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

ANNUAL REPORT

2001

Warsaw, February 2002

Edited by:

K. Zaremba
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From the Director

There can be no doubt that the Institute of Radioelectronics has reached an important point in development. Being an inherent part of the Faculty of Electronics and Information Technology, in 2001 we have participated in its 50th anniversary celebrations. Such a recent jubilee naturally invokes questions on our past experience and readiness for the challenges ahead. For this reason, I take great pleasure in opening the sixth issue of the Annual Report, which shows beyond all doubts that we are on the right path and making good progress.

I do hope that you will browse through the following sections and appreciate our record of successful projects, teaching activities, and technical publications. These are objective milestones of our on-going activity. They are also indicative of the quest for excellence permeating the whole Faculty. Yet in this introductory note, quite to the contrary, I would like to take a more personalised viewpoint and to identify the special character of our Institute rather than the general University trends.

The Institute of Radioelectronics is organised into six very distinct Divisions. For decades our staff members have been investigating domains so diversified as electroacoustics and electromagnetics, nuclear and biomedical engineering, radiocommunications and television, signal processing and monitoring systems. Looking back at our work and accomplishments, I am happy to declare that we have stood the test of time.

In the first place, we have certainly avoided the pitfall of spectatorism, and the original accomplishments of our staff have been gaining recognition in Poland and abroad. This year we have celebrated the 80th birthday of Prof. S. Hahn and his “Golden Cyborg” award. Prof.S. Hahn remains active in science, further developing his original multidimensional analytical signal theory and disseminating it through highly-ranked media. Moreover, a prestigious Medal of the Warsaw University of Technology has been bestowed upon Prof. J. Ebert for his fruitful work in science and education. We have also enjoyed two professorial nominations of Prof. R.Z. Morawski and Prof. S. Rosłoniec. I thus believe we are ready to seek new challenges of serving the third millennium society with result-oriented projects and education.

Secondly, we have managed to develop and sustain an extensive network of laboratories. It alows our students to enhance physical understanding and engineering competence. It is also a firm basis for our staff to accept and fullfil challenging contracts for the contemporary industry and within the European programmes. Our laboratories are a high profile expression of our commitment to interactive teaching, problem-related research, and good engineering.

The Institute offers courses at undergraduate, graduate, and doctoral levels. Our students take in-depth as well as more comprehensive courses, specialising in one of the three well-defined and relevant options: radiocummunications, bioengineering, or multimedia. Moreover, for a few semesters they operate in the environment of dedication, open - mindness, creativity, and just plain verve. Therefore I am satisfied but not surprised to observe an increasing number of candidates wishing to perform their studies within the Institute of Radioelectronics. I am also happy to host foreign students, who work with us under Socrates and other scholarship schemes. On top of regular courses, our programme of continuing education has also proven extremely successful. This year the first set of diplomas has been awarded.

The start of the new millenium has not been easy for anybody, and many problems await solution on the local and global scale. However, I take great heart from what I see in and around the Institute of Radioelectronics at the moment. The industrial and societal relevance has anchored at the very core of the values, which we fervently believe in and play a central role in our research and teaching. We cannot by ourselves change the economy and the environment; but we can remain firmly committed to a vision of education and science that sooner or later will make the change.

I appreciate this opportunity to express the thanks to all those who identify with our goals and support our activities through generous donations and stimulating partnerships. I am particularly grateful to the founders and sponsors of the Foundation for Development of Radiocommmunications and Multimedia Technologies. As I look to the future, I hope everyone – all our staff, students, and friends – will feel able and willing to continue to play a part in the exciting developments.

Warsaw, January 2002

Professor Józef Modelski, Ph.D., D.Sc.

Contents

This Annual Report summaries the research activities of the Institute in 2001, as well as the teaching activities of the academic year 2000/2001

1. GENERAL INFORMATION

1.1. Mission of the Institute

The Institute of Radioelectronics perceives its long-term mission in bridging the gaps between academia, industry, and society. This mission is broken into three measurable objectives: to provide teaching of contemporary societal relevance; to seek excellence in scientific research; and to run projects meeting the international standards.

Year 2001 has been successful in each regard. The quality and effectiveness of our education have once again been confirmed by increasing numbers of undergraduate diplomas: M.Sc. (72) and B.Sc. (126), and this message has been reinforced by an impressive number of five defended Ph.D. theses. Two of the Institute's professors have received prestigious awards for their overall scientific and scholarly production. The quest for scientific excellence is well-descended onto our staff of a more recent vintage, who have assembled several distinctions for specific accomplishments. Our role within the European research framework has been strengthened by two new EUREKA projects.

Considering the Institute of Radioelectronics as a unit of the Faculty, one should note and appreciate the extremely broad competence, which spans the whole field of radioelectronics. It comprises:

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

We realise that it may not be so easy for a novice student to freely navigate through such a variety of subjects. Thus a few years ago we embarked on a phase of strategic planning, which has brought results in the form of three well-defined specialisations: radiocommunications, multimedia, and biomedical engineering. These are very well perceived by students and their potential employers. 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.

As a compliment to regular studies, the Institute is deeply engaged in the continuing education. In 2001, diplomas in Radiocommunications have been awarded to the first group of 28 graduates - employees of the Polish Telecommunication S.A. The offer of over 30 courses is being dynamically extended: in 2001 a new course on Audiotechnology has been launched, which trains professional assistants to people with hearing handicaps.

Broad competence and efficient organisation are important means to success, but they are not everything. Our key asset is our staff, whose talents and enthusiasm have gained national and world-wide recognition over the years. The Institute now assembles 11 professors and 42 assistant professors. An optimistic trend started in 2001 is rejuvenation of our staff; namely, three of 2001 Ph.D. graduates now coninue their research at the Institute. Today 50 students work towards Ph.D., and many of them express the interest in further University career.

Considering commercial opportunities awaiting our graduates on the open market, it would be difficult if not impossible to maintain their interests in science and education without the generous support of the Foundation for Development of Radiocommunications and Multimedia Technologies. In 2001, the Foundation has sponsored 4 graduate and 6 undergraduate scholarships as well as 2 habiliation grants. It monitors and awards the progress of young Polish researchers.

Besides people, another noteworthy asset of the Institute is its exceptional laboratory basis. Let us only mention the Laboratory for Measurements in Radio-communications (donated in 1999 by Hewlett Packard), Electroacoustics Laboratory (modernised in 2000), Laboratory for Computed Tomography (donated in 2000 by Central Clinical Hospital for the Ministry of Internal Affairs and Administration), and a new Microwave Power & Heating Laboratory (created in 2001 within the EUREKA project). The Institute has an anechoic chamber and a sound studio, an HP ImagePoint, and various professional software packages. On the whole, over 10 other laboratories are available to the students, as well as the computer network.

In fact, 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, radiomonitoring systems, high-efficiency energy sources, high-power radio engineering devices, equipment for time and frequency services, biomedical instrumentation, mea-surement systems involving industry, nuclear engineering for scientific research, and medicine. It is planned that the facilitties added in 2001 will open new horizons for collaboration with the food industry.

The Institute carries out those tasks under long-term contracts with national and foreign universities as well as research and commercial instiitutions listed in our previous reports. In 2001, two EUREKA projects have led to new partnerships with the Swedish Instittе for Food and Biotechnology, Landeskrankenhaus-Universita-tsklinikum Graz, SIEMENS AG Oesterreich, and Technische Universitaet Graz. Most recently, col-laboration with Worcester Polytechnic Institute (US) has also been established.

The Institute actively participates in the Socrates rogramme. It always encourages participation of students and staff in international scientific events, and in 2001 has itself co-organised the *9th International Conference on Computer Analysis of Images and Patterns*.

