerical and Statistical Techniques* (Techniki obliczeniowe i symulacyjne – TOSM); 30h/sem.; semester 4; A. Miękina.

[Edu122] *Programmable Digital Devices* (Programowalne układy cyfrowe – PUCM); 30h/sem.; semester 5; M. Ziembicki.

[Edu123] *Programming* (Programowanie – PMRM); 30h/sem.; semester 3; R. Kurjata.

[Edu124] *Project 1* (Projekt 1 – PJUM); 30h/sem.; semester 5; J. Cichocki.

[Edu125] *Project 2* (Projekt 2 – PSRM); 60h/sem.; semester 6; J. Cichocki.

[Edu126] *Radiodiffusion Systems* (Systemy radiodyfuzyjne – SRDM); 60h/sem.; semester 6; A. Buchowicz, H. Chaciński.

[Edu127] *Radiocommunication Systems 1* (Systemy radiokomunikacyjne 1 – SRKM); 60h/sem.; semester 6; T. Kosiło.

[Edu128] *Radiocommunication Systems 2* (Systemy radiokomunikacyjne 1 – SRKM); 60h/sem.; semester 7; T. Kosiło.

[Edu129] *Radioelectronics Measurements* (Miernictwo radioelektroniczne – MRM); 45h/sem.; semester 5; J. Cichocki.

[Edu130] *Rules of Industrial Property* (Prawa własności przemysłowej – PWPR); 15h/sem.; semester 7; M. Bury.

[Edu131] *Signals and Modulations* (Sygnały i modulacje – SMRM); 60h/sem.; semester 3; K. Snopek, K. Radecki.

[Edu132] *Technique of Emission and Receiving* (Technika emisji i odbioru – TEM); 45h/sem.; semester 4; J. Modzelewski, W. Kazubski.

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

[Edu133] *Computer Systems* (Systemy komputerowe – SMKW); 30h/sem.; semester 2; T. Jamrógiewicz.

[Edu134] *Designing of Radiocommunication Systems* (Projektowanie systemów radiokomunikacyjnych – PSRW); 60h/sem.; semester 3; T. Kosiło.

[Edu135] *Digital Pogrammable Circuits* (Cyfrowe układy programowalne – CUPW); 45h/sem.; semester 2, P. Kopyt.

[Edu136] *Digital Signals Processing* (Cyfrowe przetwarzanie sygnałów – CPSWM); 45h/sem.; semester 1 J. Wojciechowski, Z. Kulka.

[Edu137] *Diploma Seminar* (Seminarium dyplomowe – SDMW); 30h/sem.; semester 4; P. Brzeski.

[Edu138] *Numerical Methods* (Metody numeryczne – MNW); 30h/sem.; semester 2, K. Snopek.

[Edu139] *Programming in Java Language* (Programowanie w języku Java – PJJW); 45h/sem.; semester 1; K. Ignasiak.

[Edu140] *Radio Navigation Systems* (Radiowe systemy nawigacyjne – RSNW); 45h/sem.; semester 4; T. Buczkowski, K. Czerwiński, K. Radecki.

[Edu141] *Sound Techniques* (Techniki dźwiękowe – TDRM); 30h/sem.; semester 7; M. Tajchert, P. Bobiński.

3.2.3. Environmental Noise Course

The Environmental Noise Course represents a series of courses; 135h.

[Edu142] *Basics of Acoustics* (Podstawy akustyki); 25h; M. Tajchert, A. Leszczyński.

[Edu143] *Basics of Statistics* (Podstawy statystyki); 10h; M. Kirpluk.

[Edu144] *Environment Noise Prediction* (Prognozowanie emisji hałasu w środowisku); 10h; M. Kirpluk.

[Edu145] *Noise in the Workplace* (Hałas w środowisku pracy); 6h; E. Kotarbińska.

[Edu146] *Legal Environment Noise Regulations* (Regulacje prawne w zakresie ochrony środowiska przed hałasem); 4h; M. Wojciechowska.

[Edu147] *Noise Measuring and Monitoring Methods* (Metody pomiaru i monitorowania hałasu); 16h; M. Kirpluk, J. Maciejczyk, P. Tomczyk.

[Edu148] *Noise Control* (Zabezpieczenia akustyczne); 10h; J. Sikora, G. Makarewicz.

[Edu149] *Human Health Effects of Noise* (Wpływ hałasu na organizm ludzki); 4h; Z. Koszarny.

[Edu150] *Noise Mapping* (Mapy akustyczne); 6h; J. Grabowski.

[Edu151] *Research Laboratories Accreditation* (Akredytacja laboratoriów badawczych); 6h; M. Szeląg.

[Edu152] *Selected Problems in Building Acoustics* (Wybrane zagadnienia z akustyki budowlanej); 16h; M. Niemas.

[Edu153] *Uncertainty of Noise Measurements* (Niepewność pomiarów); 8h; M. Kirpluk.

[Edu154] *Workshop - Noise Measurements* (Warsztaty - pomiary hałasu); 10h; M. Kirpluk, J. Maciejczyk, P. Tomczyk.

3.2.4. B.Sc. Level e-learning Special Courses

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

[Edu155] *Basics of Sound Technique* (Podstawy techniki dźwiękowej); 30h/sem.; Z. Kulka, A. Leszczyński M. Tajchert.

[Edu156] *Systems and Devices of Sound Technique* (Urządzenia i systemy techniki dźwiękowej); 30h/sem.; Z. Kulka, A. Leszczyński, M. Tajchert.

Wszechnica WEiTI PW (special courses for high school students)

[Edu157] **Man in the World of Sound, Pleasure and Danger** (Człowiek w świecie dźwięków, przyjemności i zagrożenia).

The course offered in the frame of "Wszechnica PW", lecture given by **J. Narkiewicz-Jodko.** According to the main assumption of this course sound can be defined as a wave motion in a media, or as the sensation results in the perception of sound. The human auditory system has very impressing abilities in understanding a target talker even if maskers, i.e., competitive sound sources like different talkers, are present at the same time. This is the so-called "cocktail party phenomenon". Frequently, when the level of speech or musical sounds are pleasantly moderated, we are interested to listen them. Sometimes at high levels above 90dB the sounds appears as unwanted noise, and is dangerous for our auditory system

3.3. International co-operation

[Edu158] **Advanced Technology Higher Education Network / Socrates** (**ATHENS**)

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

"Computer Modelling for Electromagnetics: Visibility of the Invisible" was given by **Bartłomiej Salski** from November 19 to 24, 2012. The students who attended this course were from the following EU institutions of higher education:

- Arts et Métiers ParisTech (one person);
- Universidad Politecnica de Madrid (seven persons);
- Politecnico di Milano (three persons);
- Delf University of Technology (three persons);
- Institutio Superior Tecnico Lisboa (four persons);
- BME (four persons);
- Technische Universität München (two persons);
- Technische Universität Wien (one person);
- CVUT (two persons);
- Institut d'Optique Graduate School (one person).

The main objective of the course is to introduce its participants to the contemporary computational electromagnetics (CEM). It opens way to what has been the dream of scientists and engineers for a century: visualization of electromagnetic fields and power. Those constructs, often considered hypothetical by students, will thereby gain the physical touch. The courses included 18 hours of lectures and 9 hours of class tutorials.

Lectures given by the staff

[Edu159] **IEEE Region 8 South Africa Meeting**

Within a joint meeting of the IEEE Antennas and Propagation Society, Microwave Theory and Techniques Society & Electromagnetic Compatibility Society (AP-S/MTT-S/EMCS) Chapter, IEEE South Africa Section and the South African Institute of Electrical Engineers (SAIEE), the following lecture: "New Scan and Reconfigurable Antennas" was given by **Józef Modelski** on Aug. 21, 2012.

[Edu160] **Wireless Communication Seminar:**

The lecture: "Microwave Ferroelectrical and Reconfigurable Antennas" was given by **Józef Modelski** on Sept. 14, 2012 at University of Macau (China).

[Edu161] **Wireless Communication Seminar:**

The lecture: "Microwave Ferroelectrical and Reconfigurable Antennas" was given by **Józef Modelski** on Sept. 20, 2012 at University of Beijing (China).

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4. RESEARCH PROJECTS

4.1. International projects

4.1.1. European grants

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

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

[Pro2] **Innovative Technologies of Multi–functional Materials and Structures for Nanoelectronics, Photonics, Spinotronics and Sensors** (Innowacyjne technologie wielofunkcyjnych materiałów i struktur dla nanotechniki, fotoniki, spinotroniki i technik sensorowych).
Wojciech Gwarek;
Feb. 26, 2009 – Dec. 31, 2013
INTechFun, EU Integrated Project

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

[Pro3] **High Efficiency Electronics Cooking Systems**
Małgorzata Celuch, A. Więckowski, W. Gwarek, P. Korpas
Mar. 1, 2011 – Feb. 28, 2014
HEECS, ENIAC JU Project

The HEECS project will answer the need to increase energy efficiency, developing a smart, controlled and highly efficient solid state cooking device and give significant contributions to standards. This cooking appliance will represent a breakthrough innovation which currently does not exist on the market. HEECS will deliver a new concept Microwave Oven. The main project scope is to enhance energy efficiency by more than 25% in microwave ovens (MWOs) across any range of food to be heated or cooked at home. According to this scope, breakthrough technologies will be researched and developed according to 4 HEECS main project objectives: 1) New and improved semiconductor technologies mainly focused on innovative high frequency power solid state devices. 2) Improved thermal management systems to efficiently cool the high frequency power transistor package, and make use of the dissipated heat energy in an efficient way. 3) Intelligent electromagnetic (EM) field adjustment and high frequency controls, in order to better distribute the field intensity within differing food types, there by heating the food appropriately and decreasing losses. 4) Optimized MWO technology configuration and system architecture delivering optimum feeding and efficiency of the MWO through enhanced signal conditioning. Matching the overall ENIAC objectives, all the electronic parts of the solid state cooking device, including small signal board (frequency synthesizer, high speed RF switching, micro controller), Switched mode power supply unit, high frequency power amplification stages, RF sensing and coupling, will be built with miniaturised circuits. The thermal management of the RF power devices will also incorporate thermal / material aspects relevant to ensure reliability and miniaturisation within the hybrid transistor package. The project will also deliver TCAD, and multi-physics tools enabling design of new technologies related to RF Hybrid circuit integration, phased array controls, and thermal design of High Frequency power transistor packages.

[Pro4] **Radio Frequency Sensing for Non-Destructive Testing of Carbon Fibre Reinforced Composite Materials for Structural Health Monitoring**
Bartłomiej Salski;
Dec. 01, 2012 – Nov. 01, 2014
CompHealth, EU Integrated Project

This project is carried out at Institute of Radioelectronics and Institute of Control and Industrial Electronics, Electrical Faculty, WUT. The main aim of this project is to develop a mobile scanner which can be used to detect defects in composite materials and components, at both the point of manufacture and in-service/in-situ, with a reliability of >99%. The technique will use a novel rafio frequency (RF) with remote sensing and improved scanning speed to detect defedts in a range of fibre reinforced composite materials.

4.2 Projects granted by the Ministry of Science and Higher Education, National Centre for Research and Development, and National Science Center

4.2.1. International grants

[Pro5] **The COMPASS Experiment – the Research on the Spin Structure of Nucleon** (Eksperyment COMPASS – badanie spinowej struktury nukleonu).
Krzysztof Zaremba, J. Marzec, M. Dziewiecki, G. Domański, B. Konarzewski, R. Kurjata, M. Ziembicki, A. Rychter;

COMPASS, International project realized in collaboration with the Soltan Institute for Nuclear Studies and Faculty of Physics, Warsaw University;
Oct. 30, 2007 – Dec. 31, 2014
Funded by National Science Center

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

[Pro6] **The Research of the Neutrino Oscillations – the Second Generation Experiment – Design of the Detector and Participation in the Data Acquisition in the T2K Experiment** (Badanie oscylacji neutrin – eksperyment drugiej generacji – budowa detektora i udział w pomiarach przeprowadzanych w eksperymencie T2K).
Krzysztof Zaremba, J. Marzec, M. Dziewiecki, G. Domański, B. Konarzewski, R. Kurjata, M. Ziembicki, P. Płoński;
T2K, International project realized in collaboration with the Faculty of Physics, Warsaw University, Andrzej Soltan Institute for Nuclear Studies, Institute of Nuclear Physics, Polish Academy of Sciences, Faculty of Physics and Astronomy, University of Wroclaw, Faculty of Mathematics, Physics and Chemistry, Silesian University;
Oct. 30, 2007 – Dec. 31, 2014
Funded by National Science Center

The project is a part of the collaboration with the T2K experiment in Japan. The T2K is a component of the second generation long-baseline neutrino-oscillation experiment intended for studies of the nature of neutrinos and the effect of their oscillations. Artificial neutrino beam generated in the proton accelerator in Tokai is shot toward the 50-kT water Cherenkov detector, Super-Kamiomande, which is located about 1000 m underground in Kamioka mine and is 295 km away from Tokai. The Institute of Radioelectronics takes part in the design of SMRD (Side Muon Range Detector), which is the part of the near detector (ND280), located in Tokai, 280 m away from the target position, intended for measurements of the neutrino spectrum, contamination and interaction cross-sections before the oscillation.

4.2.2. Grants for young researchers

[Pro7] **Hardware Architectures for Real-Time Multi-Source Audiovisual Coding** (Architektury sprzętowe dla wieloźródłowego audiowizualnego kodowania czasu rzeczywistego).
Grzegorz Pastuszak;
Aug. 1, 2011 – Jul. 31, 2014
LIDER Programme
Funded by the National Centre for Research and Development

The goal of the project is the design and prototype implementation of real-time audiovisual compression with the support for the multi-view disparity map. The practical effect of the project will be the reference hardware application of the real-time FPGA-based system including multi-channel audio compression, multi-view video compression, and disparity estimation. The digital part of the system will be integrated in one FPGA device. The hardware acceleration and new encoder architectures will allow higher audiovisual compression efficiencies compared to existing solutions. The accurate multi--view disparity estimation will support the video compression and allow the depth maps needed in the 3D reconstruction. Additionally, the multi-channel audio will provide information to identify the localization of objects. Therefore, the implementation of the system will provide tools to build a free-viewpoint system in the future.

[Pro8] **Novel Techniques of Electromagnetic Calorimetry for High Energy Physics** (Nowoczesne techniki kalorymetrii elektromagnetycznej w eksperymentach fizyki wysokich energii).
Marcin Ziembicki;
Jun. 13, 2011 – Jun. 12, 2012
Iuventus Plus Programme
Funded by the Ministry of Science and Higher Education

The aim of the project is to investigate photomultiplier rate effects on energy resolution of electromagnetic calorimeters, with particular interest on the electromagnetic calorimeters used in the COMPASS experiment. The result of the work will be a model of the phenomenon, which should allow development of an algirithm that will minimize negative impact of photomultiplier rate-effects, possibily leading to improvement of the energy resolution of electromagnetic calorimeters.

4.2.3. Research grants

[Pro9] **Design and Manufacturing of a sub-THz Radiation Detector based on MOS Transistor** (Zaprojektowanie i wykonanie detektora promieniowania sub-THz działającego w oparciu o krzemowy tranzystor MOS).
Wojciech Gwarek, P. Kopyt;
Dec. 22, 2009 – Apr. 21, 2012
Funded by the National Centre for Research and Development

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

[Pro10] **The Development of Anti-aircraft Artillery Radar Tracking Technology Demonstrator** (Opracowanie demonstratora technologii radaru śledzącego do kierowania artylerią przeciwlotniczą).
Daniel Gryglewski, W. Wojtasiak;
Mar. 04, 2011 – June 08, 2013
Funded by the National Centre for Research and Development

The project aim is to develop a tracking radar used for precision targeting anti-aircraft artillery. The

mastering the production of the radar by the national radar industry would use it in more sets of anti-aircraft military systems. Currently, in the national systems such type, foreign radars are used, which are very expensive. The application domestic radar signify reduce the costs and the systems. In this way, systems can become affordable for domestic and foreign customers. The project is running in cooperation with RADWAR.

[Pro11] **ET(V4) Electrical Capacitance Tomograph for 3D Imaging of Dynamic Progesses** (Elektryczny tomograf pojemnościowy ET(V4) do trójwymiarowego obrazowania procesów dynamicznych).
Roman Szabatin, W. Smolik, P. Czarnecki, J. Mirkowski, T. Olszewski;
Nov. 01, 2010 – Sep. 30, 2013
Funded by the National Centre for Research and Development

The aim of the project is the design and prototype ET(V4) electrical capacitance tomograph with the application needed in the 3D imaging of dynamic processes.

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

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

[Pro13] **Application of Multichannel Measurements of Uterine Bioelectrical Activity for Prediction of a Preterm Labour** (Wykorzystanie wielokanałowego pomiaru sygnału aktywności bioelektrycznej mięśnia macicy do wczesnego wykrycia zagrożenia porodem przedwczesnym).
Dariusz Radomski;
Aug. 4, 2010 – Sept. 20, 2012
Funded by National Science Center

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

[Pro14] **New Generation of Photonic Atennas for Radio over Fiber Transmission Systems** (Nowa generacja anten fotonicznych dla sieci transmisji radiowo-światłowodowej).
Józef Modelski, Y. Yashchyshyn, A. Urzędowska, K. Godziszewski, K. Kurek, T. Keller, M. Bury;
Apr. 8, 2010 – Oct. 7, 2012
Funded by National Science Center

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

[Pro15] **New Types of Smart Antennas with Digital Beamforming based on Electronically Reconfigurable Aperture** (Nowe rodzaje inteligentnych anten z cyfrowym kształtowaniem wiązki o rekonfigurowalnej elektronicznie aperturze).
Yevhen Yashchyshyn, P. Bajurko, H. Chaciński, K. Derzakowski, S. Kozłowski, J. Marczewski, J. Modelski, D. Tomaszewski;
Apr. 8, 2010 - Apr. 7, 2013
Funded by National Science Center

Two main aspects of the project are as follows:

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

[Pro16] **Computed Medical Image Understanding based on Integration of Signals Acquisition, Information Representation and Knowledge Models** (Komputerowe rozumienie obrazów medycznych przez integrację akwizycji sygnałów, reprezentacji informacji i modeli wiedzy).
Artur Przelaskowski, W. Smolik, R. Sikora, R. Jóźwiak, M. Jasionowska;
Aug. 30, 2012 – Aug. 29, 2014
Funded by National Science Center

The aim of research is an effective solution to the problem of computer image understanding related to the requirements of medical diagnosis. State of knowledge in this area will be developed by studying the possibility of integration of semantic representation of information with formalized model of specific domain knowledge and subjective model of reality cognition depicted by the specialists. Our intention is constructing semantic models at each stage of information transfer at different levels of abstraction. The goal is closing the loop of semantic feedback starting form image data measurement methods through approximation of information transfer up to

the effect of presented content perception with synergistic effect of imaging reality cognition depicted by the user.

[Pro17] **Microwave S band HEMT Transistor based on AlGaN/GaN Heterostructures Grown on Bulk Monocrystalline GaN Substrates** (Tranzystory mikrofalowe HEMT AlGaN/Ga na monokrystalicznych podłożach GaN).
Wojciech Wojtasiak;
Nov. 01, 2012 –Oct. 31, 2015
Funded by the National Centre for Research and Development

This project is carried out at Institute of Electron Technology, Ammono S.A., Institute of High Pressure Physics Polish Academy of Sciences, Top-Gan Ltd., Institute of Physics Polish Academy of Sciences. The objective of this project is to research and develop a new type of microwave S band HEMT transistor based on novel AlGaN/GaN heterostructures grown on bulk monocrystalline semiinsulating GaN substrates. The substrates will be fabricated by ammonothermal method and their size scaled for 1" to 1.5". Two techniques - MOVPE and MBE will be used for the epitaxial growth of HEMT structures with high concentration and high mobility electron 2D gas, and improved structural quality. The fundamental approach behind the workplan is based upon the interaction between four key technical areas of expertise: (i) HEMTs modelling and design, (ii) material growth and characterisation, (iii) devices fabrication and (iv) packaging and chip assessment. A number of specific processing steps will be optimised including the definition of the active device area, RIE/ICP etching for ohmic contacts and gate recessing, through-wafer via holes fabrication.

[Pro18] **Multi-Pixel THz Radiation Detector with Selective MOS Transistors and its Application in Biology, Medicine and Security Systems** (Wielopikselowy detektor promieniowania THz zrealizowany z wykorzystaniem selektywnych tranzystorów MOS i jego zastosowanie w biologii, medycynie i systemach bezpieczeństwa).
Wojciech Gwarek, P. Kopyt;
Nov. 13, 2012 - Oct. 31, 2015
Funded by the National Centre for Research and Development

This project is elaborated in the co-operation with Institute of Electron Technology, Warsaw University, Military University of Technology, Military Medical Institute. Based on results of research project (Design and realization of sub-THz radiation detector based on MOSFET), the proposers submit a project aimed at development, realization and validation of a multi-pixel THz radiation detector. A single pixel of the detector is a MOS transistor with a planar antenna responsible for ensuring frequency selectivity of the complete device. A pixel contains also a low-noise integrated amplifier. It is planned that the detector will consist of 10 – 15 such pixels. The device realized as a project result will also contain a conventional source of THz radiation (globar), optics as well as read-out circuitry for registering detection signals from all the pixels and software for data analysis. Such a device will become useful in identifying materials with characteristic spectra in the THz frequency band. Within the project framework measurements of spectra important in the areas of biology, medicine and security are to be performed.

4.2.4. Ph.D. grants

[Pro19] **Study of Digital Terrestrial Television Receiver Architectures for DVB-T2 Standard** (Badanie architektur odbiorników cyfrowej telewizji naziemnej standardu DVB -T2).
Józef Modelski, M. Dąbrowski;
Oct. 29, 2010 – Apr. 28, 2012
Funded by National Science Center

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

[Pro20] **Multiscale Methods of Data Representation and Modeling in Medical Imaging Sequences** (Wieloskalowe metody reprezentacji i opisu treści diagnostycznej w medycznych sekwencjach obrazowych).
Artur Przelaskowski, R. Jóźwiak;
Apr. 16, 2010 – Jul. 30, 2012
Funded by National Science Center

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

[Pro21] **Low-and High-level Audio Descriptors in Sound Recognition for Databases** (Deskryptory niskiego i wysokiego poziomu w rozpoznawaniu dźwięku dla potrzeb baz danych).
Jan Żera, A. Świercz;
Jun. 9, 2008 – Feb. 26. 2012
Funded by National Science Center

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

[Pro22] **Development of Proteins and Peptides Identification Method in Proteomics** (Opracowanie metody identyfikacji peptydów i białek w zastosowaniu do badań proteomicznych).
Krzysztof Zaremba, L. Raczyński;
Apr. 18, 2011 – Oct. 17, 2012
Funded by National Science Center

Proteins identification in biological samples is the most important task in mass spectrometry-based proteomics. In proteomic experiments, the intact proteins are first digested into short peptides, then the resulting peptides are analyzed using tandem mass spectrometry and identified by database search algorithms. In this project a novel peptide identification method is proposed that scores and classifies tandem mass spectra based on the information present in the database search results.

4.3 Projects granted by the University

4.3.1 Statutory projects

[Pro23] **Design and Investigation of Electro-acoustic Measuring Systems and Digital Audio Signal Processing Systems** (Projektowanie i badania systemów elektroakustycznych oraz systemów cyfrowego przetwarzania sygnałów fonicznych)
Zbigniew Kulka, P. Bobiński, E. Kotarbińska, A. Leszczyński, M. Lewandowski, M. Tajchert, J. Żera;
Sept. 16, 2011– Nov. 30, 2012

In the first part of the work the methodology for noise measurements in the field of the Central Campus of the Warsaw University of Technology was developed. The measurements in accordance with the developed methodology were also performed. The results were analyzed and compared to those from the acoustic map of Warsaw. In the second task the project for a bass guitar amplifier was presented. The so-called „bass combo" construction, including the preamplifier, the power amplifier and speaker within one box, was developed. The aim of the third part of the work was to compare multichannel sound formats used on DVD-Video and Blu-ray discs, and also to design and record the test audio Blu-ray disc for BD player technical parameters measurements.

[Pro24] **Development of Stationary and Distributed Measuring Systems Designing Methods** (Rozwój metod projektowania stacjonarnych i rozproszonych systemów pomiarowych).
Wiesław Winiecki, P. Bilski, P. Czernik, R. Łukaszewski, K. Mroczek, J. Olszyna;
Sept. 16, 2011 – Nov. 30, 2012

The overview of the modern computer-based methods for the virtual measurement instruments and systems was continued. The cryptographic security of the distributed measurement systems was of the main concern. Also, the design methodologies of the virtual measurement systems was expanded. The aim of the research was their time efficiency modelling and optimization. The new cryptographic methods for the secure distributed measurement systems were proposed. The hardware platforms usable for the research were investigated, including embedded systems applications. The first one is the reconfigurable NI RIO industrial computer, the second one is the ARM7-based microcontroller. The experiments with the remote configuration of the distributed system's nodes were conducted. Finally, the methodology for the measurement and control systems' software development was investigated. Results of the research were presented in the national and international conferences and in the journals from the Journal Citation Report list.

[Pro25] **Contemporary Methods for the Analysis and Design of HF Structures** (Zaawansowane techniki modelowania i projektowania układów wielkich częstotliwości).
Wojciech Gwarek, T. Morawski, S. Rosłoniec, M. Celuch, D. Gryglewski, P. Kopyt, P. Miazga, M. Sypniewski, A. Więckowski, W. Wojtasiak, J. Zborowska, K. Robaczyński, D. Rosołowski, B. Salski, P. Kończak, M. Olszewska, M. Lubiejewski;
Sept. 16, 2011 – Nov. 30, 2012

The project concerned methods of analysis and design of circuits destined for microwave, millimetre-wave and optical bands. The following subjects were specially focused:

- Important part of the work was devoted to the structures absorbing electromagnetic waves. In this area proposal of application of new materials like graphene pastes was put forward and became subject to a new externally financed grant.
- New materials were focused also in the optical band. Modelling of photonic band-gap structures (PBS) gap structures (PBS) and nonlinear effects were the main subjects of the work.
- New potential of the team in solving difficult electromagnetic problems was built. It concerned large scale problems as well as coupled problems including electromagnetic and thermal solutions. Efficiency of em solutions was enhanced by application of new GPU hardware and software effectively using such hardware.
- The work on modelling of quasi-THz detection on MOS transistor junctions proceeded and is scheduled for continuation in the next years in two externally financed projects.

[Pro26] **Modern Techniques in Nuclear and Medical Electronics** (Nowoczesne techniki elektroniki jądrowej i medycznej).
Krzysztof Zaremba, P. Bogorodzki, P. Brzeski, G. Domański, T. Jamrógiewicz, B. Konarzewski, R. Kurjata, J. Marzec, T. Olszewski, E. Piątkowska-Janko, D. Radomski, B. Sawionek, W. Smolik, R. Szabatin, M. Ziembicki, S. Adaszewski, M. Dziewiecki, Ł. Kołaszewski, W. Obrębski;
Sept. 16, 2011 – Nov. 30, 2012

He-3 SEOP Hyperpolarization instrumentation setup: Helmholtz coils and oven temperature stabilization.
A main objective of this work was design and evalation of Helmholtz coils system in application to He-3 hyperpolarization experiment called SEOP (Spin Exchange Optical Pumping). Coils would be used as a generator of magnetic field B = 5 mT (50 Gs) in the SEOP in the Nuclear and Medical Electronics Division (ZEJiM): Institute of Radioelectronics, Warsaw University of Technology. The project covered the following aspects: 1. Simulations of the magnetic field homogeneity for different coil geometries and two shapes: circular and square. 2. Design and fabrication details of Helmholtz coils for application as a static magnetic field generator. 3. Working area measurements of magnetic field homogenity using spherical harmonics methodology.
Analysis of cornea deformation during intra-ocular pressure measurements by means of air puff
Noninvasive intra-ocular pressure measurements by means of reflected light measurements is an example of optical technique application in medicine. The

cornea is deflected by strong air flux, exhausted from the nozzle. The computer program was prepared for simulation of air puff and cornea deformation by means of finite element method.

Study of light sensors based on Geiger mode multi--pixel avalanche photodiodes

The aim of the project was to build a test stand for characterizing novel multi-pixel avalanche photodiodes (MAPD) working in Geiger mode. A low-noise pre-amplifier has been designed, which allowed collection of a histogram of detector response with clearly separated photon peaks. Second accomplished task was designing and testing of a shaping amplifier for the ECAL0 electromagnetic calorimeter, currently installed in the COMPASS experiment in CERN.

Modeling and analyzing of selected physiological processes

The work was concentrated on optimization of measuring methods of bioelectrical and biomechanical activities of an uterus using the previously elaborated 4 channels electrohysterograph. An effect of variable amplifier gains on quality of registered EHG signals was tested. Also a new experiment was elaborated to verify effect of biopotentials generated by abdominal muscles on clinically useful parameters of EHG signals. Moreover, a review of literature describing identification methods of causal relations between components of multivariate signals was performed. The Granger causality concept was chosen for further analysis of EHG signals. These analyzes will help for verification of causal relationships between EHG biopotentials registered from different anatomical areas of a contracting uterus.

Electrical tomography techniques applied in medicine and industry

This year the work on Electrical Capacitance Tomography were concentrated on electric field modeling in measurement sensors. The models of tomographic capacitance sensors were elaborated and the numerical calculations were performed with different numerical methods and different software (QuickWave, COMSOL). The spatial distribution of electric field were obtained and the sensitivity matrices were calculated for selected tomographic sensor. The simulation results were verified using ECTsim 3D software. The results of image reconstruction using nonlinear iterative algorithm (Levenberg-Marquardt method) obtained for sensitivity matrices generated using QuickWave and COMSOL were compared. During this period the work on the conception of modular architecture of electrical capacitance tomograph for three dimensional imaging of dynamic processes.

[Pro27] **Methods of Analysis of the DVB-T/H Digital Terrestrial Television Systems' Transmission Parameters and their Resistance for the Interference Sources** (Metody analizy parametrów transmisji systemów naziemnej telewizji cyfrowej DVB-T/H oraz odporności tych systemów na zakłócenia w transmisji danych multimedialnych).
Józef Modelski, T. Keller, K. Kurek, M. Piasecki, K. Bryłka, M. Dąbrowski;
Sept. 16, 2011 – Nov. 30, 2012

The main aim of the statutory work was to analyze the methods used in digital terrestrial television systems based on the DVB-T and DVB-H standards to characterize their performance in the field of RF transmission parameters. In the work there has been a system proposed, which allows for automation of the measurement procedures of the transmission parameters of the DVB-T signals. Some work has been also dedicated for checking the resistance of the mobile digital television DVB-H system for the different sources of interferences in the same frequency band.

[Pro28] **Further Development of Test Bench for Measurement in Millimeter and Subterahertz Frequency Band – Design of Standard Antennas** (Rozbudowa stanowiska pomiarowego do pomiarów w pasmie milimetrowym i subterahercowym – opracowanie anten wzorcowych).
Yevhen Yashchyshyn, K. Derzakowski, M. Bury, P. Bajurko, A. Urzędowska, K. Godziszewski, B. Majewski;
Sept. 16, 2011 – Nov. 30, 2012

The main subjects of the statutory work was designing antennas for the newly estabilished measurement system, allowing investigation in the frequency range from 10 MHz up to 500 GHz. Many electromagnetic simulations were conducted in order to obtain optimal antenna structures co-operating with optical set-up for sub-terahertz frequency range. The work is planned to be continued to provide final antenna pieces..

[Pro29] **Circuits and Devices for Signal Acquisition in UWB Radar Systems** (Układy rejestracji sygnałów w ultraszerokopasmowych systemach radarowych).
Jerzy Kołakowski, J. Cichocki, R. Michnowski, K. Radecki, W. Kiełek, S. Żmudzin, P. Makal, P. Ziętek;
Sept. 16, 2011 – Nov. 30, 2012

The project dealt with UWB pulse recording techniques intended for implementation in radar systems. The scope of the project included review of methods for UWB signal acquisition, analysis of ETSI requirements concerning radar systems and sensors, development of modules for UWB signal recording. The operation of the recording module is based on coherent sampling. The project resulted in the development of reference clock signal generators intended for UWB generator triggering and sampling control, generator of pulses for switching Schottky diode sampler, amplifier and LF filter for output signal conditioning. The performed measurements showed that the developed system can be used for recording of UWB signals in the frequency range from 2 to 5 GHz.

[Pro30] **High-Power High-Efficiency Power Control and Amplitude Modulation Circuits with Switch Mode H.F. Power Amplifiers** (Wysokosprawne układy regulacji mocy I modulacji amplitudy o dużej mocy wyjściowej z kluczowanymi wzmacniaczami mocy w. cz.).
Juliusz Modzelewski, H. Chaciński, W. Kazubski, M. Mikołajewski;
Sept. 16, 2011 – Nov. 30 2012

The project has concerned power control and amplitude modulation in high-power high-efficiency switch-mode h.f. power amplifiers. It has been shown that amplitude modulation of the output sine wave signal can be obtained by phase modulation of digital input signals of two Class DE h.f. power amplifiers

operating with common load. The output voltage regulation characteristic of the amplitude modulator is non-linear and each amplifier is loaded with an complex impedance. The amplitude modulator with two Class DE ZVS amplifiers has been analyzed, and it has been proved that ZVS conditions in the two amplifiers are assured for any phase shift of the input modulating signals only if the amplifiers are designed to operate with the dead angle 90^o and the parallel capacitances of the transistor switches are reduced to 88%. According to obtained analysis results, a Class DE 40W/1MHz amplifier has been designed, computer simulated and built as well as its parameters have been measured achieving high efficiency 98%. Moreover, a self-oscillating Class E generator 150 W/6.78 MHz has also been designed, built and tested. Its measured power efficiency was 91%. A burst output power control has been applied in the generator enabling its output power to be regulated in the whole range with high efficiency. Simulation and experimental verification of an improved design method for $\pi 1$ matching circuits of Class AB, B and C amplifiers have also been done. The proposed design method takes into account finite loaded quality factor of the applied inductances and simplifies the design procedure of the amplifiers.

[Pro31] **Early Stroke Diagnostics** (Diagnostyka wczesnego udaru mózgu – ocena wpływu czynników klinicznych na skuteczność rozpoznań).
Artur Przelaskowski, G. Ostrek, R. Jóźwiak, M. Jasionowska, A. Rutczyńska;
Sept. 16, 2011 – Nov. 30, 2012

The tasks performed are a continuation of research from the previous year in the subject matter of acute stroke diagnosis and therapy. The main objective was to obtain additional clinical information that could improve the effectiveness of the interpretation of visual information - either in clinical procedures or in image analysis by computer support tools. We studied the performance of developed support tools in the context of resulting clinical effects. Additional clinical factors were investigated, which could have an impact on accurate early diagnosis of stroke and possibly effective treatment. It was an intense attempt to evaluate the usefulness of a set of clinical factors, as determined by physicians with our partner medical centers, using objectifying tests. To do this, aided tools based on PC concept (Parewise Comparisons) were used. It enables to verify the consistency of assessments undertaken and serves to obtain consensus decisions (problem of collective decision making). In parallel, study on clinical expert system (CSE), using the collected knowledge in the field of stroke diagnostics and therapy, and respective rules was started. List of possible complete knowledge of the verified, objectified level of impact on the effective diagnosis and treatment is aimed at supporting the decision of doctors and other people involved in the procedure of patient care because of stroke risk factor. Simple, clear and unambiguous as possible CSE interface can allow even less experienced physicians, non-professionals and even patient to find out as to the degree of stroke risk in cases of emergency.