1.2. Board of Directors

Director of the Institute:

Józef Modelski, Ph.D., D.Sc., Tenured Professor
room 422, phone +48(22)6607233,+48(22)8253929
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Secretariat:

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Deputy Director for Research (from 1.03.2001)**:**

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1.3. Organisation of the Institute

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

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

The structure of the Institute includes Library, Financial Section, Supply Section and Multimedia Problems Group no. 288 at Polish National Committee for Standarization in Multimedia.

1.3.1. Radiocommunications Division

Head of Division (from 1.09.2001)**:**
Tomasz Kosiło, Ph.D., Assistant Professor
room 434, phone +48(22)6607576
e-mail: T.Kosilo@ire.pw.edu.pl

Senior academic staff:

Jacek Wojciechowski, D.Sc.	Professor
Tomasz Buczkowski, Ph.D.	Assistant Professor
Henryk Chaciński, M.Sc.	Senior Lecturer
Jacek Cichocki, Ph.D.	Assistant Professor
Krzysztof Czerwiński, Ph.D.	Assistant Professor
Jacek Jarkowski, Ph.D.	Assistant Professor
Wojciech Kazubski, Ph.D.	Assistant Professor
Jerzy Kołakowski, Ph.D.	Assistant Professor
Karol Radecki, Ph.D.	Assistant Professor

Junior academic staff - Ph.D. Students:

Fathi Ali Alwafie, M.Sc.	from 1.11.1996
Piotr Bilski, M.Sc.	from 1.10.2001
Dariusz Grabowski, M.Sc.	from 1.11.1998
Paweł Kącki, M.Sc.	from 1.03.2001
Stanisław Maszczyk, M.Sc.	from 1.11.1998
Grzegorz Radzikowski, M.Sc.	from 1.10.2000
Kajetana Snopek, M.Sc.	from 1.10.1997
Zbigniew Walczak, M.Sc.	from 1.04.1998

Technical staff:
Marek Marcinkowski
Stanisław Żmudzin, M.Sc. (0.5)

Retirements:

Stefan Hahn, D.Sc.	Professor
Waldemar Kiełek, D.Sc.	Associate Professor

The teaching activities of the Radiocommunications Division are related to radiocommunication systems, antennae, signal processing, measurement in radiocommunications, and networks. Research is focused on specific problems of radiocommunications, such as:

- digital modulations,
- optimization methods of antenna synthesis,
- multidimensional signals theory,
- mobile systems,
- measurements in radiocommunications,
- networks (radio and telecommunications),
- radiomonitoring methods and systems,
- cellular communication systems (GSM, UMTS, TETRA).

Current research topics include:

- theory and applications of multidimensional complex signals,
- application of Hilbert transform to antenna radiation pattern forming and optimization,
- application of wavelet transforms in radiocommunication measurements,
- digital modulations broadcasting in AM bands,
- application of GPS for selected geodetic measurements,
- health and environmental aspects of electronics,
- fault detection in electronic systems,
- simulation and design of networks,
- scheduling in radio networks,
- development of mobile radiomonitoring systems.

1.3.2. Television Division

Head of Division:
Władysław Skarbek, D.Sc., Professor
room 425A, phone +48(22)6605315
e-mail: W.Skarbek@ire.pw.edu.pl

Senior academic staff:

Józef Modelski, D.Sc.	Tenured Professor
Andrzej Buchowicz, Ph.D.	Assistant Professor
Krzysztof Derzakowski, Ph.D.	Assistant Professor
Krystian Ignasiak, Ph.D.	Assistant Professor
Jerzy Kondarewicz, M.Sc.	Senior Lecturer (0.5)
Andrzej Krupiczka, Ph.D.	Assistant Professor (to 21.08.2001)
Tomasz Krzymień, M.Sc.	Senior Lecturer
Marek Rusin, Ph.D.	Assistant Professor (0.5)
Yevhen Yashchyshyn, Ph.D.	Assistant Professor

Junior academic staff - Ph.D. Students:

Katarzyna Cichoń, M.Sc.	from 1.03.2001
Grzegorz Galiński, M.Sc.	from 1.01.1998
Artur Gałat, M.Sc.	from 15.03.1999
Tomasz Keller, M.Sc.	from 1.10.1999
Krzysztof Kurek, M.Sc.	from 1.03.1997
Maciej Łempkowski, M.Sc.	from 1.12.1998
Jacek Marzyjanek, M.Sc.	from 1.03.1999
Nguyen Minh, M.Sc.	from 1.03.1999
Krzysztof Mroczek, M.Sc.	from 1.03.1997
Jacek Nowak, M.Sc.	from 1.10.2001
Marcin Piasecki, M.Sc.	from 1.05.1999
Adam Pietrowcew, M.Sc.	from 1.10.1998
Andrzej Ritz, M.Sc.	from 1.07.1999
Robert Seta, M.Sc.	from 1.10.2000
Ewa Snitkowska, M.Sc.	from 1.10.2000
Karol Wnukowicz, M.Sc.	from 1.03.1999

Technical staff:
Bogdan Kwiatkowski, M.Sc.
Tomasz Smakuszewski, M.Sc.

Television Division conducts scientific and applied research in the area of terrestrial, satellite and cable television systems, analogue and digital components of television systems, broadcasting equipment as well as digital image processing. Intensive activities in the multimedia area are continued. Specific research topics in 2001 included:

- image compression techniques - wavelet transform; vector quantisation, low bitrate algorithms, MPEG-4;
- intelligent multimedia systems - object tracking and recognition, compression controlled by segmentation, semantic preserving compression methods, MPEG-7;
- multimedia converged (video, data and voice) and interactive services, MPEG-21;
- algorithms of image motion detection and estimation;
- non-linear filters for colour image processing;
- selected topics in the design of cable television networks;
- dielectric resonators - analysis, design techniques;
- visualisation of the electromagnetic field in a resonator;
- closed circuit TV;
- analysis and design of microwave antennae;
- applications of ferroelectric materials to microstrip patch antennae.

1.3.3. Electroacoustics Division

Head of Division:
Zbigniew Kulka, D.Sc., Professor
room 132, phone +48(22)6607621
e-mail: Z.Kulka@ire.pw.edu.pl

Senior academic staff:

Ewa Kotarbińska, Ph.D.	Assistant Professor
Andrzej Leszczyński, Ph.D.	Assistant Professor
Jerzy Narkiewicz-Jodko, Ph.D.	Assistant Professor
Maria Tajchert, Ph.D.	Assistant Professor

Junior academic staff:

Jan Paluchowski, M.Sc.	Assistant

Ph.D. Students:

Michał Kostrzewa, M.Sc.	from 1.10.2001
Grzegorz Kustra, M.Sc.	from 1.10.2000
Piotr Kwiecień, M.Sc.	from 1.05.1999
Maciej Mikołowicz, M.Sc,	from 1.03.2001
Arkadiusz Nagórski, M.Sc.	from 1.03.2000 (on the leave)
Piotr Nykiel, M.Sc.	from 1.07.1998
Mariusz Siek, M.Sc.	from 1.03.2000 (on the leave)
Radosław Smoliński, M.Sc.	from 1.10.1998

The activities of the Division concern audioacoustics and ultrasonic techniques including investigations, measurements, and applications. They are focused on:

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

Current research topics include:

- digital audio signal processing;
- active noise reduction systems applied to acoustic waveguides;
- high frequency piezoelectric sensors for automation applications;
- detection of auditory warning signals in the presence of industrial noise;
- elaboration of computation methods for radiated acoustic field by surface acoustic sources in free space and their implemention on a PC.