[Pro32] **Mobile Technologies – Selected Problems** (Technologie mobilne - wybrane problemy).
Tomasz Kosiło, S. Hahn, T. Buczkowski, K. Czerwiński, J. Jarkowski;
Sept. 16, 2011 – Nov. 30, 2012

This work covers theoretical and practical problems of modern radio mobile systems including aspects of theory and applications. The mobile data and multimedia services are still developed from many years. We have new standards, we can find many applications in transportation systems or for handicapped persons. The number of multimedia and data transmission application users is still grooving. Because of this it is necessary to develop new transmission algorithm, new methods of radio networks management, to solve problems of electromagnetic compatibility. In the frame of this contract we studied the problem of GSM and LTE systems cooperation. We were involved in development of new mobile applications for railways and transportation as well. We studied the new field of using modern lighting systems (LED and fluorescent) for indoor multimedia transmission, including applications for handicapped users.

[Pro33] **Investigation on Multidimensional Signals of Heuristic Algorithms and Optimization of Transmission Networks** (Badania w zakresie sygnałów wielowymiarowych algorytmów heurystycznych oraz optymalizacji sieci transmisyjnych).
Jacek Wojciechowski, A. Bilski, S. Kozłowski, K. Snopek;
Sept. 16, 2011 – Nov. 30, 2012

The aim of the work was to extend a theory of hypercomplex signals, as well as to investigate heuristic optimisation algorithms. The latter topic included implementation of heuristic optimisation algorithms for two purposes: searching for routing paths in a large-scale telecommunication network and analysis ot the data from nuclear physics experiments to approximate the shape of nuclei.

[Pro34] **Interpretation of Measurement Data - Methodology and Metametrological Aspects** (Interpretacja danych pomiarowych – metodyka i aspekty meta-metrologiczne).
Roman Z. Morawski, A. Miękina, A. Podgórski;
Sept. 16, 2011 – Nov. 30, 2012

The primary objective of the project is related to the methodological and organisational aspects of metrology, in particular of the design and implementation of algorithms for calibration of measurement channels and reconstruction of measurands (*i.e.* generalised quantities to be measured); the project is also aimed at upgrading the corresponding research infrastructure (both hardware and software). The results of the project include: a methodology for designing algorithms for processing data from spectrophotometric transducers and some contributions to the history of measurement science. The results of the research accomplished have been partially published in two papers.

[Pro35] **Audiovisual Network Hybrid Systems** (Audiowizualne sieciowe systemy hybrydowe).
Krystian Ignasiak, W. Skarbek, A. Buchowicz, G. Galiński, J. Naruniec, G. Pastuszak, M. Jakubowski, M. Jędryka, M. Leszczyński, A. Nowakowski, A. Abramowski, G. Brzuchalski, M. Roszkowski, M. Wieczorek;
Sept. 16, 2011 – Nov. 30, 2012

The work was the continuation of the development of elements of the new system for digital TV coding including audio and video compression circuits based on the MPEG-4 (H.264/AVC i AAC) standard. Within the works, main function blocks of a software video coder for H.264/AVC were created based on the modularity concept. Getting fast hardware realizations of audio and video coding algorithms and their implementation in FPGA devices enable the verification of the algorithms in real-time conditions. Particularly, hardware PCB devices were designed, mounted, and tested. They include FPGA coupled external memories, ADC/DAC audio/video converters, and supply circuits. The design methodology of audio/video coding was developed for some key codec elements. In particular, the concept of adaptive video coding was applied to the motion estimation unit to different spatial/temporal resolutions and make the encoder robust to wait states. As for audio coding, the AAC encoder was enhanced to support different window lengths with options to adaptively select them. Codecs implementation efforts tend to the creation of a system of network reconfigurable audio-video nodes, which will allow the demonstration of efficiency and usefulness of particular hardware-functional profiles in distributed real-time audiovisual systems.

4.3.2. Projects granted by the Dean

[Pro36] **Models of Nonlinear Optical Phenomena in Finite Difference Method in the Time Domain** (Modele nieliniowych zjawisk optycznych w metodzie różnic skończonych w dziedzinie czasu).
Bartłomiej Salski;
Jun. 30, 2012 – Dec. 31, 2012

The aim of the project was to create a model of nonlinear optical phenomena in the third-order finite difference method in the time domain. The results were applicable to the analysis of Kerr, Raman phenomenon, or two-photon absorption in an optical system used for the self-focusing of optical beams, or the creation of optically bistable system.

[Pro37] **Multiple-Antenna Transmitting and Receiving Techniques** (Wieloantenowe techniki nadawania i odbioru).
Sebastian Kozłowski
Jun. 30, 2012 – Dec. 31, 2012

The aim of the work was to investigate the ability of the state-of–art software-defined radio (SDR) modules to support various multiple-antenna transmission and reception techniques.

4.4 Other projects

[Pro38] **Distributed System for Concrete Curing Temperature Measurement** (Rozproszony system do pomiaru temperatury tężejącego betonu).
Jerzy Kołakowski, J. Cichocki, R. Michnowski;
Jan. 09, 2012 – May 15, 2012
Funded by Mostostal Warszawa SA.

The developed system is intended for outdoor measurements of concrete temperatures, ambient temperature and humidity. It consists of several measuring nodes equipped with temperature and humidity sensors, two routing nodes and one control node. Results of measurements are sent trough ZigBee network to the control node and delivered through GPRS network to the web service server.

[Pro39] **Research Conception for the INNOTECH Program** (Opracowanie części merytorycznej wniosku o dofinansowanie w projekcie INNOTECH).
Józef Modelski
Feb. 07, 2012 – Mar. 19, 2012
Funded by Paweł Graniewski Consulting

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

[Pro40] **Webcam Eye Tracking** (Wyznaczanie kierunku patrzenia z wykorzystaniem kamery internetowej).
Władysław Skarbek, J. Naruniec, M. Leszczyński;
Feb. 17, 2012 – Dec. 23, 2012

Funded by Samsung Electronics Polska sp. z o.o.

Goal of the project is to create a programming library for the eye gaze tracking. Created solutions should work for PC computers and for latest generation of tablets and smartphones. Assumptions of the project are: high precision of analysis, using simple web camera only and lack of complicated system calibration.

[Pro41] **Delivery of 32-Channel Electrical Capacitance Tomography System** (Dostawa 32--kanałowego systemu elektrycznej tomografii pojemnościowej).
Roman Szabatin, P. Brzeski, W. Smolik, T. Olszewski;
Mar. 08, 2012 – Mar. 22, 2012
Funded by Lodz University of Technology, Computer Engineering Department (Politechnika Łódzka, Katedra Informatyki Stosowanej).

The aim of the project is to elaborate, construct and verify 32-channel electrical system for capacitance tomography.

[Pro42] **The Analysis of the Impact of the Planned Investment Located on 6/1, 7/1, 7/5-15/1, Precinct 1-08-18, at Kłobucka St. in Warsaw** (Wykonanie analizy w zakresie wpływu planowanej inwestycji zlokalizowanej na dz.nr.ew. 6/1, 7/1, 7/5-15/1 obręb 1-08-17 przy ul. Kłobuckiej w Warszawie).
Wojciech Wojtasiak;
Apr. 17, 2012 – Apr. 30, 2012
Funded by PZ-BUD Ltd.

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

[Pro43] **An Opinion about the Innovation Presented Technical Solution of the Continuous Treatment of Waste (Including Used Tires) in a Controlled Environment, Using Microwave** (Opracowanie opinii o innowacyjności przedstawionego rozwiązania technicznego linii ciągłego przetwarzania odpadów (w szczególności zużytych opon samochodowych) w kontrolowanej atmosferze, przy wykorzystaniu mikrofal).
Paweł Kopyt;
Nov. 16, 2012
Funded by Techtrans Ltd.

The goal of the project was to conduct the analysis on implementation the system for waste treatment using microwave in controlled environmental conditions.

4.5 Other activities

4.5.1. Scholarship for the outstanding young scientist granted by the Ministry of Science and Higher Education

Grzegorz Pastuszak;
29.11.2011 –28.11.2014

The scholarship is dedicated for the research on efficient hardware implementations for algorithms encoding/decoding audiovisual data. Developed architectures should allow real-time high-resolution processing for low latency, multi-source signals (multi-channel audio and multi-view video), and high--efficient compression. The architectures are mapped into FPGA devices to obtain acceleration.

4.5.2. Partnership

CC-Link

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

4.5.3. Scientific networks

Polish Network of Neutrino Physics
(Polska Sieć Neutrinowa)

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

Polish Network of Particle Astrophysics
(Polska Sieć Astrofizyki Cząstek)

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

4.5.4. Student research groups

Space Engineering Student Scientific Group
Krzysztof Kurek – tutor.

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

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

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

Biomedical and Nuclear Engineering Student Scientific Group (in Polish Studenckie Koło Inżynierii Biomedycznej i Jądrowej Biomedyczni – (http//www.ire.pw.edu.pl/biomedyczni) was formed in Dec. 2005 by a group of students from Biomedical Engineering. They cooperated with the Student Scientific Group of Cybernetics with their new Neurofeedback project, Students Scientific Group of Dietetics with some software. They participated in "Faces of neuroscience" Conference at University of Warsaw.

Innovative Information Technologies Student Scientific Group
Przemysław Miazga – tutor.

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

Technique in Medicine Student Scientific Group
Artur Przelaskowski – tutor.

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

- series of open lectures for students led by interesting people from the world of science;
- promotion of Biomedical Engineering among students;
- trips for students to places related with biomedical engineering;

partnership with the Student Scientific Groups from the Medical University of Warsaw

MuGEd Student Scientific Group
Władysław Skarbek – tutor.

MuGEd Scientific Group (in Polish Koło Naukowe MuGEd) (www.ztv.ire.pw.edu.pl/muged) was founded in April 2011, at the Division of Television. The aim of the group is a modern approach to teaching and learning processes by using many kinds of Multimedia in Educational Games (MuGEd). This objective relates to such topics as computer graphics, artificial intelligence, and machine vision, Also, our projects are consulted with experts from other fields such as psychology and pedagogy. Therefore we

cooperate with LUDUS scientific group, which is located on Faculty of Education at the University of Warsaw. Together we are working on a project “Enigame”, which is a city game supported by mobile technologies. There is a feeling in the group, that the future belongs to mobile systems, hence the MuGEd works are dedicated to portable devices. The new vision of educational games, creating software for mobile systems and huge interdisciplinary of the work are the hallmarks of our Group.

4.6 Instrumentation investments

4.6.1 Laboratory of hyperpolarized contrast for MRI

Piotr Bogorodzki, E. Piątkowska-Janko, B. Sawionek.
2009 - 2012
Founded by FNiTP (Fundusz Nauki i Technologii Polskiej)

The aim of the project is to build an laboratory of a new hyperpolarisable MRI contrast agents. This aim covers following aspects of MRI of hyperpolarized media: designing and testing new experimental procedures, hyperpolarisation instrumentation designing and methods for MRI data processing. Project was founded by the Polish Science Foundation and has foreseen following activities: purchase of 0.23 T whole body scanner, design of a noble gases (He3) hyperpolarisation system and adaptation of Warsaw University of Technology laboratory.

4.6.2 Centre for Biomedical Technology and Medical Physics

Nuclear and Medical Electronics Division (**Krzysztof Zaremba** – head)
2008 - 2013
Founded by European Regional Development Fund (ERDF) in scope of Operational Programme Innovative Economy (POIG).

The project is a part of the CePT (Centre for Preclinical Research and Technology) the biggest biomedical and biotechnological undertaking in Central and Eastern Europe. The CePT project is coordinated by the Medical University of Warsaw in partnership with the University of Warsaw, the Warsaw University of Technology and seven research institutes of the Polish Academy of Sciences. The main objective of the Centre is to establish the network of biomedical engineering and biomaterial technology laboratories which will form the base for scientific research and technology implementation. In this Project participates 8 faculties of Warsaw University of Technology. At present the Centre is in a phase of equipment purchasing and organization of laboratories.

4.6.3 Sub-terahertz Technology and An--tenna Laboratory

Yevhen Yashchyshyn, P. Bajurko
2010 - 2013
Founded by European Regional Development Fund (ERDF) in scope of Operational Programme Innovative Economy (POIG).

The project is a part of the Faculty Research Centre FOTEH (Photonics and Terahertz Technologies). The project encompasses modernizing of infrastructure of the Antenna Laboratory that enables research on spatial distributions of the electromagnetic field in the millimetre-wave and sub-terahertz range to develop and study of antennas, characterize parameter of materials and designing of the communication, imaging and radar systems.

5. TITLES AND DEGREES AWARDED

5.1. Professor Titles

[Prof1] Krzysztof Zaremba – promoted to a professor title (Jul. 3, 2012).

5.2. D.Sc. Degrees

[DSc1] Piotr Bogorodzki: *"Zastosowanie metod tomograficznych do badania dynamiki procesów fizjologicznych"* (An aplication of tomography methods to studying dynamics of physiological processes), Warsaw, Jun. 2012.

5.3. Ph.D. Degrees

[PhD1] Paweł Bajurko: *„Czasowo-przestrzenno--częstotliwościowe badania sterowanych mikrofalowych systemów antenowych"* (Time-spatial-frequency examination of steerable microwave antenna systems), Prof. **Y. Yashchyshyn** (supervisor), (Ph.D. degree with honours), Warsaw, Jun. 5, 2012.

[PhD2] Michał Grabowski: *„Nowe rozwiązania konstrukcyjno-technologiczne szyków antenowych wykorzystywanych w dwu-polaryzowanych urządzeniach radiolokacyjnych"* (Novel constructional and technological solution of the array antennas used in dual-polarised radars), Prof. **S. Rosłoniec** (supervisor), Warsaw, Mar. 13, 2012.

[PhD3] Mariusz Jakubowski: "*Adaptive hardware--oriented motion estimation algorithms in compression of visual data*", Prof. **W. Skarbek** (supervisor), (Ph.D. degree with honours), Warsaw, Dec. 11, 2012.

[PhD4] Cezary Jezierski: *"Zmodyfikowany algorytm AES do szyfrowania toru danych w łączności satelitarnej"* (Modified AES algorithm to encrypt the data track satellite communications), Prof. **J. Modelski** (supervisor), Warsaw, Dec. 11, 2012.

[PhD5] Rafał Korycki: *„Zastosowanie metod czasowo-częstotliwościowej analizy sygnałów w wykrywaniu śladów ingerencji w ciągłość cyfrowych zapisów fonicznych"* (Application of time-frequency methods in authentication of digital audio recordings), Prof. **Z. Kulka** (supervisor), (Ph.D. degree with honours), Warsaw, Jan. 31, 2012.

[PhD6] L. Raczyński: *„Modelowanie widm fragmentacyjnych w zastosowaniu do identyfikacji peptydów za pomocą tandemowej spektrometrii mas (MS/MS)"* (Modeling of mass spectra in application to peptide identification using tandem mass spectrometry (MS/MS), Prof. **K. Zaremba** (supervisor), (Ph.D. degree with honours), Warsaw, Nov. 27, 2012.

[PhD7] Dawid Rosołowski: *„Projektowanie mikrofalowych wzmacniaczy mocy z adaptacyjnymi obwodami dopasowującymi"* (A microwave power amplifier design with adaptive matching networks), Prof. **T. Morawski** (supervisor), Warsaw, Feb. 7, 2012.

5.3. M.Sc. Degrees

[MSc1] Arkadiusz Bednarzak: *„Mobilny monitor promieniowania jonizującego z łączem USB"* (Device supporting exercise training in cardiac rehabilitation), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[MSc2] Arkadiusz Bedner: *"Zastosowanie eksploracji danych w medycynie na przykładzie wspomagania wykrywania choroby Alzheimera"* (Application of data mining in medicine. Alzheimer's disease assessment support), Assist. Prof. **E. Piątkowska-Janko** (supervisor).

[MSc3] Konrad Bielecki: *"Oprogramowanie ECT--Sim do trójwymiarowego modelowania w elektrycznej tomografii pojemnościowej"* (ECTSim software for three dimensional modeling in electrical capacitance tomography), Assist. Prof. **W. Smolik** (supervisor).

[MSc4] Andrzej Bielski: *"Demodulator kwadraturowy na pasmo ISM 5,8 GHZ dla systemu transmisji danych wykorzystującego technikę RFID"* (Quadrature demodulator for data transmission system using RFID technique operating in the 5.8 GHz band), Assist. Prof. **P. Kopyt** (supervisor).

[MSc5] Hubert Chrzaniuk: *"Implementacja normy ISO/IEEE 11073"* (ISO/IEEE 11073 implementation), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[MSc6] Marek Ciepłucha: *„Implementacja modułu CPRM dla kontrolera SDIO-HOST"* (Implementation of the CPRM module for the SDIO-HOST controller), Assist. Prof. **M. Rawski** (supervisor), (M. Sc. degree with honours).

[MSc7] Adam Czapski: *"Kluczowany wzmacniacz mocy klasy G"* (Class G switching power amplifier), Assist. Prof. **J. Modzelewski** (supervisor).

[MSc8] Przemysław Czerepaniak: *„Projekt i wykonanie systemu DGPS do zastosowań w urządzeniach mobilnych"* (Design and implementation of DGPS system for mobile devices), Assist. Prof. **K. Radecki** (supervisor), (M. Sc. degree with honours).

[MSc9] Błażej Czupryński (co-author: Michał Krajewski): *"Kamera światła strukturalnego - kalibracja i zastosowanie"* (Structured light camera calibration and applications), Prof. **W. Skarbek** (supervisor).

[MSc10] Daniel Duchna: *"Half-bridge LLC resonant DC/DC converter",* Assist. Prof. **M. Mikołajewski** (supervisor).

[MSc11] Kararzyna Dukielska: *„Generacja sygnałów LTE w warunkach laboratorium radiokomunikacji PW"* (LTE signals generation using equipment available in Institute of Radioelectronics PW), Reader **J. Cichocki** (supervisor), (M.Sc. degree with honours).