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

1.3.4. Radio-Engineering Division

Head of Division:
Roman Z. Morawski, D.Sc.,Tenured Professor
(from 08.06.2001)
room 445, phone +48(22)6607721
e-mail: R.Morawski@ire.pw.edu.pl

Senior academic staff:

Jan Ebert, D.Sc.	Tenured Professor
Konrad Adamowicz, Ph.D.	Assistant Professor (0.5)
Andrzej Miękina, Ph.D.	Assistant Professor
Mirosław Mikołajewski, Ph.D.	Assistant Professor
Juliusz Modzelewski, Ph.D.	Assistant Professor
Andrzej Podgórski, Ph.D.	Assistant Professor
Krzysztof Puczko, Ph.D.	Senior Lecturer (0.5)
Wiesław Winiecki, Ph.D.	Assistant Professor

Junior academic staff:

Robert Łukaszewski, M.Sc.	Assistant

Ph.D. Students:

Piotr Bobiński, M.Sc.	from 1.11.1998
Cezary Niedziński, M.Sc.	from 1.04.1998
Paweł Sprzęczak, M.Sc.	from 1.04.1998
Andrzej Wajs, M.Sc.	from 1.10.1997

Technical staff:
Ryszard Leoniak, M.Sc.

The activities of the Division concern fundamental and applied research associated with high-frequency techniques, metrology, instrumentation and measuring systems. They are focused on:

- improving the efficiency of high-frequency power sources and other high-frequency devices;
- improving the quality of measurements using signal-processing techniques;
- designing automated computer-based measuring systems.

Current research topics include:

- computer-aided analysis and synthesis of class D, class E and class DE resonant amplifiers, resonant rectifiers, resonant dc/dc converters, uninterruptible power suppliers, amplitude modulators;
- software environment for computer-aided design of algorithms for reconstruction of measurands and for calibration of measuring systems;
- software environment for computer-aided design of measuring systems, virtual instrumentation, plug-in boards for data acquisition, IEEE-488 equipment, measuring systems for the measurement of wide-range broadcasting signals, distributed measuring systems;
- computer-aided spectrophotometry for applications in the monitoring of natural environment and telecommunication channels;
- portable signal analysers for technical diagnostics and the monitoring of natural environment.

1.3.5. Microwave and Radiolocation Engineering Division

Head of Division:
Tadeusz Morawski, D.Sc., Tenured Professor
room 541, phone +48(22)6607402
e-mail: T.Morawski@ire.pw.edu.pl

Senior academic staff:

Wojciech Gwarek, D.Sc.	Tenured Professor
Stanisław Rosłoniec, D.Sc.	Tenured Professor (from 02.01.2001)
Małgorzata Celuch-Marcysiak, Ph.D.	Assistant Professor
Daniel Gryglewski, Ph.D.	Assistant Professor from 1.10.2001)
Krzysztof Kowalski, Ph.D.	Assistant Professor (0,5; till 1.09.2001)
Przemysław Miazga, Ph.D.	Assistant Professor
Krzysztof Robaczyński, M.Sc.	Senior Lecturer (0.5)
Maciej Sypniewski, Ph.D.	Assistant Professor
Andrzej Więckowski, Ph.D.	Assistant Professor
Wojciech Wojtasiak, Ph.D.	Assistant Professor
Jolanta Zborowska, Ph.D.	Assistant Professor

Junior academic staff - Ph.D. Students:

Tomasz Ciamulski, M.Sc.	from 1.03.2000
Paweł Kopyt, M.Sc.	from 1.10.2001
Ryszard Michnowski, M.Sc.	from 2.05.1997
Michał Rosiński-Potocki, M.Sc.	from 1.04.1998
Janusz Rudnicki, M.Sc.	from 1.10.2000
Robert Szelenbaum, M.Sc.	from 1.10.2001
Zbigniew Żołnierowicz, M.Sc.	from 1.04.1998

Technical staff:

Krzysztof Kowalski, Ph.D.	Assistant Professor (0,5; till 1.09.2001)
Mirosław Lubiejewski	
Krzysztof Robaczyński, M.Sc.	(0.5)

The Microwave and Radiolocation Engineering Division conducts scientific and applied research in the area of electromagnetic field theory, microwave theory and techniques, measurement techniques for very high frequency range as well as computer-aided design, data acquisition and data processing. Specific research topics in 2001 included:

- design of high-frequency systems for radar techniques (oscilators, synthesisers, modulators, amplifiers, high-power noise sources, transmitter/receiver modules);
- methods of synthesis and computer-aided design of passive and active microwave circuits (couplers, summators and dividers, switches, transistor circuits);
- analysis and design of multielement planar in-phase radar antenna arrays intended to work at high power level;
- development of new structures of noncommonsurate nonsynchronous transmission line stop-band filters and application of them in various radar equipments;
- design of modern computer-aided measuring systems;
- development of numerical methods and implementation of computer programmes for full-wave analysis and design of two- and three-dimensional microwave circuits (filters, matching circuits, uniform and periodic guiding structures, polarisers, antennae);
- development of non-linear programming and artificial intelligence methods, and their application to the automated design of microwave circuits.

1.3.6. Nuclear and Medical Electronics Division

Head of Division:

Zdzisław Pawłowski, D.Sc., Tenured Professor
room 65, phone +48(22)6607955, +48(22)8251363
e-mail: Z.Pawlowski@ire.pw.edu.pl

Senior academic staff:

Adam Piątkowski, D.Sc.	Tenured Professor
Piotr Bogorodzki, Ph.D.	Assistant Professor
Piotr Brzeski, Ph.D.	Assistant Professor
Grzegorz Domański, Ph.D.	Assistant Professor (from 1.10.2001)
Tomasz Jamrógiewicz, M.Sc.	Senior Lecturer
Marek Karolczak, Ph.D.	Assistant Professor (on the leave)
Marian Kazubek, Ph.D.	Assistant Professor
Bogumił Konarzewski, Ph.D.	Assistant Professor
Janusz Marzec, Ph.D.	Assistant Professor
Jacek Mirkowski, Ph.D.	Assistant Professor (till 28.02.2001)
Lechisław Padee, Ph.D.	Senior Lecturer (0.33)
Ewa Piątkowska-Janko, Ph.D.	Assistant Professor
Artur Przelaskowski, Ph.D.	Assistant Professor
Waldemar Smolik, Ph.D.	Assistant Professor
Roman Szabatin, Ph.D.	Assistant Professor
Krzysztof Zaremba, Ph.D.	Assistant Professor

Junior academic staff:

Paweł Błociszewski, M.Sc.	Senior Lecturer (on the leave)
Tomasz Olszewski, M.Sc.	Lecturer

Ph.D. Students:

Walid Al-Him, M.Sc.	from 1.10.2000
Paweł Bargieł, M.Sc.	from 1.10.2001
Dariusz Janusek, M.Sc.	from 1.10.1997
Robert Kurjata, M.Sc.	from 1.10.2000
Potr Łyszcz, M.Sc.	from 1.10.2001
Mateusz Orzechowski, M.Sc.	from 1.03.2001
Tomasz Wolak, M.Sc.	from 1.12.1998

Technical and administrative staff:

Dariusz Ćwiek, M.Sc.	(on the leave)
Andrzej Wasilewski	
Joanna Witkowska	

Retirements:

Waldemar Scharf, Ph.D. Assistant Professor

The research and teaching activities carried out in the Nuclear and Medical Electronics Division are concentrated on Biomedical Engineering. Research in this inter-disciplinary area covers a broad range of topics and integrates sophisticated electronics and information technology with elements of medical knowledge. The Division's research is focused on following topics:

- nuclear medicine (emission tomography: SPECT, PET);
- quantitative computer-aided tomography;
- tomographic dynamic studies;
- process tomography;
- magnetic resonance imaging;
- analogue and digital radiography;
- medical image processing and recognition;
- methods and instrumentation for electrocardiography, high resolution electrocardiography and electro-encephalography;
- medical applications of isotope techniques;
- biomedical accelerators.

Areas of recent studies include:

- methodology and apparatus for non-invasive determination of bone density and concentration of heavy metals in bone;
- electrical instability of heart study;
- multimodal imaging of topographic, tomographic and functional studies in medicine;
- correlated methods for the investigation of neurosystems by NMR and SPECT tomography;
- MR imaging sequence optimisation for better contrast resolution in heart and large vessels examination;
- telecardiology;
- field homogeneity in MRI tomography improvement with combined "passive" and "active" approach;
- expert systems for high resolution ECG with P-wave averaging technique;
- application of wavelet transform for echocardiographic images' quality improvement and for image data compression;
- algorithms for 3D brain imaging;
- dynamic tomographic studies (computer-aided method of early diagnosis of brain strokes);
- digital structural radiography;
- X-ray stereoscopy.

1.4. Evening Studies and Continuing Education

1.4.1. Engineering Evening Studies on Radiocommunications

Head (from 22.02.2001)**:**
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Board of Consultants:
Tadeusz Morawski, D.Sc., Professor - chairman
Andrzej Dąbrowski, D.Sc., Professor
Krzysztof Kowalski, Ph.D.,
Elżbieta Janczewska (TP S.A. - Polish Telecommunications)
Marek Rusin, D.Sc. (URT - Office of Telecommunications Regulations)

1.4.2. Postgraduate Studies

Head (from 1.10.2001)**:**
Jacek Jarkowski, Ph.D.,
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1.4.3. Studies on Radiocommunications, Multimedia Technologies and Biomedical Engineering – "RADEM" (short courses)

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

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Jan Paluchowski, M.Sc.	Assistant *phone: 660-7637*

2.2.1. Ph.D. students

Fathi Ali Alwafie, M.Sc.
Walid Al Him, M.Sc.
Paweł Bargieł*), M.Sc.
Piotr Bilski*), M.Sc.
Piotr Bobiński, M.Sc.
Tomasz Ciamulski*), M.Sc.
Katarzyna Cichoń*), M.Sc.
Grzegorz Galiński, M.Sc.
Artur Gałat, M.Sc.
Dariusz Grabowski, M.Sc.
Dariusz Janusek, M.Sc.
Paweł Kącki*), M.Sc.
Tomasz Keller*), M.Sc.
Paweł Kopyt*), M.Sc.
Michał Kostrzewa*), M.Sc.
Krzysztof Kurek, M.Sc.
Robert Kurjata*), M.Sc.
Grzegorz Kustra*), M.Sc.
Piotr Kwiecień, M.Sc.
Maciej Łempkowski, M.Sc.
Piotr Łyszcz*), M.Sc.
Jacek Marzyjanek, M.Sc.
Stanisław Maszczyk, M.Sc.
Ryszard Michnowski, M.Sc.
Mariusz Mikołowicz*), M.Sc.
Nguyen Minh, M.Sc.
Krzysztof Mroczek, M.Sc.
Arkadiusz Nagórski*), M.Sc.
Cezary Niedziński, M.Sc.
Jacek Nowak*), M.Sc.
Piotr Nykiel, M.Sc.
Mateusz Orzechowski*), M.Sc.
Marcin Piasecki, M.Sc.
Adam Pietrowcew, M.Sc.
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Andrzej Ritz, M.Sc.
Michał Rosiński-Potocki, M.Sc.
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Mariusz Siek*), M.Sc.
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Kajetana Snopek, M.Sc.
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Robert Szelenbaum*), M.Sc.
Andrzej Wajs, M.Sc
Zbigniew Walczak, M.Sc.
Karol Wnukowicz, M.Sc.
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*) the third level studies

2.3. Technical and administrative staff

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3. TEACHING ACTIVITIES (academic year 2000/2001)

3.1. Regular studies - Specialisations:

- **Radiocommunications and Multimedia Technologies**

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- **Biomedical Engineering**

Head:
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3.2. Basic courses

[Edu1] *Basics of Computer Technique* (Podstawy techniki komputerowej - PTKO); 4h/week; semester 1; A. Więckowski, J. Marzec.

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

[Edu3] *Basics of Television* (Podstawy telewizji - POTE); 3h/week; semester 6; A. Buchowicz.

[Edu4] *Basics of Acoustics and Electroacoustics* (Podstawy akustyki i elektroakustyki - PAE); 3h/week; semester 6; A. Leszczyński, J. Narkiewicz-Jodko.

[Edu5] *Computer Networks* (Sieci komputerowe - SKP1); 1h/week; semester 5; J. Marzec.

[Edu6] *Detection of Nuclear and Medical Signals* (Detekcja sygnałów biomedycznych i jądrowych - DSBJ); 4h/week; semester 6; Z. Pawłowski.

[Edu7] *Electronics III* (Elektronika III - ELKA III); 2h/week; semester 4; T. Olszewski.

[Edu8] *Fields and Waves* (Pola i fale - POFA); 3h/week; semester 3; T. Morawski, W. Gwarek.

[Edu9] *Materials, Components, and Designs* (Materiały, elementy i konstrukcje - MEIK); 1h/week; laboratory; semester 6; J. Cichocki.

[Edu10] *Measuring Systems* (Systemy pomiarowe - SPOM); 6h/week; semester 5; W. Winiecki.

[Edu11] *Measuring Systems I* (Systemy pomiarowe I - SPOM I); 4h/week; semester 5; W. Winiecki.

[Edu12] *Measuring Systems* II (Systemy pomiarowe II - SPOM II); 4h/week; semester 6; W. Winiecki.

[Edu13] *Medical Electronic Instrumentation* (Elektroniczna aparatura medyczna - EAME); 4h/week; semester 5 - 6; L. Padée.

[Edu14] *Numerical Methods (*Metody numeryczne - MNM); 3h/week; semester 3; R. Z. Morawski.

[Edu15] *Operating Systems* (Systemy operacyjne - SOP); 3h/week; semester 5; M. Sypniewski.

[Edu16] *Orientation 1* (Orientacja 1 - OR1); 1h/week; semester 1; W. Gwarek.

[Edu17] *Orientation 2* (Orientacja 2 - OR2); 1h/week; semester 2; M. Tajchert, M. Mikołajewski, T. Jamrógiewicz.

[Edu18] *Orientation 3* (Orientacja 3 - OR3); 1h/week; semester 3; E. Piątkowska-Janko, T. Jamrógiewicz.

[Edu19] *Orientation 4* (Orientacja 4 - OR4); 1h/week; semester 4; E. Piątkowska-Janko, M. Tajchert.

[Edu20] *Orientation 5* (Orientacja 5 - OR5); 1h/week; semester 5; E. Piątkowska-Janko, T. Jamrógiewicz, J. Modzelewski.

[Edu21] *Orientation 6* (Orientacja 6 - OR6); 1h/week; semester 6; P. Brzeski.

[Edu22] *Programming* (Programowanie - PROG); 5h/week; semester 2; A. Podgórski.

[Edu23] *Programming 2* (Programowanie 2 - PROG2); 3h/week; semester 5; W. Smolik.

[Edu24] *Radiology and Nucleonics* (Radiologia z Nukleoniką - NK); 3h/week; semester 5; W. Scharf.

[Edu25] *Signals and Systems* (Sygnały i Systemy - SYS); 4h/week + laboratory; semester 3; J. Wojciechowski.

[Edu26] *Theory of Signals and Modulations* (Teoria sygnałów i modulacji - TSIM); 3h/week + laboratory; semester 4; K. Radecki.

3.3 Advanced courses

[Edu27] *Analysis and Synthesis of Microwave Circuits* (Analiza i synteza układów mikrofalowych - ASUM); 3h/week; elective; S. Rosłoniec.

[Edu28] *Antennae and Radiowave Propagation* (Anteny i propagacja fal - AIPF); 3h/week; elective; J. Jarkowski.