[MSc12] Mateusz Cezary Flis: *„Monitorowanie saturacji krwi dla pilotów szybowców”* (Measurements of glider pilot's blood oximetry), Assist. Prof. **R. Kurjata** (supervisor).

[MSc13] Łukasz Gąska: *“Syntezer ADPLL/PLL na pasmo X (8-12 GHz)”* (X-band (8-12 GHz) ADPLL/PLL synthesizer), Assist. Prof. **D. Gryglewski** (supervisor).

[MSc14] Paweł Gielmuda: *“Nieinwazyjny czujnik pulsu z interfejsem bezprzewodowym”* (Non-invasive pulse sensor with wireless interface), Assist. Prof. **T. Buczkowski** (supervisor).

[MSc15] Ryszard Gomółka: *„Model ośrodkowej regulacji ciśnienia tętniczego w mechanizmie ANG/Apelina/AVP”* (The central regulation of blood pressure model in ANG/Apelina/AVP mechanism), Prof **A. Grzanka** (supervisor).

[MSc16] Piotr Gruziel: *„Wizualizacja pola elektromagnetycznego dla elementów mikrofalowych w standardzie OPENGL”* (Visualization of the electromagnetic field for the microwave elements in the OPENGL standard), Assist. Prof. **A. Więckowski** (supervisor).

[MSc17] Daniel Grzywczak: *“Image deblurring using PSF parametric model”,* Assist. Prof. **G. Galiński** (supervisor).

[MSc18] Grzegorz Gwardys: *“Detekcja punktów charakterystycznych twarzy z wykorzystaniem zrównoleglonej klasyfikacji metodą maszyny wektorów nośnych”* (Detection of facial points using parallely implemented SVM classification), Prof. **W. Skarbek** (supervisor).

[MSc19] Krzysztof Jankowski: *“Synteza widoków w systemach kompresji sekwencji wielowidokowych”* (View synthesis in compression of multiview video sequences), Assist. Prof. **G. Galiński** (supervisor).

[MSc20] Marta Jarczyńska: *“Analiza systemów informacyjnych w placówkach medycznych”* (Analysis of information systems in medical facilities), Assist. Prof. **M. Baszun** (supervisor).

[MSc21] Michał Jarosz: *“Zastosowanie symulacji metodą Monte Carlo w opracowaniu zagadnień ochrony radiologicznej akceleratora ESS”* (Application of the Monte Carlo method in the development of radiological protection issues of ESS accelerator), Prof. **K. Zaremba** (supervisor).

[MSc22] Tomasz Krzysztof Jurkowski: *„Układ do pomiaru prądu w dozymetrycznej komorze jonizacyjnej”* (System for measuring current of the dosimetric ionization chamber), Assist. Prof. **B. Konarzewski** (supervisor).

[MSc23] Marta Kalbarczyk: *“Układ rejestracji impulsów ultraszerokopasmowych z wykorzystaniem próbkowania koherentnego”* (I-UWB receiver with a sampling down converter), Assist. Prof. **J. Kołakowski** super-visor), (M.Sc. degree with honours).

[MSc24] Wojciech Klepacki: *“Implementacja modelu propagacji ITU-R P. 1546”* (Implementation of ITU-R P.1546 propagation model), Assist. Prof. **W. Kazubski** (supervisor).

[MSc25] Monika Knap: *“Automatyczne rozpoznawanie tkanki niedokrwiennej we we wczesnoudarowych obrazach CT mózgu”* (Automatic recognition of ischaemic tissue in early-stroke CT images of brain), Prof. **A. Przelaskowski** (supervisor).

[MSc26] Jakub Kołodziej: *„Opracowanie oprogramowania systemu do analizy parametrów sygnałów I-UWB”* (Development of system software for analysis of ultra-wideband signal parameters), Reader **J. Cichocki** (supervisor).

[MSc27] Łukasz Korczak: *„Telemetryczny pomiar średniego ciśnienia tętniczego krwi”* (Telemetric mean blood pressure measurement), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[MSc28] Marcin Kotz: *“Przeglądarka obrazów medycznych DICOM na urządzenia mobilne”* (DICOM medical images viewer software for mobile platforms), Assist. Prof. **E. Piątkowska-Janko** (supervisor).

[MSc29] Michał Kowalski: *„Stymulator wymuszonego ruchu palców dłoni do wykorzystania w badaniach czynnościowych z wykorzystaniem techniki rezonansu magnetycznego”* (Forced movement of the fingers simulator for use in functional studies by means of magnetic resonance technique), Assist. Prof. **E. Piątkowska-Janko** (supervisor).

[MSc30] Michał Krajewski (co-author: Błażej Czupryński): *„“Kamera światła strukturalnego - kalibracja i zastosowanie”* (Structured light camera calibration and applications), Prof. **W. Skarbek** (supervisor).

[MSc31] Andrzej Krawczyk: *“Zwiększenie efektywności widmowej w pasmie 900 MHz na terenach słabo zurbanizowanych”* (Spectral efficiency increase in the 900 MHz band in the poorly urbanized areas), Reader **T. Kosiło** (supervisor).

[MSc32] Jacek Kryszyn: *„Symulacje pola elektrycznego w sondzie tomografu pojemnościowego”* (Electric field simulations in electrical capacitance tomography sensor), Reader **R. Szabatin** (supervisor).

[MSc33] Beata Kuc: *“Sześciowrotnik mikrofalowy do pomiaru kierunku nadchodzenia fail”* (Six-port microwave junction for direction of arrival measurement, Prof. **Y. Yashchyshyn** (supervisor).

[MSc34] Tomasz Piotr Leśniak: *„Projektowanie wysokosprawnych, mikrofalowych wzmacniaczy mocy z wykorzystaniem tranzystora GaN HEMT”* (The designing of microwave high-efficiency power amplifiers

on base of GaN technology), Assist. Prof. **W. Wojtasiak** (supervisor).

[MSc35] Krzysztof Liszewski: *"Nieinwazyjna metoda monitorowania zużycia energii elektrycznej"* (Non-invasive method of monitoring the consumption of electric energy), Prof. **W. Winiecki** (supervisor).

[MSc36] Konrad Łubianka: *„Wyszukiwanie obrazów na podstawie kolorów dominujących"* (Image search using dominant colors), Assist. Prof. **G. Galiński** (supervisor), (M.Sc. degree with honours).

[MSc37] Radosław Malesa: *„Urządzenie do pomiaru sygnału EKG"* (Device for measuring the ECG signal), Assist. Prof. **B. Konarzewski** (supervisor).

[MSc38] Radosław Marcinkowski: *„Architektura nowego systemu tomografii pojemnościowej ET4 i jej platforma testowa"* (The architecture of the new capacitance tomography system ET4 with its test platform), Reader **R. Szabatin** (supervisor), (M.Sc. degree with honours).

[MSc39] Michał Maruszak: *"Modelowanie rozkładu pola przy użyciu zagęszczanej siatki kartezjańskiej w elektrycznej tomografii pojemnościowej"* (Modelling of electric field distribution using refined cartesian mesh in electric capacitance tomography), Assist. Prof. **W. Smolik** (supervisor), (M.Sc. degree with honours).

[MSc40] Roman Modzelewski: *„Zdalny system informatyczny do wspomagania diagnozowania stanu zatok szczękowych"* (Remote information system to support the diagnosis of maxillary sinuses), Assist. Prof. **M. Baszun** (supervisor).

[MSc41] Radosław Mołdrzykowski: *"Opracowanie modułu wymiany danych w ultraszerokopasmowym systemie lokalizacyjnym z wykorzystaniem sieci Ethernet i WLAN"* (Development of Ethernet/WLAN module for data exchange between ultra-wideband localization system nodes), Assist. Prof. **J. Kołakowski** (supervisor).

[MSc42] Michał Moryc: *„Weryfikacja metod archiwizacji danych w radiologicznych systemach informacyjnych"* (Verification of data compression methods used in radiology information systems), Prof. **A. Przelaskowski** (supervisor).

[MSc43] Sebastian Opałczyński:

– *ChimPythia"* (Tool to support quality assessment of protein models – Chim Pythia), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[MSc44] Krzysztof Kamil Ostrowski: *„Oprogramowanie do sterowania i wizualizacji danych pomiarowych z ultraszerokopasmowego systemu lokalizacyjnego"* (Controlling and data processing software for ultrawideband localization system), Assist. Prof. **J. Kołakowski** (supervisor).

[MSc45] Agata Otrocka (Rogowska): *"Słyszalność zmian brzmienia nagrań muzycznych w ciszy i w warunkach hałasu po zastosowaniu kompresji stratnej"* (Discrimination of lossy compression in music samples in quiet and with background noise), Prof. **J. Żera** (supervisor), (M. Sc. degree with honours).

[MSc46] Konrad Paurowicz: *„Projekt w układzie FPGA elementów modulatora i demodulatora QAM z możliwością wyboru wartościowości modulacji"* (Designing of elements of digital QAM modulator and demodulator in FPGA structures), Assist. Prof. **K. Kurek** (supervisor).

[MSc47] Michał Placha: *"Uniwersalny symulator sygnału EKG"* (Multipurpose ECG signal generator), Assist. Prof. **T. Buczkowski** (supervisor).

[MSc48] Michał Płatek: *"Sprzętowa implementacja odwrotnej dyskretnej transformacji falkowej i dekwantyzatora dekodera JPEG 2000"* (Hardware implementation of inverse discrete wavelet transformation and inverse quantization for JPEG 2000 standard), Assist. Prof. **G. Pastuszak** (supervisor).

[MSc49] Zbigniew Pomianowski: *"Świetlny wskaźnik prezentacyjny z lokalizacją 2D"* (Light indicator with 2D localisation for presentation purposes), Prof. **W. Skarbek** (supervisor).

[MSc50] Przemysław Probola: *„Standard ETSI 300 718 i jego modyfikacja w elektronicznych detektorach lawinowych"* (Standard ETSI 300 718 and its modification in avalanche beacon system), Assist. Prof. **P. Kopyt** (supervisor).

[MSc51] Maciej Ratyński: *"8-kanałowy cyfrowy mikser audio na procesorze sygnałowym SHARC ADSP-21364"* (8-channel digital audio mixing console using SHARC ADSP - 21364 sound processor), Assist. Prof. **P. Bobiński** (supervisor).

[MSc52] Aleksandra Różańska: *"Badanie wpływu mechanizmów warstwy fizycznej i dostępu do medium na zachowanie systemu WIMAX w typowym środowisku propagacyjnym"* (Study on the impact of physical and MAC layers mechanisms on the behaviour of the WIMAX system in the typical measurement environment), Assist. Prof. **T. Keller** (supervisor).

[MSc53] Maciej Ryszkowski: *"Zastosowanie sieci neuronowych w systemach aktywnej redukcji hałasu generowanego przez pojazdy uprzywilejowane"* (Application of neural networks in active noise control systems for emergency vehicles), Prof. **J. Żera** (supervisor).

[MSc54] Magdalena Agnieszka Sawicka: *„Modelowanie parametryczne w badaniach szybkości metabolizmu glukozy w mózgu z wykorzystaniem pozytonowej tomografii emisyjnej (PET)"* (Parametric modeling in dynamic glucose metabolism PET studies

in human brain), Assist. Prof. **M. Baszun** (supervisor).

[MSc55] Agnieszka Smycz: *"Subiektywna ocena jakości dźwięku poddanego rekwantyzacji i konwersji częstotliwości"* (A subjective evaluation of the quality of sound subject to requantization and sample rate conversion), Assist. Prof. **M. Tajchert** (supervisor), (M. Sc. degree with honours).

[MSc56] Tomasz Szczerba: *"Symulacja komputerowa toru transmisji QPSK z synchronizacją nośnej oraz symbolową w środowisku SPW"* (Computer simulation of QPSK data transmission link with carrier and symbol recovery system in SPW environment), Assist. Prof. **K. Radecki** (supervisor).

[MSc57] Gracjan Szczęch: *"Opracowanie i badanie aktywnej przegrody o zmiennej izolacyjności"* (Elaboration and research into active partition of variable insulation), Assist. Prof. **M. Tajchert** (supervisor).

[MSc58] Maciej Trochimiuk: *"Sprzętowa implementacja filtrów interpolacyjnych w standardzie kompresji H.265/HEVC"* (Hardware implementation of interpolation filters for H.265/HEVC video compression), Assist. Prof. **G. Pastuszak** (supervisor).

[MSc59] Mateusz Tulibacki: *"Projekt i badania zintegrowanego, mobilnego systemu zdalnej lokalizacji pojazdów"* (Vehicle remote localisation system), Assist. Prof. **T. Keller** (supervisor), (M. Sc. degree with honours).

[MSc60] Jakub Ufnal: „*Jednokanałowy aparat EKG z łączem USB"* (Single-channel ECG with USB connection), Assist. Prof. **G. Domański** (supervisor).

[MSc61] Paweł Wasiluk: *"Czasowo-częstotliwościowe odwzorowania sygnałów radiowych z wykorzystaniem aparatury dostępnej w laboratorium radiokomunikacji IR PW"* (Time-frequency processing of radio signals using instrumentation available in the radiocomunications laboratory), Reader **J. Cichocki** (supervisor).

[MSc62] Beata Wąchocka: *"Tworzenie modeli statystycznych w środowisku GAMLSS dla antropometrycznych zastosowań medycznych"* (Constructing statistical models for anthropometric medical applications using GAMLSS), Prof. **J. Mulawka** (supervisor).

[MSc63] Paweł Janusz Wąsowski: *„System wymiany informacji w ultraszerokopasmowym systemie lokalizacyjnym z wykorzystaniem standardu ZigBee"* (ZigBee based network for data exchange in ultrawideband localization system), Assist. Prof. **J. Kołakowski** (supervisor), (M.Sc. degree with honours).

[MSc64] Jakub Karol Wiszowaty: *"Frequency synthetizer 2.35 - 2.7 GHz",* Assist. Prof. **P. Kopyt** (supervisor).

[MSc65] Agnieszka Ziemek: *„Komputerowe wspomaganie detekcji symptomów raka płuc w radiogramach"* (Computer-aided detection of lung cancer in chest X-ray images), Prof. **A. Przelaskowski** (supervisor).

[MSc66] Łukasz Żeleźnicki: *"Standard DICOM w radioterapii"* (DICOM standard in radiotherapy), Assist. Prof. **R. Kurjata** (supervisor).

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

[MSc67] Jarosław Czuba: *"Budowa miksera audio wysokiej jakości"* (The construction of high quality audio mixer), Assist. Prof. **W. Kazubski** (supervisor).

[MSc68] Tomasz Niedzielski: *"Modulacje kodowane kratowo - podstawy teoretyczne i implementacja kodera i dekodera"* (Trellis coded modulations - theoretical fundamentals and implementation of coder and decoder), Assist. Prof. **K. Snopek** (supervisor).

[MSc69] Bogumił Muczyński: *"Optymalizacja struktury konwertera do systemu WLAN 802.11x"* (Optimization of the structure of the converter to 802.11x WLAN system), Assist. Prof. **W. Wojtasiak** (supervisor).

5.5. B.Sc. Degrees

[BSc1] Adam Babiński: *"Wzmacniacz mocy klasy D sygnałów akustycznych"* (Class D audio amplifier), Assist. Prof. **J. Modzelewski** (supervisor).

[BSc2] Anna Badawika; *"Analiza pomiarowa właściwości akustycznych Studia S2 Polskiego Radia"* (Measurement analysis of the acoustic properties of the Polish Radio Studio S2), Assist. Prof. **M. Tajchert** (supervisor).

[BSc3] Wojciech Bałazy: *„Analiza krzywych dynamicznych z badań scyntygraficznych"* (Analysis of dynamic curves in scintigraphic examinations), Reader **P. Brzeski** (supervisor).

[BSc4] Eryk Błażejczyk: *„Wymiana danych z użyciem usługi internetowej na przykładzie aplikacji internetowej pełniącej funkcję systemu obsługi studiów"* (Electronic data interchange using web services based on the example of web application supporting teaching process), Assist. Prof. **K. Ignasiak** (supervisor).

[BSc5] Grzegorz Bogdan: *"Rozproszony system pomiarowy z gwarancją jakości usług (QoS)"* (Quality of service in distributed measurement system), Assist. Prof. **R. Łukaszewski** (supervisor).

[BSc6] Paweł Boguszewski: *„Rozproszony system pomiarowo - sterujący z transmisją bezprzewodową Wi-Fi"* (Distributed measurement and control system with wireless

WiFi transmission), Assist. Prof. **R. Łukaszewski** (supervisor).

[BSc7] Paweł Borkowski: *„Misja balonowa - część programowa"* (Baloon mission - software implementation), Prof. **Y. Yashchyshyn** (supervisor).

[BSc8] Nikola Brodowska: *"Urządzenie do pomiaru siły nacisku u osób z porażeniami kończyn"* (Pressure measurement device for patients with hand paralysis), Assist. Prof. **G. Domański** (supervisor).

[BSc9] Maciej Bucholc: *"System do weryfikacji i testowania parametrów sygnału DVB-T"* (System for testing and verification of DVB-T signal parameters), Assist. Prof. **T. Keller** (supervisor).

[BSc10] Michał Budka: *"Implementacja lokalnego deskryptora obrazu w oparciu o analizę dwuwymiarowego widma osobliwego w technologii nVidia CUDA"* (Implementation of local image descriptor based on two-dimensional singular spectrum analysis using nVidia CUDA technology), Prof. **W. Skarbek** (supervisor).

[BSc11] Kamil Burdzy: *"System komputerowego planowania i symulacji ortopedycznych zabiegów chirurgicznych"* (A computer assisted planning and simulation system for orthopedic surgery applications), Assist. Prof. **M. Kwacz** (supervisor).

[BSc12] Daniel Burek: *"Implementacja sprzętowa układu generatora on-screen display"* (Physical implementation of on-screen display system), Assist. Prof. **G. Pastuszak** (supervisor).