[Edu29] *Artificial Neural Networks in Medicine* (Sztuczne sieci neuronowe w medycynie - SESN); 3h/week; elective; K. Zaremba.

[Edu30] *Basics of Loudspeakers* (Podstawy urządzeń głośnikowych); 4h/week; elective; J. Narkiewicz-Jodko.

[Edu31] *Basics of Medical Imaging Techniques* (Podstawy technik obrazowania w medycynie - PRIR); 4h/week; elective; P. Brzeski.

[Edu32] *Basics of Microprocessor Technique* (Podstawy techniki mikroprocesorowej - TMIK); 2h/week; elective; K. Czerwiński.

[Edu33] *Basics of Multimedia Techniques* (Podstawy technik multimedialnych - PTMU); 3h/week; elective; K. Ignasiak.

[Edu34] *Basics of Radiocommunications* (Podstawy radiokomunikacji - PR); 3h/week; elective; T. Kosiło.

[Edu35] *Basics of Radiolocation and Navigation* (Podstawy radiolokacji i nawigacji - PRIR); 3h/week; elective; S. Rosłoniec.

[Edu36] *Biomedical Accelerators* (Akceleratory biomedyczne - ABM); 2h/week; elective; W. Scharf.

[Edu37] *Biomedical Signals Processing* (Cyfrowe przetwarzanie sygnałów biologicznych - CPSB); 4h/week; elective; W. Wierzejski.

[Edu38] *Broadcasting Systems* (Systemy radiofoniczne - SYR); 3h/week; elective; H. Chaciński.

[Edu39] *Cable Television* (Telewizja przewodowa - TVP); 3h/week; elective; J. Modelski.

[Edu40] *Computer Systems* (Systemy komputerowe - SYKO); 3h/week; elective; T. Jamrógiewicz.

[Edu41] *Computed Tomography* (Tomografia komputerowa - TOM); 4h/week; elective; J. Mirkowski.

[Edu42] *Contemporary Applications of Microwaves* (Współczesne zastosowania mikrofal - WZN); 3h/week; elective; K. Derzakowski.

[Edu43] *Digital Audio Signal Processing* (Cyfrowe przetwarzanie sygnałów fonicznych - CPSF); 3h/week; elective; Z. Kulka.

[Edu44] *Digital Circuits - Laboratory* (Układy logiczne; laboratorium - UKLO); 2h/week; laboratory; semester 4; K. Zaremba.

[Edu45] *Digital Circuits* (Układy logiczne - EDC1; A13); 2h/week elective; P. Miazga.

[Edu46] *Digital Image Processing* (Cyfrowe przetwarzanie obrazów - CPOO); 4h/week; elective ; M. Kazubek.

[Edu47] *Digital Information Transmission* (Cyfrowa transmisja informacji - CTIN); 3h/week, project: 1h/week; elective; T. Buczkowski.

[Edu48] *Digital and Interactive Television Systems* (Telewizja cyfrowa i interaktywna - TCI); 4h/week; elective; A. Krupiczka.

[Edu49] *Electromagnetic Compatibility* (Kompatybilność elektromagnetyczna - KE); 2h/week; elective; W. Gwarek.

[Edu50] *Electromagnetic Field Theory* (Teoria pola elektromagnetycznego - TPE); 4h/week; elective; T. Morawski.

[Edu51] *Fields, Waves and Antennae* (EFWA); 4h/week; elective; M. Celuch-Marcysiak.

[Edu52] *Graphs and Networks* (Grafy i Sieci - GIS); 4h/week, project; elective; J. Wojciechowski.

[Edu53] *GSM and Third Generation Cellural Systems* (GSM i systemy komórkowe trzeciej generacji - GSMS); 4h/week; elective; J. Cichocki.

[Edu54] *Information Technologies in Medical Image Diagnostics* (Techniki informacyjne w medycznej diagnostyce obrazowej - TIM); 4h/week; elective; P. Bogorodzki.

[Edu55] *Measured Data Analysis in Medicine* (Analiza danych pomiarowych w medycynie - ADP); 3h/week; elective; Z. Pawłowski.

[Edu56] *Measuring Systems Software* (Oprogramowanie systemów pomiarowych - OSP); 4h/week; elective; W. Winiecki.

[Edu57] *Methods and Algorithms for Processing of Measurement Signals* (Metody i algorytmy przetwarzania sygnałów pomiarowych - MAP); 3h/week; elective; A. Miękina.

[Edu58] *Methods and Equipment for Organ Structure Visualisation* (Metody i urządzenia do wizualizacji struktur narządowych - MWSN); 3h/week; elective; R. Szabatin.

[Edu59] *Microwave Technique* (Technika mikrofalowa - TMO); 3h/week; elective; W. Wojtasiak.

[Edu60] *Mobile Radio Communications* (Radiokomunikacja ruchoma lądowa - RRL); 3h/week; elective; T. Kosiło.

[Edu61] *Nuclear Medicine Techniques* (Techniki medycyny nuklearnej - TMN); 4h/week; elective; R. Szabatin.

[Edu62] *Object Oriented Programming of Distributed and Multimedia Applications in Java* (Java - obiektowe programowanie aplikacji rozproszonych i multimedialnych - OPA); 3h/week; elective; K. Ignasiak.

[Edu63] *Radioelectronics Measurements* (Miernictwo radioelektroniczne - MR); 3h/week; elective; J. Cichocki.

[Edu64] *Radio Transmitting Technique and its Applications (*Technika nadawania radiowego i jej aplikacje - TNR); 4h/week; elective; J. Modzelewski.

[Edu65] *Satellite Communications* (Łączność satelitarna - ŁS); 3h/week; elective; J. Modelski.

[Edu66] *Semantic Analysis of Images and Sounds* (Analiza semantyczna obrazu i dźwięku - ASOD); 3h/week; elective; W. Skarbek.

[Edu67] *Signal Processors and their Applications* (Procesory sygnałowe i ich zastosowania - PS); 4h/week; elective; K. Czerwiński.

[Edu68] *Software for Medical Systems* (Oprogramowanie systemów medycznych - OSM); 3h/week; elective; W. Smolik.

[Edu69] *Sound Recording and Forming* (Odbiór i kształtowanie dźwięku - OKD); 3h/week; elective; M. Tajchert.

[Edu70] *System Measuring and Controlling Devices* (Systemowe urządzenia pomiarowe i sterujące - SUPS); 4h/week; elective; K. Adamowicz.

[Edu71] *Technique of a Radio Receiving* (Technika odbioru radiowego - TOR); 2h/week; elective; W. Kazubski.

[Edu72] *Theory and Designing of Antennae* (Teoria i projektowanie anten - TPA); 4h/week; elective; Y. Yashchyshyn.

[Edu73] *Ultrasonography Instrumentation* (Aparatura ultrasonograficzna - AUS); 3h/week; elective; L. Padee.

3.4. Special courses

3.4.1. Engineering Evening Studies on Radiocommunications

[Edu74] *Antennae* (Anteny - ANR); 34h/sem.; semester 4; S. Rosłoniec.

[Edu75] *Basics of Computer Techniques* (Podstawy techniki komputerowej - PTKR); 70h/sem.; semester 1; J. Marzec.

[Edu76] *Basics of Digital Circuits and Microprocessing Technique* (Podstawy układów logicznych i techniki mikroprocesorowej - PULR); 55h/sem.; semester 4; K. Czerwiński.

[Edu77] *Basics of High-Frequency Techniques* (Podstawy techniki w.cz. - PTWR); 65h/sem.; semester 3; K. Kowalski.

[Edu78] *Basics of Metrology* (Podstawy metrologii - PMER); 40h/sem.; semester 1; J. Olędzki.

[Edu79] *Basics of Satellite Communications* (Podstawy łączności satelitarnej - SATR); 20h/sem.; semester 4; J. Modelski.