[BSc13] Krystian Buszkowski: *"Sterownik przesuwu liniowego do badania rozkładu pola elektromagnetycznego w strefie bliskiej"* (Linear shift driver for testing electromagnetic field distribution in the near zone), Senior Lecturer **H. Chaciński** (supervisor).

[BSc14] Wojciech Chaberek: *„Badanie właściwości akustycznych reżyserii R1a przy studiu koncertowym Polskiego Radia im. Witolda Lutosławskiego"* (The acoustic properties in R1a control room of Witold Lutosławski Polish Radio concert studio), Prof. **Z. Kulka** (supervisor).

[BSc15] Grzegorz Chmielewski: *„Sprzętowa implementacja dekodera nagłówków w standardzie kompresji wideo H.265/HEVC"* (Stream headers decoder hardware module for H.265/HEVC video), Assist. Prof. **G. Pastuszak** (supervisor).

[BSc16] Maria Cieślak: *„Interfejs człowiek - komputer dla osób niepełnosprawnych - myszka sterowana ruchami głowy"* (Human - computer interface for people with disabilities - head controlled mouse), Assist. Prof. **T. Buczkowski** (supervisor).

[BSc17] Andrzej Ciura: *"Bezwładnościowy przyrząd do zdalnej obserwacji kinematyki sportowców"* (Inertial instrument for remote observation of sportsmen kinematics), Assist. Prof. **T. Buczkowski** (supervisor).

[BSc18] Paweł Cyrynowski: *„Właściwości transmisyjne filtrów rzeczywistych i ich badanie w środowisku MATLAB"* (Transmission properties of real filters and their analysis using Matlab), Assist. Prof. **K. Snopek** (supervisor).

[BSc19] Marcin Czarnocki: *"Telemedyczny system fonokardiologiczny"* (Phonocardiographic telemedicine system), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[BSc20] Katarzyna Anna Czernikow: *"Rozproszony system pomiarowo - sterujący z wykorzystaniem telefonii komórkowej"* (Distributed controlling and measurement system based on mobile network), Assist. Prof. **R. Łukaszewski** (supervisor).

[BSc21] Krzysztof Czubaszek: *"Stanowisko do badania modulacji FSK i PSK. Realizacja w środowisku LabView"* (Stand for investigation of FSK and PSK modulation. Realization in the LabView environment), Senior Lecturer **H. Chaciński** (supervisor).

[BSc22] Patryk Ćwiek: *"Symulacja Monte Carlo rozchodzenia się światła w tkankach"* (Monte Carlo simulation of light transport in tissue), Assist. Prof. **G. Domański** (supervisor).

[BSc23] Grzegorz Dziarmaga: *„Wymiana danych z użyciem usług sieciowych na przykładzie księgarni internetowej"* (Data interchange system using web services on the example of bookshop), Assist. Prof. **K. Ignasiak** (supervisor).

[BSc24] Wojciech Ferenc: *„Projekt programowego narzędzia do testowania urządzeń DOCSIS 3.0"* (Project of measurement environment for testing the devices in compliance with standard DOCSIS 3.0), Assist. Prof. **T. Keller** (supervisor).

[BSc25] Marcin Frąckiewicz: *"Interfejs graficzny użytkownika generatora dużej mocy"* (User Interface for high power generator), Assist. Prof. **D. Gryglewski** (supervisor).

[BSc26] Marcin Fuz: *„Aplikacja do detekcji twarzy w obrazach pojedynczych"* (Application to face detection in single images), Prof. **A. Przelaskowski** (supervisor), Warsaw Uniwersity of Technology Distant Learning Center (Ośrodek Kształcenia na Odległość PW).

[BSc27] Grzegorz Galiński: *„Głośność reklam w programach telewizyjnych"* (Loudness of advertisements in television programs), Prof. **J. Żera** (supervisor).

[BSc28] Karol Gliwa: *„Moduł detektora wraz z oprogramowaniem dla źródła mocy na pasmo ISM 2,4GHz"* (Detector module and software for the 2.4GHz ISM band power source), Assist. Prof.**D. Gryglewski** (supervisor).

[BSc29] Jan Grabiński: *„Specjalizowany procesor do rozpoznawania objawów tachykardii”* (Single-purpose processor used in recognition of tachycardia symptoms), Assist. Prof. **Z. Jaworski** (supervisor).

[BSc30] Piotr Górski: *“Program do analizy odpowiedzi hemodynamicznej w tomografii optycznej mózgu”* (Program for analysing the haemodynamic response in optical tomography of the brain), Assist. Prof. **G. Domański** (supervisor), (B.Sc. degree with honours).

[BSc31] Marcin Iwanow: *“Projekt i realizacja układu jednostopniowej przemiany częstotliwości dla sygnału DVB-T”* (The project and implementation of an upconverter for the DVB-T signal), Assist. Prof. **M. Bury** (supervisor), (B.Sc. degree with honours).

[BSc32] Aleksander Andrzej Jankowski: *„Układ pomiaru mocy w zakresie częstotliwości do 2,5 GHz”* (Power measurement system for frequency to 2.5 GHz), Senior Lecturer **H. Chaciński** (supervisor).

[BSc33] Witold Januszewski: *“PHYLODIGM - program do digitalizacji drzew filogenetycznych”* (PHYLODIGM – PHYLOgenetic tree DIGitalisation Manager), Prof. **K. Zaremba** (supervisor).

[BSc34] Artur Jóźwikowski: *„Deinterlacing - konwersja obrazów z wybieraniem międzyliniowym na obrazy z wybieraniem kolejnoliniowym”* (Deinterlacing – the conversion of interlaced images into non-interlaced images), Assist. Prof. **A. Buchowicz** (supervisor).

[BSc35] Marta Karska: *„Wysokooporowe kryształy (Cd,Mn)Te jako detektory promieniowania gamma”* (High-resistivity (Cd,Mn)Te crystals as gamma rays detectors), Reader **R. Szabatin** (supervisor).

[BSc36] Piotr Kąkol: *“Interfejs człowiek-komputer dla niepełnosprawnego użytkownika komputera - uniwersalna "klawiatura" sterowana kodem Morse'a”* (The human-computer interface for person with physical disability - Morse code controlled universal "keyboard"), Assist. Prof. **T. Buczkowski** (supervisor).

[BSc37] Tomasz Kołakowski: *“Badanie podwójnego zabezpieczenia wkładką i nausznikiem przeciwhałasowym przy mechanicznym pobudzaniu czaszy nausznika do drgań”* (Measurements of double protection with earmuff and earplug mechanically driven by electromagnetic exciter), Prof. **J. Żera** (supervisor).

[BSc38] Maciej Korzybski: *“Program do syntezy wybranych tranzystorów impedancji”* (Software implementation of algorithm for synthesis of some impedance matching circuits), Assist. Prof. **P. Miazga** (supervisor).

[BSc39] Marcin Kossakowski: *“Repeater dla systemu GPS-NAVSTAR na pasma dostępu standardowego i autoryzowanego”* (GPS-NAVSTAR signal repeater for standard and precise positioning services modes), Assist. Prof. **W. Wojtasiak** (supervisor).

[BSc40] Marek Kowalski: *“Single image 3D face reconstruction for face recognition”* Assist. Prof. **J. Naruniec** (supervisor), studies in English.

[BSc41] Paweł Tomasz Kracki: *„Analiza funkcjonalna aktywności genów”* (Functional analysis of gene activity), Assist. Prof. **T. Rubel** (supervisor).

[BSc42] Jakub Krawczyk: *“Mikroprocesorowy układ sterujący oświetleniem LED”* (Microprocessor LED lighting controller), Assist. Prof. **K. Czerwiński** (supervisor).

[BSc43] Wioletta Kruk: *“Blok regulowania mocy do źródła dużej mocy na pasmo ISM 2.4 GHz”* (Control power block for ISM 2.4 GHz band high power source), Assist. Prof. **W. Wojtasiak** (supervisor).

[BSc44] Kamil Damian Kubacki: *“Urządzenie wspomagające trening wysiłkowy w rehabilitacji kardiologicznej”* (Device supporting exercise training in cardiac rehabilitation), Senior Lecturer **T. Jamógiewicz** (supervisor).

[BSc45] Maciej Kucharski: *“Opracowanie syntezera częstotliwości na zakres 5.5-6.1 GHz”* (Frequency synthesizer for 5.5-6.1 GHz), Assist. Prof. **R. Michnowski** (supervisor).

[BSc46] Adam Kuczyński: *“Oprogramowanie do zdalnej konfiguracji i sterowania urządzeniami standardu DOCSIS 3.0”* (Configuration tool for DOCSIS 3.0 device), Assist. Prof. **T. Keller** (supervisor).

[BSc47] Łukasz Kulawczuk: *„Badanie stabilności systemów czasu ciągłego i dyskretnego w środowisku LabVIEW”* (Study of stability of systems in LabVIEW environment), Assist. Prof. **K. Snopek** (supervisor).

[BSc48] Magdalena Kurzyp: *„Dokładność pomiarów scyntygraficznych wychwytu jodu 131 w badaniach tarczycy”* (The accurancy of the scintigraphic measurements of capture of iodine 131 in examinations of the thyroid gland), Prof. **N. Golnik** (supervisor).

[BSc49] Paweł Lasecki: *„Projekt anteny z cylindrycznym rezonatorem dielektrycznym pobudzanym otwartym końcem falowodu na pasmo 10 GHz”* (Rectangular waveguide excitation of cylindrical dielectric resonator antenna working at 10GHz), Assist. Prof. **K. Derzakowski** (supervisor).

[BSc50] Michał Laskowski: *„Rekonstrukcja sceny 3D techniką stereo-pary w telefonie komórkowym HTC”* (3D scene reconstruction by stereo-pair technique for HTC telephone), Prof. **W. Skarbek** (supervisor).

[BSc51] Grzegorz Lipiński: *„Aplikacja do zdalnej kontroli i sterowania stacja bazową systemu WiMAX”* (An applicaion for remote

control of WiMAX system base station), Assist. Prof. T**. Keller** (supervisor).

[BSc52] Barbara Litwińska: *"Moduł medycyny ratunkowej z zakresu telekardiologii"* (Emergency medicine unit in the field of telecardiology), Prof. **A. Przelaskowski** (supervisor).

[BSc53] Grzegorz Lubicz-Krupowicz: *„Rezonansowy wzmacniacz mocy pracujący w klasie C, B i AB"* (High-frequency class-C, B and AB resonant power amplifier), Assist. Prof. **J. Modzelewski** (supervisor).

[BSc54] Karol Łyżwiński: *„Projekt i realizacja anteny mikro-paskowej zasilanej przez sprzężenie"* (Microwave aperture coupled microstrip antenna - project and realization), Assist. Prof. **M. Bury** (supervisor).

[BSc55] Wojciech Krzysztof Machula: *„Antena z rezonatorem dielektrycznym pobudzana za pomocą szczeliny o przełączanej polaryzacji"* (Slot-coupled dielectric resonator antenna with reconfigurable polarization), Assist. Prof. **K. Derzakowski** (supervisor).

[BSc56] Małgorzata Majewska: *"Projekt i realizacja systemu transkrypcji muzyki na układzie FPGA"* (Automatic music transcription system design based on FPGA), Assist. Prof. **P. Bobiński** (supervisor).

[BSc57] Agnieszka Makowska: *"Indywidualny monitor narażenia na stałe pole magnetyczne dla pracowników medycznych"* (The individual monitor of the exposure to static magnetic field for medical workers), Assist. Prof. **R. Kurjata** (supervisor).

[BSc58] Andrzej Manujło: *"Odbiornik sygnałów transponderów lotniczych ADS-B"* (Receiver for signals from ADS-B transponders), Assist. Prof. **W. Kazubski** (supervisor).

[BSc59] Aleksandra Mardofel: *"Urządzenie mikroprocesorowe do badania czasu reakcji pacjenta na bodziec świetlny"* (The microprocessor device for testing visual reaction time), Assist. Prof. **G. Domański** (supervisor), (B.Sc. degree with honours).

[BSc60] Ewa Anna Mergalska: *„Oprogramowanie stanowiska komputerowego do badań słuchu w zakresie kierunkowości słyszenia, binauralnego sumowania głośności i dudnień binauralnych"* (Computer software for measurements of directional hearing, binaural loudness summation and binaural beats), Prof. **J. Żera** (supervisor).

[BSc61] Łukasz Mioduszewski: *"Program graficznego modelera 3D bazujący na bibliotekach QT i VTK"* (Graphical modeler application based on the QT and VTK library), Assist. Prof. **M. Sypniewski** (supervisor), studies in English.

[BSc62] Paweł Mrozek: *"Oprogramowanie do wizualizacji 2D i 3D widm mas próbek biologicznych"* (Software for 2D and 3D visualization of mass spectra of biological samples), Assist. Prof. **T. Rubel** (supervisor), (B. Sc. degree with honours).

[BSc63] Agnieszka Naplocha: *"Symulacja odbicia światła od tkanek"* (Simulation of light reflection from tissues), Assist. Prof. **G. Domański** (supervisor), (B.Sc. degree with honours).

[BSc64] Kamil Nawrot: *„Rozpoznawanie komend głosowych przy pomocy sztucznej sieci neuronowej"* (Voice commands recognition based on artificial neural network), Prof. **K. Zaremba** (supervisor).

[BSc65] Michał Nawrot: *"Niskoprofilowa antena znacznika RFID na pasmo UHF"* (Low-profile antenna for UHF RFID tags), Assist. Prof. **P. Kopyt** (supervisor).

[BSc66] Mikołaj Olszewski: *„Badania odporności systemu DVB-H w transmisji danych multimedialnych"* (The measurements of the DVB-H system resistance in the transmission of multimedia data), Assist. Prof. T**. Keller** (supervisor).

[BSc67] Paulina Osiak: *"Pomiary i ocena hałasu w środowisku pracy"* (The measurement and assessment of noise in the workplace), Assist. Prof. **E. Kotarbińska** (supervisor).

[BSc68] Marcin Panek: *"Komputer biegowy" – monitorowanie pulsu metodą osłuchową"* („Running computer" – pulse monitoring using auscultatory method), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[BSc69] Dominik Paszkowski: *"Projekt szyku antenowego na pasmo 24 GHz"* (24 GHz array antenna design), Prof. **Y. Yashchyshyn** (supervisor).

[BSc70] Michał Pawlak: *"Metody śledzenia kontrastu w badaniach USG realizowane w środowisku MATLAB"* (Methods of tracking the contrast in USG examination using Matlab), Prof. **A. Przelaskowski** (supervisor), Warsaw University of Technology Distant Learning Center (Ośrodek Kształcenia na Odległość PW).

[BSc71] Helena Pentman: *„Implementacja wybranych instrumentów muzycznych jako instrumentów wirtualnych w technologii VSTi"* (The implementation of musical instruments as virtual instruments in VSTi technology), Assist. Prof. **P. Bobiński** (supervisor).

[BSc72] Przemysław Piasecki: *„Tor drugiej przemiany częstotliwości odbiornika radaru impulsowego"* (The second frequency mixing of a pulse radar receiver), Assist. Prof. **D. Gryglewski** (supervisor).

[BSc73] Marta Piejdak: *"Zanurzenie obiektów graficznych w scenach naturalnych"* (Immersion of graphical objects in natural scene), Prof. **W. Skarbek** (supervisor).

[BSc74] Radosław Pietkiewicz: *„Telekonsultacje medyczne z wykorzystaniem narzędzia do wideokonferencji"* (Medical teleconsultation

with video conferencing tool), Prof. **A. Przelaskowski** (supervisor).

[BSc75] Agnieszka Paula Pietrzak: *"Oprogramowanie do badań słuchu w zakresie binauralnego zmniejszenia maskowania"* (Computer software for measurements of binaural decrease in masking), Prof. **J. Żera** (supervisor).

[BSc76] Małgorzata Pietrzyk: *"Modelowanie elektromagnetyczne bi-fazowanych mieszanin na potrzeby ekranów Salisbury"* (Electromagnetic modeling of bi-phased mixtures for Salisbury screens), Assist. Prof. **M. Celuch** (supervisor), studies in English.

[BSc77] Filip Polanowski: *"Projekt i realizacja dwudrożnej kolumny głośnikowej do systemu audio"* (Design and creation of a two-way loudspeaker for audio system), Assist. Prof. **P. Bobiński** (supervisor).

[BSc78] Paweł Pszczółkowski: *"Badanie i charakteryzacja głowic kapilarnych w czujnikach optycznych opartych o systemy światłowodowe"* (Study of capillary heads in optical sensors based on fiber optic systems), Assoc. Prof. **M. Borecki** (supervisor).

[BSc79] Olga Pyrka: *"Wpływ parametrów powierzchniowej diody PIN na parametry anteny szczelinowej pracującej na częstotliwości 60 GHz"* (Influence of parameters of surface PIN diode of slot working antenna at 60 GHz frequency), Assist. Prof. **K. Derzakowski** (supervisor).

[BSc80] Piotr Radaj: *„Wideootoskop"* (Video otoscope), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[BSc81] Piotr Regulski: *„Porównanie algorytmów szkieletyzacji: pocieniania i pomiaru odległości w zastosowaniach stomatologicznych"* (Comparison of algorithms of skeletonization: thinning method and distance field method in dental applications), Prof. **A. Przelaskowski** (supervisor), Warsaw University of Technology Distant Learning Center (Ośrodek Kształcenia na Odległość PW).

[BSc82] Joanna Rogowska: *"Segmentacja wododziałowa w zastosowaniu do danych tomograficznych"* (Watershed segmentation applied to computed tomographic data), Assist. Prof. **K. Mikołajczyk** (supervisor), (B.Sc. degree with honours).

[BSc83] Filip Rogowski: *"System bezdotykowego sterowania wirtualnym obiektem 3D za pomocą ruchów ręki"* (System of touchless controlling virtual 3D object with hand movement), Assist. Prof. **J. Naruniec** (supervisor).

[BSc84] Jakub Rostkowski: *"Design and optimization of an axisymmetrical horn antenna for wireless communication"*, Prof. **W. Gwarek** (supervisor), studies in English.

[BSc85] Mateusz Różański: *„Adaptacja biblioteki kryptograficznej opartej o krzywe eliptyczne w środowisku Lab WINDOWS/CVI"* (Implementation of cryptographic library based on elliptic curve for the LabWindows /CVI environment), Assist. Prof. **R. Łukaszewski** (supervisor).

[BSc86] Łukasz Ruta: *"Digitalizacja sygnału EKG"* (Digitalization ECG signal), Prof. **K. Zaremba** (supervisor).

[BSc87] Łukasz Rytel: *"Rozproszony system zarządzania informacją na przykładzie kiosku multimedialnego"* (The distributed information managment system on the example of a multimedia kiosk), Assist. Prof. **K. Ignasiak** (supervisor).

[BSc88] Kamil Salman: *"Pomiar ciśnienia tętniczego krwi z użyciem sygnałów EKG i PPG"* (Blood pressure measurement using ECG and PPG signals), Assist. Prof. **T. Buczkowski** (supervisor).

[BSc89] Dominika Sawicka: *"Projekt bezkontaktowego termometru komunikującego się jako akcesorium z systemem operacyjnym Android"* (Design of a non-contact infrared thermometer working as an accessory with Android operating system), Assist. Prof. **R. Kurjata** (supervisor).

[BSc90] Filip Skibiński: *"Analiza wideo tekstur w układzie mikroskopu polaryzacyjnego"* (Video texture analysis in the polarizing microscope system), Assist. Prof. **P. Garbat** (supervisor).

[BSc91] Jakub Skrzypkowski: *"Lokalizacja oczu w sekwencjach wideo z wykorzystaniem światła podczerwonego"* (Eyes localization using infrared light in video sequences), Assist. Prof. J**. Naruniec** (supervisor).

[BSc92] Mateusz Smarzewski: *"Konfiguracja przenośnego skanera USG Sontrace firmy Dramiński wraz z rekonstrukcją obrazów modu B"* (USG Sontrace mobile scanner configuration with mode B image reconstruction), Prof. **A. Przelaskowski** (supervisor).

[BSc93] Radosław Sokołowski: *"Wykorzystanie modułów radiowych do komunikacji w sieci złożonej z mierników parametrów środowiskowych"* (Using radio modules to communicate in network composed of instruments for environmental parameters measurement and analysis), Assist. Prof. **A. Podgórski** (supervisor).

[BSc94] Szymon Sokół: *„Syntezer VCO/PLL do źródła dużej mocy na pasmo ISM2.4GHz"* (VCO synthesis with integrated PLL loop for high power microwave source), Assist. Prof. **W. Wojtasiak** (supervisor).

[BSc95] Olga Stankiewicz: *"Ukrywanie informacji w obrazach medycznych"* (Information hiding in medical images), Prof. **A. Przelaskowski** (supervisor).

[BSc96] Aleksander Stańczak: *"Sterowanie automatyką budynku za pomocą gestów"* (Building automation control using gestures), Assist. Prof. **J. Naruniec**(supervisor).

[BSc97] Piotr Michał Starzyński: *„Oprogramowanie do mapowania identyfikatorów baz danych genów i białek"* (Software for the mapping of identifiers of genes and proteins databases), Assist. Prof. **T. Rubel** (supervisor).

[BSc98] Michał Stasiuk: *"Antena RFID pracująca w paśmie 13,56 MHz"* (RFID antenna for 13,56 MHz band), Assist. Prof. **P. Kopyt** (supervisor).

[BSc99] Marcin Dominik Staszek: *„Badania wpływu doboru degradowalnego materiału polimerowego na szybkość uwalniania leku"* (Study of the effect of selection biodegradable polymeric materials on the rate of drug release), Assist. Prof. **W. Święszkowski** (supervisor).

[BSc100] Adam Stolarczyk: *„Projekt i realizacja korektora parametrycznego do zastosowań studyjnych"* (Project and implementation of parametric EQ for use in recording studio), Assist. Prof. **P. Bobiński** (supervisor).

[BSc101] Mateusz Stosio: *"Zastosowanie układu FPGA do sterowania systemem pomiarowym"* (Using FPGA device to control the measurement system), Senior Lecturer **T. Olszewski** (supervisor).

[BSc102] Łukasz Sypuła: *"Urządzenie do pomiaru rozkładu nacisku na stopie"* (Device for the analysis of foot pressure distribution), Assist. Prof. **R. Kurjata** (supervisor).

[BSc103] Dariusz Szabłowski: *"Układ pomiaru poziomu mocy mikrofalowej"* (Microwave power measurement system), Assist. Prof. **R. Michnowski** (supervisor).

[BSc104] Jolanta Szałkowska: *„Zastosowanie okienkowanego rozkładu Wignera do analizy sygnałów elektromiograficznych"* (Application of the Smoothed Wigner Transformation to analysis of electromyographic signals), Assist. Prof. **K. Snopek** (supervisor).

[BSc105] Regina Szczepańska: *"Kontrola jakości w medycynie nuklearnej"* (Quality control nuclear medicine), Prof. **N. Golnik** (supervisor).

[BSc106] Michał Szewczyk: *„Oprogramowanie i badania urządzeń nadawczo-odbiorczych do systemu lokalizacji radiowej w paśmie ISM 868 MHz"* (Software design and research on transmitter and reciever intended for radio location system in ISM 868 MHz band), Assist. Prof. **K. Radecki** (supervisor).

[BSc107] Artur Szopa (co-author: Radosław Wiankowski): *"Zestaw głośnikowy sterowany za pomocą interfejsu Bluetooth"* (Bluetooth wireless stereo speaker system), Prof. **Z. Kulka** (supervisor).

[BSc108] Marta Sztybor: *"Opracowanie oprogramowania do badań symulacyjnych ultraszerokopasmowych systemów lokalizacyjnych"* (Software development for simulation studies of ultrawideband localization systems), Assist. Prof. **J. Kołakowski** (supervisor).

[BSc109] Marta Szulecka: *"Oprogramowanie do klasyfikacji schorzeń nowotworowych za pomocą sztucznych sieci neuronowych na podstawie danych pochodzących z eksperymentów mikromacierzowych"* (Software for classification of neoplastic diseases with the use of neural networks based on data coming from microarray experiments), Assist. Prof. **T. Rubel** (supervisor).

[BSc110] Piotr Szupiluk: *„Generowanie profili geotechnicznych na podstawie badań in-situ"* (Soil profile generation using in-situ examinations), Assist. Prof. **P. Bilski** (supervisor).

[BSc111] Jan Bolesław Szyszko: *„Oprogramowanie do modelowania i rekonstrukcji obrazu w tomografii nanocząsteczek magnetycznych"* (Software for modeling and image reconstruction in magnetic particle imaging), Assist. Prof. **W. Smolik** (supervisor).

[BSc112] Łukasz Torbicki: *„Dynamiczny symulator rozprzestrzeniania się epidemii"* (Epidemics spreading dynamic simulator), Assist. Prof. **B. Konarzewski** (supervisor).

[BSc113] Krzysztof Urbański: *"Projekt i realizacja układu stabilizacji częstotliwości sygnału generatora"* (Design and realisation of a circuit which stabilizes the frequency of a generated signal), Senior Lecturer **H. Chaciński** (supervisor), Warsaw University of Technology Distant Learning Center (Ośrodek Kształcenia na Odległość PW).

[BSc114] Mateusz Walczyk: *„Misja balonowa- część sprzętowa"* (Baloon mission - hardware and mechanical implementation), Prof. **Y. Yashchyshyn** (supervisor).

[BSc115] Radosław Wiankowski (co-author: Artur Szopa): *„Zestaw głośnikowy sterowany za pomocą interfejsu Bluetooth"* (Bluetooth wireless stereo speaker system), Prof. **Z. Kulka** (supervisor).

[BSc116] Łukasz Krzysztof Wiktorowicz: *„Interfejs Ethernet do tomografu pojemnościowego"* (Ethernet interface for an electrical capacitance tomograph), Senior Lecturer **T. Olszewski** (supervisor).

[BSc117] Robert Wiktorowicz: *„Realizacja medycznego systemu informacyjnego do archiwizacji, przetwarzania i wyszukiwania obrazów"* (Implementation of a medical information system for archiving, processing and retrieval of images), Prof. **A. Przelaskowski** (supervisor).

[BSc118] Adrian Wojewódzki: *"Implementacja sprzętowa warstwy MAC kontrolera*

sieciowego ethernet" (MAC layer ethernet controller), Assist. Prof. **G. Pastuszak** (supervisor).

[BSc119] Katarzyna Wojtasik: *„Analiza propagacji radiowej w środowisku miejskim w pasmach VHF i UHF z wykorzystaniem programu Radiowave Propagation zSimulator"* (Analysis of the radio wave propagation in the urban environment in the VHF and UHF band using the Radiowave Propagation Simulator), Assist. Prof. **K. Kurek** (supervisor).

[BSc120] Krzysztof Wolański: *"Interfejs człowiek – komputer dla niepełnosprawnego użytkownika komputera – wpisywanie tekstu za pomocą ruchów gałki ocznej"* (Interface human - computer for disabled computer user - enter text with eyes), Assist. Prof. **T. Buczkowski** (supervisor).

[BSc121] Anna Wróblewska: *"Testowanie żywotności oka dla potrzeb biometrii tęczówki przy wykorzystaniu analizy częstotliwościowej"* (Fake iris detection for iris biometrics base on frequency spectrum analysis), Assist. Prof. **A. Czajka** (supervisor).

[BSc122] Bartłomiej Zamorski: *"Projekt i wykonanie miksera słuchawkowego do zastosowań studyjnych"* (Design and construction of matrix headphone mixer for recording studio), Prof. **Z. Kulka** (supervisor).

[BSc123] Rafał Zawiślak: *„Projekt oraz realizacja anteny łatkowej z dwoma punktami pobudzenia wraz z układem zasilającym umożliwiającym elektroniczną zmianę polaryzacji"* (Project and realization of patch antenna with two feeding points with feeding system designed for the electronic change of polarization), Assist. Prof. **M. Bury** (supervisor).

[BSc124] Dawid Zdrojewski: *„Oprogramowanie do klasyfikacji schorzeń nowotworowych metodą wektorów nośnych na podstawie danych z mikromacierzy DNA"* (Software for tumor classification using Support Vector Machine and microarray data), Assist. Prof. **T. Rubel** (supervisor).

[BSc125] Magdalena Zieleniewska: *"Bezpieczny system wymiany informacji medycznej"* (Secure medical information exchange system), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[BSc126] Adam Zieliński: *„System komputerowy dla elektrycznego tomografu pojemnościowego w technologii Net"* (Computer system for Electrical Capacitance Tomograph in NET Technology), Assist. Prof. **W. Smolik** (supervisor).

[BSc127] Maciej Władysław Zieliński: *„Optymalizacja kształtu szczeliny anteny sterowanej powierzchniową diodą"* (Shape optimization of slot in the antenna controlled by surface PIN diode), Assist. Prof. **K. Derzakowski** (supervisor).

[BSc128] Grzegorz Żebrowski: *"Automatyczny wskaźnik źródła promieniowania/skażenia"* (Automatic directional radiation/contamination indicator), Prof. **K. Zaremba** (supervisor), (B.Sc. degree with honours).

[BSc129] Jakub Żurkowski: *„Tor nadawczy do konwertera nadawczo-odbiorczego radaru na pasmo Ku"* (Up-converter of Ku-band radar), Assist. Prof. **D. Gryglewski** (supervisor).

[BSc130] Dominika Życka: *"Metoda przestrzennej wizualizacji struktur mózgowia w TK"* (Visualization of brain structures from CT head images), Prof. **A. Przelaskowski** (supervisor).

[BSc131] Marek Żyliński: *„Charakteryzacja wzorcowych pól promieniowania neutronowego"* (Characterization of neutron reference fields), Assist. Prof. **P. Tulik** (supervisor).

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

[BSc132] Małgorzata Bugajska: *"Analiza widmowa i filtracja sygnałów w środowisku LabVIEW"* (Spectrum analysis and filtering of signals in LabVIEW), Assist. Prof. **K. Snopek** (supervisor).

[BSc133] Michał Głogowski: *„Generator funkcji specjalnych PAL"* (Special functions generator for PAL system), Senior Lecturer **T. Krzymień** (supervisor).

[BSc134] Włodzimierz Karłowicz: *"Wspomagane komputerowo stanowisko kontroli i kalibracji głowic ultradźwiękowych"* (Computer assisted inspection and calibration of the ultrasound transducers), Senior Lecturer **T. Jamrógiewicz** (supervisor).

[BSc135] Tomasz Krajewski: *"Określenie charakterystyk ciśnieniowych i pola swobodnego dla półcalowych mikrofonów piezoceramicznych"* (Designation of a pressure characteristic and a free-field characteristic for half-inch piezoceramic microphone), Assist. Prof. **A. Podgórski** (supervisor).

[BSc136] Grzegorz Michaluk: *"Światłowodowe foniczne łącze optyczne w technologii VoIP"* (Fiber optic audio link in the technology of VoIP), Assist. Prof. **L. Lewandowski** (supervisor).

[BSc137] Sebastian Morawski: *"Pomiary i ocena hałasu na wybranym terenie Politechniki Warszawskiej"* (Measurements and rating of noise in the selected area of Warsaw University of Technology), Assist. Prof. **E. Kotarbińska** (supervisor).

[BSc138] Rafał Wojtyś: *"Interfejs człowiek – komputer dla niepełnosprawnego użytkownika komputera uniwersalna klawiatura sterowana kodem Morse'a"* (Human computer interface for the disabled user of the computer. A standard keyboard operated by the Morse code), Assist. Prof. **T. Buczkowski** supervisor).

6. PUBLICATIONS

6.1. Scientific and technical books, chapters in books

[Pub1] M. Dziewiecki: "Measurement-Based Characterization of Multipixel Avalanche Photodiodes for Scintillating Detectors", Editorial Series on Accelerator Science, R. Romaniuk (Ed.), O*ficyna Wydawnicza PW* (2012), 115 pp.

[Pub2] D. Gryglewski, W. Wojtasiak, T. Morawski: „Szyki fazowane z zasilaniem rozproszonym" (Phased Arrays with Distributed Power), in: W. Zieniutycz (Ed.): *„Współczesne technologie radarowe. Anteny o sterowanej wiązce w technice radarowej"* (Modern Radar Technologies. Steered Beam Antenna in Radar Technology), Chapter 4, *WKŁ* (2012), pp. 189-224.

[Pub3] R. Z. Morawski, A. Miękina, J. Wagner: „A Method of Weighing Matrix for Spectrometric Analysis of Oil Mixtures", in: F. Pavese, M. Bär, J. R. Filtz, A. B. Forbes, L. Pendrill and K. Shirono (eds.): *Advanced Mathematical and Computational Tools in Metrology and Testing IX*, *Series on Advances in Mathematics for Applied Sciences*, vol. 84 (2012), *World Scientific Publishing Co. Pte. Ltd.,* ISBN-13 978-981-4397-94-0, pp. 276-283.

[Pub4] G. Pastuszak: „Video Compression from the Hardware Perspective", in: C. Volosencu (Ed.): *Cutting Edge Research in New Technologies*, chapter 11 (2012), *InTech.*, ISBN 978-953-51-0463-6, pp. 233-256.

[Pub5] B. W. Salski, M. K. Leśniewska-Matys, P. Szczepański: „On the Applicability of Photonic Crystal Membranes to Multi-Channel Propagation", in: A. Massaro (ed.): *Photonic Crystals – Innovative Systems, Lasers and Waveguides*, chapter 7 (2012), *InTech,* ISBN 978-953-51-0416-2, pp. 97-122.

6.2. Scientific and technical papers in journals

6.2.1 JCR –ISI list journals

[Pub6] K. Abe, N. Abgrall, (...), M. Dziewiecki, R. Kurjata, J. Marzec, K. Zaremba, M. Ziembicki: „First Muon-Neutrino Disappearance Study with an Off-Axis Beam", *Physical Review D*, vol. 85 (2012), doi: 10.1103/PhysRevD. 85.031103, pp. 031-103-1-031103-7.

[Pub7] K. Abe, N. Abgrall, (…), M. Dziewiecki, R. Kurjata, J. Marzec, K. Zaremba, M. Ziembicki: „Measurements of the T2K Neutriono Beam Properties Using the INGRID on-axis Near Detector", *Nuclear Instruments and Methods in Physics Research A*, vol. 694 (2012), pp. 211-223

[Pub8] C. Adolph, M. G. Alekseev (...), M. Dziewiecki, J. Marzec, K. Zaremba, M. Ziembicki: "First Measurement of Chiral Dynamics in $\pi^- \gamma \rightarrow \pi^- \pi^- \pi^+$", *Physical Review Letters,* vol. 108, doi: 10.1103/PhysRevlett.108.192001 (2012), pp. 192001-1-192001-6.

[Pub9] C. Adolph, M. G. Alekseev (...), M. Dziewiecki, J. Marzec, K. Zaremba, M. Ziembicki: „Transverse Spin Effects in Hadron-Pair Production from Semi-Inclusive Deep Inelastic Scattering", *Physics Letters B*, vol. 713 (2012), pp. 10-16.

[Pub10] C. Adolph, M. G. Alekseev (...), M. Dziewiecki, J. Marzec, K. Zaremba, M. Ziembicki: "I-Experimental Investigation of Transverse Spin Asymmetries in μ-p SIDIS Processes: Sivers Asymmetries", *Physics Letters B*, vol. 717 (2012), pp. 376-382.

[Pub11] C. Adolph, M. G. Alekseev (...), M. Dziewiecki, J. Marzec, K. Zaremba, M. Ziembicki: "II-Experimental Investigation of Transverse Spin Asymmetries in μ-p SIDIS Processes: Sivers Asymmetries", *Physics Letters B*, vol. 717 (2012), pp. 383-389.