[Edu80] *Computer-Aided Controlling and Data Processing* (Komputerowe sterowanie i przetwarzanie danych - KSTR); 41h/sem.; semester 5; W. Winiecki.

[Edu81] *Digital Data Transmission* (Cyfrowa transmisja danych - CTSR); 43h/sem.; semester 5; T. Kosiło.

[Edu82] *Fields and Waves* (Pola i fale - PFR); 72h/sem.; semester 2; T. Morawski.

[Edu83] *Frequency Standards* (Wzorce częstotliwości - WCR); 32h/sem.; semester 7; K. Radecki, T. Buczkowski.

[Edu84] *Materials and Elements* (Materiały i elementy - MER); 16h/sem.; semester 4; K. Radecki.

[Edu85] *Multimedia Techniques* (Techniki multimedialne - TMR); 20h/sem; semester 6; A. Krupiczka.

[Edu86] *Numerical Methods* (Metody numeryczne - MNR); 35h/sem.; semester 3; A. Miękina.

[Edu87] *Programmable Digital Systems* (Programowalne układy cyfrowe - PUCR); 32h/sem.; semester 5; T. Buczkowski, T. Olszewski.

[Edu88] *Programming* (Programowanie - PMR); 32h/sem.; semester 3; W. Smolik.

[Edu89] *Project 1 (systemic)* (Projekt 1- układowy - PUR); 30h/sem.; semester 5; K. Kowalski.

[Edu90] *Propagation of Waves* (Propagacja fal - PFR); 16h/sem.; semester 4; J. Jarkowski.

[Edu91] *Radioelectronics Measurements* (Miernictwo radiolektroniczne - MRR), 42h/sem.; semester 5; J. Cichocki.

[Edu92] *Radiocommunication Systems I* (Systemy radiokomunikacyjne I - SRK); 36h/sem. + lab. 3h +proj. 15 h, semester 6; T. Kosiło.

[Edu93] *Radiocommunication Systems II* (Systemy radiokomunikacyjne II - SRK); 36h/sem. + lab. 3h +proj. 15 h; semester 7; T. Kosiło.

[Edu94] *Technique of Emission and Receiving* (Technika emisji i odbioru - TER); 40h/sem.; semester 4; J. Modzelewski, W. Kazubski.

[Edu95] *Transmitters and Receivers Measurements* (Pomiary nadajników i odbiorników - PNOR); 32h/sem.; semester 7; J. Cichocki.

3.4.2. Postgraduate Studies on Radiocommunications

[Edu96] *Basics of Fiber Optics Telecommunications* (Podstawy telekomunikacji światłowodowej - PTS); 20h; J. Siuzdak.

[Edu97] *Computer Controlled Measurement and Data Processing* (Komputerowe sterowanie i przetwarzanie danych - KSP); 28 h + lab. 9h; A. Więckowski, W. Winiecki.

[Edu98] *Contemporary Telecommunication Networks* (Współczesne sieci tele-

komunikacyjne - WST); 20h; M. Dąbrowski.

[Edu99] *Digital Signal Transmission* (Cyfrowa transmisja sygnałów - CTS); 28h; T. Kosiło.

[Edu100] *Digital Cellular Systems* (Cyfrowe systemy komórkowe - CSK); 16h; J. Cichocki, J. Kołakowski.

[Edu101] *Digital Signal Processing* (Cyfrowe przetwarzanie sygnałów - CPS); 16h; A. Jakubiak.

[Edu102] *Law in Telecommunications* (Prawo w telekomunikacji - PT); 20h; C. Woźniak.

[Edu103] *Modern Radiocommunication and Broadcasting Systems* (Współczesne systemy radiokomunikacyjne i radiofoniczne - WRR); 32h; T. Kosiło.

[Edu104] *Modern Telecommunication Networks* (Współczesne sieci telekomunikacyjne - WST); 20h; M. Dąbrowski.

[Edu105] *Radio Links and Satellite Communications* (Linie radiowe i łączność satelitarna - LR); 20h; J. Zygierewicz.

[Edu106] *Theory of E-M Fields and Microwaves* (Problemy teorii pola i techniki mikrofalowej - PTM); 20h; K. Kowalski.

[Edu107] *Wide - band Systems in Telecommunications* (Systemy szeroko-pasmowe w telekomunikacji - SST); 16h; A. Dąbrowski.

3.4.3. Studies on Radiocommunications, Multimedia Techniques and Biomedical Engineering "RADEM"

[Edu108] *Access Network Systems* (Systemy i sieci dostępu - SSD); 4x19h, four times a year; A. Kalinowski, T. Kosiło.

[Edu109] *Access Network xDSL Systems* (Systemy i sieci dostępowe xDSL - SSD); 12 h; once a year; S. Kula.

[Edu110] *Architecture of Signalling Networks No. 7* (Architektura sieci sygnalizacji nr 7); 18h, once a year; M. Bromirski.

[Edu111] *Cable Television* (Telewizja kablowa - TP); 31 h + lab. 3h; once a year; T. Krzymień.

[Edu112] *Digital and Interactive Television Systems* (Telewizja cyfrowa i interaktywna - TCI); 2x13h; two times a year; A. Buchowicz.

[Edu113] *Exploitation of Electroenergetic Devices in Telecommunications* (Eksploatacja urządzeń elektroenergetycznych w telekomunikacji - EUET); 25h + lab. 8h; once a year; A. Dmowski.

[Edu114] *Implementation and Services for Intelligent Networks* (Implementacje i usługi sieci inteligentnych); 18h; once a year; M. Bromirski.

[Edu115] *Introduction to Telecommunications* (Wstęp do telekomunikacji); 3x12h; three times a year; A. Kostka.

[Edu116] *Introduction to UMTS Technique* (Wprowadzenie do techniki UMTS - UMTS); 4x12h; four times a year; J. Cichocki, J. Kołakowski.

[Edu117] *Legal Regulations in Telecommunications* (Regulacje prawne w telekomunikacji - RPT); 14h; once a year; C. Woźniak.

[Edu118] *Legal Regulations in Telecommunications Investments* (Regulacje prawne w inwestycjach telekomunikacyjnych - RPIT); 3x18h; three times a year; W. Kietliński.

[Edu119] *Management in Telecommunication Networks* (Zarządzanie sieciami telekomunikacyjnymi - ZST); 3x30h; three times a year; M. Bromirski.

[Edu120] *Management System with SNMP Protocol* (System zarządzania z protokółem SNMP); 25h; once a year; M. Bromirski.

[Edu121] *Modern Measuring and Controlling Systems* (Współczesne systemy pomiarowo-kontrolne - WSPK); 24h + lab. 12h; once a year; W. Winiecki.

[Edu122] *Multimedia in Telecommunications* (Multimedia w telekomunikacji - MMT); 17h + lab. 3h; once a year; W. Skarbek.

[Edu123] *New Techniques of Emission in GSM Networks* (Nowe techniki emisji w sieciach GSM); 14h; once a year; J. Cichocki.

[Edu124] *Optical Waveguide Construction* (Budowa sieci światłowodowej); 2x12h; two times a year; K. Holejko.

[Edu125] *Optical Telecommunication WDW and DWDM Systems and their Measurements* (Optyczne systemy telekomunikacyjne WDM i DWDM i ich pomiary - DWDM); 12h; once a year; K. Perlicki.

[Edu126] *Planning and Designing of Telecommunication Networks* (Planowanie i projektowanie sieci telekomunikacyjnych - PPST); 20h; five times a year; A. Drobnik.

[Edu127] *Protocols of Modern Packet Networks - TCP/IP and ATM* (Protokóły nowoczesnych sieci pakietowych - TCP/IP i ATM); 2x24h; two times a year; M. Bromirski.

[Edu128] *Selected Problems of Law in Telecommunications* (Wybrane zagadnienia prawa w telekomunikacji - PT); 7h; once a year; C. Woźniak.