[Pub12] C. Adolph, M. G. Alekseev (...), M. Dziewiecki, J. Marzec, K. Zaremba, M. Ziembicki: „Exclusive ρ^0 Muoproduction on Tranversely Polarised Protons and Deuterons", *Nuclear Physics B*, vol. 865 (2012), pp. 1-20.

[Pub13] M. Antonello, P. Aprili (…), P. Płoński, K. Zaremba: „A Search for the Analogue to Cherenkov Radiation by High Energy Neutrinos at Superluminal Speeds in ICARUS", *Physics Letters B*, vol. 711, doi:10.1016j./physletb.2012.04.014 (2012), pp. 270-275.

[Pub14] M. Antonello, P. Aprili (…), P. Płoński, K. Zaremba: „Measurement of the Neutrino Velocity with the ICARUS Detector at the CNGS Beam", *Physics Letters B*, vol. 713 (2012), pp. 17-22.

[Pub15] M. Antonello, B. Baibussinov, P. Benetti, (…..), P. Płoński, K. Zaremba: „Precision Measurement of the Neutrino Velocity with the ICARUS Detector in the CNGS Beam", *Journal of High Energy Physics* (2012), doi: 10.1007/JHEP11(2012)049, pp. 1-19.

[Pub16] P. Bilski, W. Winiecki: „Methods of Assessing the Time Efficiency in the Virtual Measurement Systems", *Computer Standards and Interfaces,* vol.34, issue 6, November (2012), pp. 485-492.

[Pub17] D. Gryglewski, W. Wojtasiak, P. Kopyt, J. Żurkowski: „Układ przemiany częstotliwości toru nadawczego radaru impulsowego na pasmo Ku" (Up-converter for Ku-Band Radar), *Przegląd Elektrotechniczny,* vol. 88, no. 11b (2012), pp. 14-17.

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[Pub172] K. Werys, Ł. Błaszczyk, J. Petryka, E. Piątkowska-Janko, P. Bogorodzki, B. Sawionek, J. Miśko: „Comparison of Myocardial Strain Estimation Methods in Tagged Magnetic Resonance Imaging", *Proc. IEEE 9th International Symposium on Biomedical Imaging* (Barcelona, Spain, May 2-5, 2012), poster.

7. REPORTS AND PATENTS

[Rep1] M. Antonello, D. Bagliani (....), P. Płoński, K. Zaremba: *"Search for "anomalies" from neutrino and anti-neutrino oscillations at $\Delta m^2 \approx 1eV^2$ with muon spectrometers and large LAr-TPC imaging detectors"*, Technical proposal (CERN-SPSC-2012--010 and SPSC-P-347), ICARUS Collaboration.

[Rep2] P. Grabowski: *"Wymiana danych między pojazdami samochodowymi z wykorzystaniem sieci peer-to-peer"* (The Data Exchange using Peer-to–Peer Networks), Technical proposal for the Institute of Radioelectronics, WUT, Warsaw, Nov. 2012.

[Rep3] D. Gryglewski, W. Wojtasiak: *"Opracowanie demonstratora technologii radaru śledzącego do kierowania artylerią przeciwlotniczą"* (The Development of Anti-aircraft Artillery Radar Tracking Technology Demonstrator), Final report for the development grant, Institute of Radioelectronics, WUT, Warsaw, Sept. 2012.

[Rep2] W. Gwarek, T. Morawski, S. Rosłoniec, M. Celuch, D. Gryglewski, P. Kopyt, P. Miazga, M. Sypniewski, A. Więckowski, W. Wojtasiak, J. Zborowska, K. Robaczyński, D. Rosołowski, B. Salski, P. Kończak, M. Olszewska, M. Lubiejewski: *„Zaawansowane techniki modelowania i projektowania układów wielkich częstotliwości"* (Contemporary Methods for the Analysis and Design of HF Structures), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep3] S. L. Hahn: *„Possible experimental verification of Bellert's cosmological red shift using the Cosmic Microwave Background Radiation*, *in commemoration of prof S. Bellert and dr ing. G. Hahn"*, Final raport no. 1, Institute of Radioelectronics, WUT, Warsaw, Apr. 2012.

[Rep4] S. L. Hahn: *„Proposal of experimental verification of the hypothesis of the noise generated by quantum vacuum"*, Final raport no. 2, Institute of Radioelectronics, WUT, Warsaw, Oct. 2012.

[Rep5] K. Ignasiak, W. Skarbek, A. Buchowicz, G. Galiński, J. Naruniec, G. Pastuszak, M. Jakubowski, M. Jędryka, M. Leszczyński, A. Nowakowski, A. Abramowski, G. Brzuchalski, M. Roszkowski, M. Wieczorek: *„Audiowizualne sieciowe systemy hybrydowe"* (Audiovisual Network Hybrid Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep6] J. Kołakowski: *„Rozproszony system do pomiaru temperatury tężejącego betonu"* (Distributed System for Concrete Curing Temperature Measurement), Final report for Mostostal Warszawa SA., Warsaw, May 2012.

[Rep7] J. Kołakowski, J. Cichocki, R. Michnowski, K. Radecki, W. Kiełek, S. Żmudzin, P. Makal, P. Ziętek: *"Układy rejestracji sygnałów w ultraszerokopasmowych systemach radarowych"* (Circuits and Devices for Signal Acquisition in UWB Radar Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep8] P. Kopyt: *„Opracowanie opinii o innowacyjności przedstawionego rozwiązania technicznego linii ciągłego przetwarzania odpadów (w szczególności zużytych opon samochodowych) w kontrolowanej atmosferze, przy wykorzystaniu mikrofal"* (An Opinion about the Innovation Presented Technical Solution of the Continuous Treatment of Waste (Including Used Tires) in a Controlled Environment, Using Microwave), Final report for Techtrans Ltd., Warsaw, Nov. 2012.

[Rep9] S. Kozłowski: *"Wieloantenowe techniki nadawania i odbioru"* (Multiple-Antenna Transmitting and Receiving Techniques), Final report for the Dean grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep10] Z. Kulka, P. Bobiński, E. Kotarbińska, A. Leszczyński, M. Lewandowski, M. Tajchert, J. Żera: *„Projektowanie i badania systemów elektroakustycznych oraz systemów cyfrowego przetwarzania sygnałów fonicznych"* (Design and Investigation of Electroacoustic Measuring Systems and Digital Audio Signal Processing Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep11] J. Modelski: *"Opracowanie części merytorycznej wniosku o dofinansowanie w projekcie INNOTECH"* **(**Research Conception for the INNOTECH Program), Final report for Paweł Graniewski Consulting, Warsaw, Mar. 2012.

[Rep12] J. Modelski, M. Dąbrowski: *„Badanie architektury odbiorników cyfrowej telewizji naziemnej standardu DVB-T2"* (Study of Digital Terrestrial Television Receiver Architectures for DVB-T2 Standard), Final report for the Ph.D. grant, Institute of Radioelectronics, WUT, Warsaw, Apr. 2012.

[Rep13] J. Modelski, Y. Yashchyshyn, K. Kurek, T. Keller, M. Bury: *„Nowa generacja anten fotonicznych dla sieci transmisji radiowo-światłowodowej"* (New Generation of Photonic Antennas for Radio over Fiber Transmission Systems), Final report for the research grant, Institute of Radioelectronics, WUT, Warsaw, Apr. 2012.

[Rep14] J. Modelski, T. Keller, K. Kurek, M. Piasecki, K. Bryłka, M. Dąbrowski: *"Metody analizy parametrów transmisji systemów naziemnej telewizji cyfrowej DVB-T/H oraz odporności tych systemów na zakłócenia w*

transmisji danych multimedialnych" (Methods of Analysis of the DVB-T/H Digital Terrestrial Television Systems' Transmission Parameters and their Resistance for the Interference Sources), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep15] J. Modzelewski, H. Chaciński, W. Kazubski, M. Mikołajewski: *„Wysokosprawne układy regulacji mocy i modulacji amplitudy o dużej mocy wyjściowej z kluczowanymi wzmacniaczami mocy w. cz"* (High-Power High-Efficiency Power Control and Amplitude Modulation Circuits with Switch Mode H.F. Power Amplifiers), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw,Dec. 2012.

[Rep16] R. Z. Morawski, A. Miękina, A. Podgórski: *„Interpretacja danych pomiarowych – metodyka i aspekty meta-metrologiczne"* (Interpretation of Measurement Data - Methodology and Metametrological Aspects), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep17] A. Przelaskowski, R. Jóźwiak: *„Wieloskalowe metody prezentacji i opisu treści diagnostycznej w medycznych sekwencjach obrazowych"* (Multiscale Methods of Data Representation and Modeling in Medical Imaging Sequences), Final report for the Ph.D. grant, Institute of Radioelectronics, WUT, Warsaw, Jun. 2012.

[Rep18] A. Przelaskowski, G. Ostrek, R. Jóźwiak, M. Jasionowska, A. Rutczyńska: *„Diagnostyka wczesnego udaru mózgu – ocena wpływu czynników klinicznych na skuteczność rozpoznań"* (Early Stroke Diagnostics – Extentions of CAD System), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep19] B. Salski: *"Modele nieliniowych zjawisk optycznych w metodzie różnic skończonych w dziedzinie czasu"* (Models of Nonlinear Optical Phenomena in Finite Difference Method in the Time Domain), Final report for the Dean grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep20] W. Skarbek: *„Wyznaczanie kierunku patrzenia z wykorzystaniem kamery internetowej"* (Webcam Eye Tracking), Final report for Samsung Electronics Polska, Warsaw, Dec. 2012.

[Rep21] R. Szabatin, P. Brzeski, W. Smolik, T. Olszewski: *„Dostawa 32-kanałowego systemu elektrycznej tomografii pojemnościowej"* (Delivery of 32-channel Electrical Capacitance Tomography System), Final report for Lodz University of Technology, Computer Engineering Department, Warsaw, Mar. 2012.

[Rep22] W. Winiecki, P. Bilski, P. Czernik, R. Łukaszewski, K. Mroczek, J. Olszyna: *„Rozwój metod projektowania stacjonarnych i rozproszonych systemów pomiarowych"* (Development of Stationary and Distributed Measuring Systems Designing Methods), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep23] J. Wojciechowski, A. Bilski, P. Grabowski, S. Kozłowski, K. Snopek: *„Badania w zakresie sygnałów wielowymiarowych algorytmów heurystycznych oraz optymalizacji sieci transmisyjnych"* (Investigation on Multidimensional Signals of Heuristic Algorithms and Optimization of Transmission Networks), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep24] Y. Yashchyshyn K. Derzakowski, M. Bury, P. Bajurko, A. Urzędowska, K. Godziszewski, B. Majewski: *„Rozbudowa stanowiska pomiarowego do pomiarów w pasmie milimetrowym i subterahercowym – opracowanie anten wzorcowych"* (Further Development of Test Bench for Measurement in Millimeter and Subterahertz Frequency Band – Design of Standard Antennas), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep25] K. Zaremba, P. Bogorodzki, P. Brzeski, G. Domański, T. Jamrógiewicz, B. Konarzewski, R. Kurjata, J. Marzec, T. Olszewski, E. Piątkowska-Janko, D. Radomski, B. Sawionek, W. Smolik, R. Szabatin, M. Ziembicki, S. Adaszewski, M. Dziewiecki, Ł. Kołaszewski, W. Obrębski: *„Nowoczesne techniki elektroniki jądrowej i medycznej"* (Modern Techniques in Nuclear and Medical Electronics), Final report for the statutory grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2012.

[Rep26] K. Zaremba, L. Raczyński: *„Opracowanie metody identyfikacji peptydów i białek w zastosowaniu do badań proteomicznych"* (Development of Proteins and Peptides Identification Method in Proteomics), Final report for the Ph.D. grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2012.

[Rep27] M. Ziembicki: *„Nowoczesne techniki kalorymetrii elektromagnetycznej w eksperymentach fizyki wysokiej energii"* (Novel Techniques of Electromagnetic Calorimetry for High Energy Physics), Final report for Iuventus Plus Programme, Institute of Radioelectronics, WUT, Warsaw, Jun. 2012.

[Rep28] J. Żera, A. Świercz: *„Deskryptory niskiego i wysokiego poziomu w rozpoznawaniu dźwięku dla potrzeb baz danych"* (Low-and High-level Audio Descriptors in Sound Recognition for Databases), Final report for the Ph.D. grant, Institute of Radioelectronics, WUT, Warsaw, Feb. 2012.

PATENTS AND PATENT APPLICATIONS

[Pat1] M. Bury, R. Zawiślak, S. Kozłowski, P. Bajurko: *„Antena o przełączanej polaryzacji”* (Antenna with switchable polarization), Patent application P.398059, Feb. 9, 2012.

[Pat2] P. Bajurko, M. Bury, S. Kozłowski: *„Impulsowy system pomiarowy do wyznaczania parametrów sterowanych układów mikrofalowych”* (Pulse measurement system for determing the parameters of steerable microwave circuits), Patent application P.398249, Feb. 27, 2012.

[Pat3] P. Bajurko, M. Bury, S. Kozłowski: *„Sposób kalibracji wektorowego systemu pomiarowego oraz zestaw kalibracyjny dla wektorowego systemu pomiarowego”* (Method of calibration of vector measurement system and calibration kit for such system), Patent application P.398727, Apr. 4, 2012.

[Pat4] P. Bajurko, M. Bury, S. Kozłowski: *„Mikrofalowy system pomiarowy z oknowaniem w czasie”* (Microwave measurement system with time gating), Patent application P. 399175, May, 14, 2012.

[Pat5] P. Bajurko: *„Planarna antena dipolowa z ekranem przewodzącym”* (Planar dipole antenna with conductive patch), Patent application P.399395, Jun. 1, 2012.

8. SCIENTIFIC EVENTS

8.1 Scientific events co-organized by the Institute

[Con1] *Konferencja: Techniki hiperpolaryzacji w obrazowaniu za pomocą rezonansu magnetycznego* (Hyperpolarization Techniques in Magnetic Resonance Imaging), (Warsaw, Oct. 12, 2012), P. Bogorodzki (speaker).

8.2. International scientific events

[Con2] *XIth International Conference – Modern Problems of Radioengineering, Telecommunications and Computer Science: TCSET'2012* (Lviv-Slavske, Ukraine, Feb. 21-24, 2012), Y. Yashchyshyn (session co-chair, speaker).

[Con3] *14th Seminar: Computer Modeling in Microwave Engineering and Applications* (Bayreuth, Germany, Mar. 4-7, 2012), P. Korpas, M. Krysicki, A. Raniszewski (participants).

[Con4] *COST Action Meeting* (Stambul, Turkey, Mar. 18-21, 2012), Y. Yashchyshyn (participant).

[Con5] *6th International Symposium on Process Tomography: ISIPT'2012* (Cape Town, South Africa, Mar. 23-30, 2012), W. Smolik (participant).

[Con6] *6thEuropean Conference on Antennas and Propagation: EuCAP'2012* (Prague, Czech Republic, Mar. 26-30, 2012), Y. Yashchyshyn (speaker).

[Con7] *132 Audio Engineering Society Convention* (Budapest, Hungary, Apr. 26-29, 2012), Z. Kulka (participant).

[Con8] *11th International Conference on Artificial Intelligence and Soft Computing* (Zakopane, Poland, May 1-4, 2012), P. Płoński (participant).

[Con9] *Picture Coding Symposium* (Cracow, Poland, May 7-9, 2012), M. Jakubowski (participant).

[Con10] *2012 IEEE International Instrumentation and Measurement Technology Conference: I2MTC'2012* (Graz, Austria, May 12-17, 2012), P. Bilski (speaker).

[Con11] *19th International Conference on Microwaves, Radar and Wireless Communications: MIKON 2012* (Warsaw, Poland, May 21-23, 2012), J. Modelski, W. Gwarek (members of Technical Program Committee), Y. Yashchyshyn (session co-chair, participant, member of Technical Program Committee), J. Kołakowski (session co-chair, speaker), P. Kopyt.

[Con12] *Fifth Microwave and Radar Week: MRW 2012* (Warsaw, Poland, May 21-26, 2012), J. Modelski (general chair).

[Con13] *11th IFAC/IEEE International Conference on Programmable Devices and Embedded Systems* (Brno, Czech Republic, May 23-25, 2012), G. Brzuchalski (participant).

[Con14] *XXXth IEEE-SPIE Joint Symposium on Photonics, Web Engineering, Electronics for Astronomy and High Energy Physics Experiments* (Wilga, Poland, May 28-Jun. 2, 2012), G. Brzuchalski, P. Czernik, J. Olszyna, A. Rychter (speakers).

[Con15] *3rd International Conference Information Technogies in Biomedicine* (Kamień Śląski, Poland, Jun. 11-13, 2012), M. Jasionowska (speaker).

[Con16] *International Conference on Mechanics of Nano, Micro and Macro Composite Structures* (Torino, Italy, Jun. 17-21, 2012), M. Olszewska (participant).

[Con17] *IEEE International Microwave Symposium* (Montreal, Canada, Jun. 17-22, 2012), M. Celuch (session chair, member of the Scientific Committee, TPRC SC-33 chair), J. Modelski (member of the Technical Paper Review Committee), W. Gwarek (speaker).

[Con18] *2012 IEEE International Conference on Imaging Systems and Techniques: IST 2012* (Manchester, UK, Jul. 15-18, 2012), W. Smolik (participant).

[Con19] *Third International Symposium on Dynamic Nuclear Polarization* (Dublin, Ireland, Jun. 28 - Jul. 2, 2012), P. Bogorodzki (participant).

[Con20] *Progress in Electromagnetics Research Symposium: PIERS 2012* (Moscow, Russia, Aug. 19-22, 2012), B. Salski (participant).

[Con21] *The European Academy of Forensic Science Conference* (the Hague, the Netherlands, Aug. 20-24, 2012), R. Korycki (speaker).

[Con22] *XX IMEKO World Congres: Metrology for Green Growth* (Busan, Republic of Korea, Sept. 9-14, 2012), R. Z. Morawski (speaker, session chair, member of International Programme Committee), P. Bilski (speaker).

[Con23] *IEEE Photonics Society Conference 2012* (Burlingname, USA, Sept. 15-29, 2012), B. Salski (participant).

[Con24] *2012 IEEE MTT-S International Microwave Workshop Series on Milimeter Wave Wireless Technology and Applications* (Nanjing, China, Sept. 18-20, 2012), J. Modelski (keynote talk).

[Con25] *IEEE International Conference on Signals and Electronic Systems: ICSES 2012* (Wrocław, Poland, Sept. 18-22, 2012), J. Wojciechowski (member of the Program Committee).

[Con26] *IEEE Joint Conference NTAV/SPA 2012:* (Łódź, Poland, Sept. 27-29, 2012), Z. Kulka, W. Skarbek (members of the

Scientific Committee), P. Nykiel (participant), P. Bobiński, R. Korycki, M. Lewandowski (speakers).

[Con27] *VIIIth International Conference: Modern Information and Telecommunication Technologies: COMINFO 2012* (Lviv, Ukraine, Oct. 1-5, 2012), Y. Yashchyshyn (speaker).

[Con28] *European Microwave Conference: EuMW* (Amsterdam, the Netherlands, Oct. 27-Nov. 1, 2012), J. Modelski (session chair, member of TPC).

[Con29] *XXXIX Międzynarodowa Konferencja i Wystawa: PIKE 2012* (39th International Conference and Exhibition: PIKE 2012) (Jachranka, Poland, Oct. 1-3, 2012), J. Modelski (discussion panel chair).

[Con30] *6th International Forum on Innovative Technologies for Medicine: ITMED 2012* (Białystok, Poland, Nov. 21-23, 2012), K. Zaremba (Program Committee chairman).

8.2. National scientific events

[Con31] *Economic Forum: TIME – Telecommunication, Internet, Media, Eelectronics* (Jachranka, Poland, Mar. 13-15, 2012), J. Modelski (invited expert).

[Con32] *Konferencja Naukowa Młodych Naukowców, II edycja: Wpływ młodych naukowców na osiągnięcia polskiej nauki* (Scientific Conference on Young Scientists, Second Edition: The Impact of the Young Scientists on the Polish Science Achievements) (Gdańsk, Poland, Apr. 20-22, 2012), M. Jasionowska (speaker).

[Con33] *Krajowa Konferencja Radiokomunikacji, Radiofonii i Telewizji: KKRRiT 2012* (National Conference on Radiocommunications and Broadcasting) (Gdańsk, Poland, May 14-16, 2012), J. Modelski (session chair), J. Cichocki (session chair, member of the Programme Committee), Y. Yashchyshyn (member of the Programme Committee), A. Buchowicz, T. Buczkowski, J. Jarkowski, W. Kazubski, T. Keller, J. Kołakowski, K. Godziszewski R. Korycki, A. Urzędowska R. Michnowski, M. Kalbarczyk, M. Kucharski, T. Szczerba, M. Sztybor (speakers).

[Con34] XXII Ogólnopolski Zjazd Dziekanów Wydziałów Elektrycznych, Elektroniki, Telekomunikacji, Automatyki i Robotyki oraz Informatyki (XXIInd National Congress of Deans of Faculties of Electrical, Electronic, Telecommunications, Automation and Robotics, and Computer Science) (Łódź, Poland, May 31-Jun. 2, 2012), J. Modelski (invited speaker), W. Winiecki (participant).

[Con35] *PPM'2012 Podstawowe Problemy Metrologii* (Krynica-Zdrój, Poland, Jun. 3-6, 2012), W. Winiecki (member of the Scientific Committee).

[Con36] *XI Krajowa Konferencja Elektroniki* (XIth National Conference on Electronics) (Darłówko Wschodnie, Poland, Jun. 10-13, 2012), T. Morawski (member of the Scientific Committee) D. Gryglewski, M. Mikołajewski, J. Modzelewski (speakers), P. Kopyt (participant).

[Con37] *IX Konferencja Naukowa: Systemy pomiarowe w badaniach naukowych i w przemyśle* (IXth Scientific Conference: Measurement Systems in the Scientific Research and Industry) (Łagów, Poland, Jun. 17-20, 2012), W. Winiecki (member of the Scientific Committee, session chair), R. Łukaszewski, P. Czernik, J. Olszyna, M. Kocot (speakers).

[Con38] *XLIV Międzyuczelniana Konferencja Metrologów* (XLIV Inter-University Metrologists' Conference) (Ustroń-Jaszowiec, Poland, Sept. 9-12, 2012), W. Winiecki (member of the Scientific Committee).

[Con39] *XXVIII Krajowe Sympozjum Telekomunikacji i Teleinformatyki; KSTiT 2012* (XXVIII National Symposium on Telecommunication and Teleinformatics) (Warszawa - -Miedzeszyn, Sept. 12-14, 2012), J. Modelski, W. Skarbek (members of the Prograne Committee).

[Con40] *Konferencja Naukowa: Młodzi naukowcy wobec wezwań współczesnej techniki* (Scientific Conference: Young Scientists Towards the Challenges of Modern Technology) (Warsaw, Poland, Sept. 17 - -20, 2012), P. Makal (member of the Organizing Committee, speaker).

[Con41] *XIV Konferencja: Światłowody i ich zastosowania* (XIVth Conference: Optical Waveguides and its Applications) (Lublin i Nałęczów, Oct. 8-12, 2012), T. Karpisz (participant).

[Con42] *VIII Konferencja Ewaluacyjna-Ewaluacja w systemie polityk publicznych* (VIIIth Evaluation Conference-Evaluation in the System of Public Policies) (Warsaw, Poland, Nov. 12-13, 2012), M. Jaworska (participant).

[Con43] *40th Anniversary of IEEE Poland Section* (Warsaw, Poland, Nov. 16, 2012), J. Modelski (member of Directors' Board of IEEE, speaker).

[Con44] *XIII Seminarium: Radiokomunikacja i Techniki Multimedialne* (XIIIth Seminar: Radiocommunications and Multimedia Technologies) (Warsaw, Poland, Dec. 5, 2012), A. Jóźwikowski, M. Kalbarczyk, R. Maksimiuk, Ł. Nowak, J. Olszyna, K. Ostrowski, P. Piasecki, M. Trochimiuk, P. Wąsowski, J. Żurkowski (speakers).

[Con45] *Urządzenia i Systemy Radioelektroniczne* (Devices and Radioelectronic Systems) (Sobienie Królewskie, Poland, Dec. 6 2012), J. Modelski (member of the Programme Committee, plenary session chair).

[Con46] *Techniki Zarządzania Projektem* (Techniques of Managing a Project) (Warsaw, Poland, Dec. 17, 2012), M. Jaworska (participant), training organized by Bureau of Development and Strategic Project, WUT.

9. AWARDS AND DISTINCTIONS

State Medals

Medal Złoty za Długoletnią Służbę (Golden Medal for Long-lasting Service).

Teresa Miąsek, M.A.
Andrzej Wasilewski

Award of the Minister of Science and Higher Education:

Top 500 Innovators – Science – Management-Commercialization Programme

Piotr Bilski, Ph.D.

Scholarship for the outstanding students' granted by the Ministry of Science and Higher Education

Marcin Iwanow

Award of the International Measurement Confederation: IMEKO

Roman Z. Morawski, Prof. D.Sc.
Distinguished Service Award

As recognition and appreciation for his valuable contribution to the international exchange of scientific and technical information relating to developments in measuring techniques, instrument design and manufacture and in the application of instrumentation in scientific research and in industry.

IEEE Poland Section 40th Anniversary

Andrzej Miękina, Ph.D.,

Certificate of Appreciation for outstanding leadership and sustained contributions to the development of the IEEE Poland Section as Section Treasurer during the term 1999-2012.

Awards of the Rector

Roman Z. Morawski, Prof. D.Sc.

Individual I° award for the book: *"Ethical aspects of reasearch in empirical sciences"*

Józef Modelski, Prof. D.Sc.

Individual I° award for the organizational achievements in academic year 2010/2011

Józef Modelski, Prof. D.Sc.
Jacek Jarkowski, Ph.D.
Krzysztof Kurek, Ph.D.
Juliusz Modzelewski, Ph.D.
Wojciech Kazubski, Ph.D.
Henryk Chaciński, M.Sc.
Andrzej Dusiński B.Sc.
Ewa Wielowiejska

Team I° award for the scientific co-operation with National Institute of Telecommunications in 2010-2011.

WUT Business School

Roman Z. Morawski, Prof. D.Sc.

Medal of Warsaw University of Technology Bussiness School for his enormous dedication to the development of the School.

Award of the students of the Faculty

"Golden Chalk" Award

Krzysztof Zaremba, Prof. D.Sc.

Award of *the Foundation for the Development of Radiocommunications and Multimedia Technologies* in the Ph.D. competition

Rafał Korycki, Ph.D.

Awards granted for the conference papers and posters

Award of Association for Microwave Power in Europe for Research and Education

Przemysław Korpas, M.Sc.

Individual award in the Student Paper Competition for his contribution: *"Modeling of Multi-Source Microwave Power Scenarios-Ambiguities Due to Polarization"* at *14th Seminar: "Computer Modeling in Microwave Engineering and Applications"* (Bayreuth, Germany, Mar. 5-6, 2012).

Award of Audio Engineering Society

Marcin Lewandowski, M.Sc.

Individual award for the paper titled*: "Application of Intrinsic Time-Scale Decomposition in Analyzing Sigma-Delta Modulator for Audio DAC"* at *The Joint Conference: New Trends in Audio and Video Signal Processing: Algorithms, Architectures, Arrangements, and Applications 2012* (Łódź, Poland, Sept. 27 - 29, 2012).

Award of *the Foundation for the Development of Radiocommunications and Multimedia Technologies* in the Young Authors' competition

Anna Urzędowska, M.Sc.
Marta Kalbarczyk, B.Sc

Equivalent awards for winning 3rd place at *National Conference on Radiocommunications and Broadcasting* (Krajowa Konferencja Radiokomunikacji, Radiofonii i Telewizji: KKRRiT 2012) (Gdańsk, Poland, May 14-16, 2012).

Rafał Korycki, Ph.D.
Mikołaj Roszkowski, M.Sc.

Award at *The Joint Conference: NTAV/SPA 2012* (Łódź, Poland, Sept. 27-29, 2012).

Poster Award

Przemysław Korpas, M.Sc.

Co-author of the poster titled: "Split Post Dielectric Measurement Set-up for Every Microwave Laboratory" granted the second prize at *7th International Conf. on Microwave Materials and their Applications: MMA 2012* (Taipai, China, Jun. 5-6, 2012).

Scholarships of *the Foundation for the Development of Radiocommunications and Multimedia Technologies*

For preparing Ph.D. Thesis

Marcin Lewandowski
Jakub Olszyna

For preparing M.Sc. Thesis

Przemysław Czerepaniak
Marta Kalbarczyk
Rafał Maksimiuk
Łukasz Nowak
Krzysztof Ostrowski
Maciej Trochimiuk
Wojciech Szelągowski
Paweł Wasiluk
Paweł Wąsowski
Jakub Wiszowaty

For preparing B.Sc. Thesis

Artur Jóźwikowski
Mateusz Krysicki
Agnieszka Naplocha
Przemysław Piasecki
Adam Raniszewski
Jakub Żurkowski

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

SPECIFICATION	2008	2009	2010	2011	2012
academic staff [posts] total	64,5	63,25	62,08	65,5	64,55
tenured professors	4	5	4,5	4,5	4,5
professors	7	8	8	9	9
associate professors	1,5	0,5	0,5	0	1
assistant professors	40,75	39	38,75	41,6	41,65
readers	4	4	4,33	4,25	2,25
senior lecturers	4,5	4,5	4	4	3,5
assistants	1,75	2,25	2	2,15	2,65
Ph.D. students [persons] total	43	36	39	37	37
regular, the third level studies	23	23	23	23	19
without scholarship	20	13	16	14	18
technical and administrative staff [posts] total	18,25	18,9	18,4	19,2	17,6
senior R&D associates		2,4	2,9	2,5	2,5
R&D associates	8,25	4,75	4,75	4,35	4
administrative associates	7	9	9	10,35	9,1
service workers	2	2	2	2	2
temporary staff (projects: Proteus, Lider, Eniac)		4,8	12,5	8,1	6,8
library resources books (volumes)	15785	15924	16055	10993	11140
books (titles)	8662	8774	8888	7204	7251
journals (subscribtions)	126	126	83	83	83
teaching activities basic courses	61	63	67	67	69
advanced courses	25	25	27	23	23
other courses	57	58	73	47	51
international course projects	1	2	2	2	2
research projects total	48	48	47	40	43
international	9	9	4	4	4
granted by Ministry	16	15	19	17	18
granted by the University	18	18	20	17	15
other	5	9	4	2	6
research projects budget **PLN:** / **Euro:**	5 712 877 / 211 000	6 853232	6 555168	4 987642 / + 1 500000 *	5 349402
titles and degrees awarded Prof. titles	-	-	-	1	1
D.Sc. degrees	-	-	-	-	1
Ph.D. degrees	4	6	6	4	7
M.Sc. degree (regular studies + evening studies)	75+2	67+8	57+10	62+3	66+3
M.Sc. degree (studies in English)	-	-	2	-	-
B.Sc. degrees (regular studies + evening studies)	47+10	65+7	77+11	84+11	123+7
B.Sc. degrees (studies in English)	5	5	3	7	4
B.Sc. degrees (distant learning)	1	2	-	2	4
publications total	194	197	206	165	172
sci.-tech. books and chapters in books	12	12	9	6	5
sci.-tech. papers in journals - total	92	100	94	76	54
JCR-ICI list (IF>0)	39	21	20	20	26
MSHE list	49	72	67	55	27
in other journals	4	7	7	1	1
sci.-tech. papers in conference proceedings	69	58	74	74	95
other publications	21	27	29	9	18
research reports	27	26	22	24	28
conferences attended by the staff	52	60	40	41	46

* investement from the Polish Science and Technology Fund into instrumentation - *Laboratory of Hyperpolarized Contrast for MRI*

EXPLANATORY NOTE ON POLISH ACADEMIC AND PROFESIONAL TITLES, DEGREES AND POSTS

According to Polish law, the following terms are used for academic and professional titles, degrees and posts held by staff members at the Institute of Radioelectronics.

The academic title of ***profesor (prof.)***, is conferred by the president of the Republic of Poland upon a motion of the Central Commission for Academic Degrees and Title.
This title may be awarded to a person who:
- has obtained a degree of *doktor habilitowany*;
- has scientific achievements, which fall far beyond the requirements for the candidates applying for the degree of doktor habilitowany;
- has remarkable didactic achievements, among other things, within the scope of training of academic staff.

Academic degrees awarded by the organizational unit entitled to confer such degrees, it means the respective Faculty Council or another organizational unit of a higher education institution or another scientific institution.

- ***doktor (dr)***, translated here as **Ph.D.**, is conferred to a person who:
  - holds the professional title of *magister* or *magister inżynier*;
  - has successfully passed doctorate examinations covering the scope defined by faculty board; and
  - has submitted and successfully defended a doctoral thesis assessed favorably by two reviewers.

The doctoral dissertation, prepared under the supervision of a tutor, should provide an original solution of a scientific problem and present general theoretical knowledge of the candidate in a given discipline of science, as well as should confirm the candidate's skill to conduct scientific work independently

- ***doktor habilitowany (dr hab.)***, translated here as **D.Sc.**, is conferred to a person who:
  - holds the academic degree of *doktor*;
  - has remarkable scientific achievements;
  - has submitted a habilitation dissertation which contributes significantly to the development of a given scientific discipline;
  - has received favorable assessment of his/her dissertation from four reviewers;
  - has passed a habilitation examination; and
  - has delivered a favorably assessed habilitation lecture.

The dissertation may constitute a work completed by candidate after he/she was awarded the degree of *doktor*. This work should be also published as a whole or in its fundamental part. The *doktor habilitowany* degree authorize the holder to promote doctoral theses.

- ***profesor doktor habilitowany (prof. dr hab.)***, translated here as **Prof. D.Sc.**, is conferred to a person who holds the academic degree of *doctor habilitowany* and the academic title of *professor*.

Research and teaching posts:
- ***asystent*** – *magister* professional title is required;
- ***adiunkt*** – *doktor* degree is required;
- ***profesor nadzwyczajny*** – *doktor habilitowany* degree is required;
- ***profesor zwyczajny*** – *profesor* title is required.

Teaching posts:
- ***wykładowca***, translated here as **Lecturer**;
- ***starszy wykładowca***, translated here as **Senior Lecturer**,
- ***docent***, translated here as **Reader** – doktor degree is required;

Professional titles:
- ***inżynier (inż.)***, translated here as **B.Sc.**, are awarded to the graduates of higher vocational studies in the technical fields of study when the technical subjects constitute not less than 50% of the total of didactic activities included in the timetable for this fields of study;
- ***magister (mgr)***, translated here as **M.Sc.**, are awarded to the graduates of master-level courses in such fields of studies as: natural sciences, mathematics etc.;
- ***magister (mgr)***, translated here as **M.A.**, are awarded to the graduates of master-level courses in the arts and humanities fields of studies.
- ***magister inżynier (mgr inż.)***, translated here as **M.Sc.**, are awarded to the graduates of master-level courses in the technical fields of studies.

The following English titles have been adopted here for Polish academic posts:
- **Assistant –** the holder of the *magister inżynier* professional title in the post of *asystent*;
- **Assistant Professor** – the holder of *doktor* degree in the post of *adiunkt*;
- **Reader** – the holder of *doktor* degree in the post of *docent*;
- **Associate Professor** – the holder of *doktor habilitowany* degree in the post of *adiunkt*;
- **Professor** – the holder of *doktor habilitowany* degree in the post of *profesor nadzwyczajny*;
- **Tenured Professor** – the holder of a *profesor* academic title in the post of *profesor zwyczajny*.