[Edu129] *Systems and SDH Networks* (Systemy i sieci SDH - SSDH); 3x24h + lab. 6h; three times a year; S. Kula.

[Edu130] *Synchronization of Telecommunication Networks* (Synchronizacja sieci tele-

komunikacyjnych - SST); 13h; once a year; S. Kula, C. Dreger, K. Radecki.

[Edu131] *System of Signalling No.7* (System sygnalizacji nr 7 - SS7); 3x19h; three times a year; M. Bromirski.

[Edu132] *UMTS System* (System UMTS - UMTS); 2x16h; twice a year; J. Cichocki, J. Kołakowski.

3.4.4. Studies on Audiological Techniques

The Studies on Audiological techniques represents a series of courses; 180h; twice a year.

[Edu133] *Anatomy and Physiology of Hearing* (Anatomia i fizjologia słyszenia);12h.

[Edu134] *Ear Pathology* (Patologia ucha); 9h.

[Edu135] *Foundamentals of Acoustics* (Podstawy akustyki); 20h.

[Edu136] *Audiometry* (Audiometria); 32h.

[Edu137] *Hearing Aid Technology and Elements of Electronics* (Technika aparatów słuchowych i elementy elektroniki); 30h.

[Edu138] *Hearing Aid Measurements* (Miernictwo aparatów słuchowych); 14h.

[Edu139] *Earmold Technics* (Wkładki douszne); 5h.

[Edu140] *Hearing Aid Fitting* (Dobór aparatów słuchowych); 34h.

[Edu141] *Aural Rehabilitation* (Rehabilitacja); 7h.

[Edu142] *Elements of Psychology* (Elementy psychologii); 6h.

[Edu143] *Sign Language* (Język gestów); 6h.

3.5. International co-operation

[Edu144] SOCRATES Programme: **Higher Education**.
T. Kosiło, Ph.D., T. Buczkowski, Ph.D.
1999-2001

In the frame of SOCRATES Institutional Contract two bilateral programmes were realised: between Institute of Radioelectronics of Warsaw University of Technology and:

- Katholieke Hogeschool Sint – Lieven, Gent, Belgium
- Instituto Superior Tecnico, Universidade Tecnica de Lisboa, Lisboa, Portugal

In both cases the Student Mobility actions were realised in the frame of Electronics and Telecommunication Engineering (Socrates code 06.05). The objective of the programme is to realize a student project at the partner University. The Student Mobilty programme was as follows:

- Poland-Portugal; one student for 6 months
- Poland-Belgium, two students for 4 months

In the frame of cooperation with Belgium there was also realised a ”teaching staff mobility of short duration action” (Socrates code 06.05):

- Belgium-Poland; one lecturer for one week
- Poland-Belgium; one lecturer for one week.

4. RESEARCH PROJECTS

4.1. Projects granted by the University

Statutory projects

[Pro1] **Analysis of the Propagation Channel Properties in Wireless Communication Systems** (Analiza właściwości propagacyjnych w systemach łączności bezprzewodowej).
Józef Modelski, Prof., D.Sc.,
Y. Yashchyshyn, K. Kurek
29.05.2000 – 30.04.2001

The model and practical tool for radio channel analysing and modelling in outdoor and indoor areas have been developed. This tool uses ray tracing technique to model 2D signal propagation and enables: to analyse electromagnetic field distribution around the transmitter, to analyse the channel interference's, to calculate the channel impulse response. Additionally, the analysis of the indoor propagation channel, based on measurements, has been done. The influence of visibility between antennae and configuration of room on the channel properties has been considered.

[Pro2] **Home Multimedia Platform** (Domowa platforma multimedialna).
Władysław Skarbek, Prof., D.Sc.,
A. Buchowicz, K. Ignasiak, T. Keller, R. Pączkowski
29.05.2000 – 30.04.2001

The application for the digital cable television system was the main objective of this project. It was conducted in the co-operation with Arris Interactive, Atlanta, USA. It was focused on the integration of telecommunication and Internet services with the standard functionality of the digital television receiver. The software for a set top box is capable to:

- display banners with information on new e-mail's, telephone call's and voice mail messages during normal TV presentation,
- display electronic program guide with the content of all available TV channels,
- display and modification the preferences of user concerning the number of types of received TV channel, parameters of the telephone line, parameters of the Internet connection.

In the second phase, all services were implemented using wireless Bluetooth protocol. Their scope was extended to control electronic devices such as: camera, DVD, DAD, and PC with Internet access.

[Pro3] **Design and Investigation of Electroacoustic Studio and Measuring Systems and Digital Systems for Audio Signal Processing** (Projektowanie i badania elektroakustycznych systemów studyjnych i pomiarowych oraz systemów cyfrowego przetwarzania sygnałów fonicznych).
Zbigniew Kulka, Prof., D.Sc.,
A. Leszczyński, M. Tajchert, J. Narkiewicz – Jodko, P. Nykiel, G. Kustra
29.05.2000 – 30.04.2001

Primary topics included in the statutory grant are as follows:

- analysis of practical measurement methods of reverberation time. The impulse response and LMS methods have been chosen for reverberation time measurements in two listening rooms (small and large),
- application of LMS method for design, simulation and testing of loudspeaker systems,
- evaluation of sound properties at the output of digital reverberation units,
- design and construction of a test stand for acoustic emission using wideband piezoelectric transducers,
- design, construction and testing of a jitter meter/reductor unit for application in a S/PDIF digital interface
- preparation of software decoder of multichannel stream audio data encoded in Dolby Digital (AC-3) standard.

[Pro4] **Radiation Methods in Medical Techniques** (Metody radiacyjne w technikach medycznych).
Zdzisław Pawłowski, Prof., D.Sc.,
J. Marzec, K. Zaremba, B. Konarzewski, G. Domański, A. Piątkowski, P. Bogorodzki, E. Piątkowska – Janko, T. Wolak, M. Kazubek, T. Jamrógiewicz, A. Przelaskowski, L. Padee, R. Szabatin, P. Brzeski, W. Smolik, J. Mirkowski, T. Olszewski.
29.05.2000 – 30.04.2001

- *Investigation of properties of radiographic imaging sensors*

The methods and apparatus for measurements of radiographic, luminescent, imaging sensor parameters were developed. For ZnCdS, $CaWO_4$, LaOBr, $YTaO_4$ the effective X-ray-to-light conversion efficiency, modulation transfer function and detective quantum efficiency were determined. The decay time and light transport efficiency in a measuring system (in sensors and optical fibres) were estimated. The results of this work may be useful for sensor selection in particular applications of digital radiology.

- *Artificial neural networks in high resolution ECG*

High resolution technique means that we averaged (150-250 beats) ECG signal which was recorded form orthogonal bipolar XYZ Frank leads, averaged, filtered and combined into a vector magnitude of QRS complex – late ventricle potentials, or P-wave – late atrial potentials.
In this work artificial neural networks (neural networks with error back propagation) was used for supporting medical diagnosis in case to patients differentiation. Results for artificial neural networks classification and multidimensional analysis of discrimination were compared.

- *The free-hand three-dimensional ultrasound system*

Project concerns a development of 3D ultrasound imaging system. A system for acquiring volumetric pulse-echo ultrasound data uses a conventional high quality US scanner equipped with a magnetic spatial

localizer. Position and orientation measurements determined by the 6Dpc-Bird Motion Tracker localizer are synchronised with the acquisition of 2D-B-scans from HP PowerPoint scanner. The scans are digitised from the video output of HP scanner via AverMedia frame grabber BT848. The resolution and accuracy of a 3D reconstruction can be no better than constituent 2D slices from which it is assembled, and it is strongly dependent on position accuracy of localizer system and the synchronization of scan/location registration process.
The aim of our research was simply realization of software interface between pc-Bird card, Linux as operating system, and application of visualisation, control and driving of acquisition process. Registration of 3D-ultrasound database information should be easy to manage, and data organisation could be ordered to make visualisation process as easy and quickly as possible.
Assumed purposes were realised and the results were presented. Correlated B-scans and locations allow to follow scanner movement and to cover examined volume with acquired projections. Suitable volume interpolation, rendering, etc. are the topics of future visualisation-oriented research of our group.

- *Research stand for image analysis originated from a SIEMENS DR tomograph*

The modernization of computer tomography laboratory has been continued. The Siemens Somatom tomograph was adapted for scientific research performed at Division of Nuclear and Medical Electronics. The Division collaborates with Traumato - Orthopedic Department of MSWiA hospital (R. Granowski - Prof., D.Sc.) in the field of hip joint endoprosthesis design. The CT scanner was applied for geometric identification of bone system of individual patient. The collaboration with the Institute of Organic Industry has been established. The application of CT scanner for technological studies is planned. The numerous tests of imaging of different material structure (eg. carbon electrodes) have been done. The main task of the work was elaboration of the software for data transfer form Somatom CT scanner to the PCTOMO system (system for tomographic image analysis). The software is designed for data transmission using RS-232 connection and data conversion. The conversion is possible in two formats: ACR-NEMA (used in PCTOMO system) and DICOM 3.0. The software was elaborated using Visual C++ compiler for Windows platform.

[Pro5] **Novel Methods of Computer Systems Designing** (Nowoczesne metody projektowania komputerowych systemów pomiarowych).
Wiesław Winiecki, Ph.D.,
K. Adamowicz, P. Bobiński, R. Leoniak, R. Łukaszewski
29.05.2000 – 30.04.2001

The main objectives of the project are related to applications of novel integrated software tools in measuring system designing as well as to design of new software tools. Application of ActiveX technology for distributed measuring systems was considered. An experimental measuring system using ActiveX technology was designed and tested. New research concerning a formalisation and optimisation of intelligent monitoring system designing has been started, new methods for optimal decomposition of measuring systems were considered.

[Pro6] **Design, Modelling and Measuring the Microwave Devices** (Projektowanie, modelowanie i pomiary układów mikrofalowych).

Tadeusz Morawski, Prof., D.Sc.,
W. Gwarek, S. Rosłoniec, K. Kowalski
29.05.2000 – 30.04.2001

The research project mentioned above includes the following subjects:

- *Design of microwave devices (functional components) for radio-transmitters:*
  The research efforts have been focused on methods for designing the following functional components for modern radar transmitters, synthesizers (PLL/DDS), power noise sources, wide-band phase modulators with nonuniform transmission lines, power amplifiers for T/R modules and avionics applications, MMIC's switches, band pass filters for constrain the frequency spectrum of power noise sources.
- *Generalised algorithms of S-parameter extraction form electromagnetic simulations:*
  A system of S-parameter extraction from electromagnetic simulations has been extended to allow:
  - Circuit partitioning into subcircuits connected by propagating as well as evanescent modes, separate analysis of each subcircuit, and cascading of partial results into a complete S-matrix. Such an approach allows reducing the CPU time, especially if only one subcircuit is subject to modifications, or if a resonant circuit can be decomposed into non-resonant discontinuities. A novel S-matrix definition relevant and practical for evanescent modes has been proposed to facilitate this task.
  - De-embedding of subcircuit S-matrix in the presence of multimodal connections.
  - Incorporating an electromagnetic solver into an external optimisation loop, working with a discontinuous and noisy goal function constructed from S-matrices.
- *A quiet navigation radar operating at L band*
  In this case the research work have been concentrated on design and fabrication the antenna system. The antenna array being investigated consists of four radiating elements and the four-channel in phase power divider with $3\lambda/2$ in length directional coupler at its input. Due to that constructional solution the antenna creates two radiation patterns, i.e. sum and differential. The obtained experimental results are in good agreement with the corresponding theoretical predictions.
- *The proofs of modernisation and optimisation of automatic control units and processing units in the measuring system*
  The main parameters of the new type AP4 autopilot was identified. On the base of these results the range of modernisation of automatic control units and processing units in the

measuring system necessary for testing this autopilot was determined.

[Pro7] **Implementation and Investigation of the Selected Algorithms for Interpretation of Measurement Data** (Realizacja i badanie wybranych algorytmów interpretacji danych pomiarowych).
Roman Z. Morawski, Prof., D.Sc.,
A. Miękina, A. Podgórski, T. Szafrański
29.05.2000 – 30.04.2001

The main objectives of the project are related to the design and implementation of new algorithms for calibration of measurement channels and reconstruction of measurands, as well as to the design of the procedures for uncertainty analysis of those algorithms, and to the upgrading of the corresponding research infrastructure. A new systematic approach to the classification and analysis of the algorithms for quasi-dynamic calibration of measurement channels and measurand reconstruction has been developed. Several interval-algebra-based procedures for the uncertainty analysis of weakly non-linear algorithms have been improved, implemented and verified. A study on DSP implementation of some previously developed algorithms for spectrometer calibration and spectrum reconstruction has been advanced. The algorithms and instrumentation for frequency-domain analysis of acoustic-range signals have been studied as well. The results of the research accomplished have been published in: a chapter of a book, 2 papers in the reviewed international journals, and 7 conference papers.

[Pro8] **Digital Radio Transmission** (Cyfrowa transmisja radiowa).
Jacek Wojciechowski Prof., D.Sc.,
J. Cichocki, J. Kołakowski, K. Radecki, S. Żmudzin, S. Maszczyk, D. Grabowski, T. Kosiło, T. Buczkowski, K. Czerwiński, W. Kazubski D. Janusek, J. Jarkowski, H. Chaciński
29.05.2000 – 30.04.2001

- *Problems and methods of radio parameters measurement in CDMA cellular system*

The project dealt with measurement methods for CDMA *(Code Division Multiple Access*) signals used in cellular systems. It covered the following topics:
- analysis of problems and requirements concerning CDMA test arrangements,
- evaluation of an opportunity for performance of such measurements in the Institute,
- completion of test arrangement and driving it into operation,
- elaboration of the software supporting measurements of chosen parameters.

The project resulted in test arrangement for advanced investigation of CDMA signals and IS-95 mobile equipment. Acquired know-how allows for further development of investigations and didactic activity in the area of CDMA systems as well as performance of type-approval measurements.

- *Research for influence of RRL devices on electronic measuring apparatuses.*

Mobile telephones may potentially cause malfunctioning of electromedical apparatuses. This research investigated potential hazards in operation of selected medical apparatus introduced by mobile telephones. An analysis enabled to identify the most critical mobile phone operating conditions for medical apparatuses. Measurements with telephones, manufactured by Alcatel, Ericsson and Nokia, working in these conditions were performed using Hewlett-Packard HP5515A tester. For testing automatic defibrillators of four different manufacturers and "artificial patient" were used:

- *Analysis of selected problems on modulation in DAB system*

A computer program generating QAM signals and calculating frequency spectrum was prepared. As a case study 36-ary QAM signal was examined. Results are presented in the conference paper. The program will serve as a supporting tool in the Radiocommunication Laboratory.

- *Modelling, simulation and designing of switchmode circuits*

The research deals with modelling, simulation and design of switchmode circuits. Models of elements with different levels of detail have been introduced. New methods of analysis of switchmode circuits with ideal switches, leading to consistent initial conditions, have been proposed. An approach of quick simulation based on ideal models, on the early stages of design has been proposed. A final verification relies on full physical models. Software for simulation, including quick steady state analysis, has been worked out. Interactive design methodology, using SCAD software engine, has been proposed.

[Pro9] **High-Efficiency dc/dc Converters with h.f. Resonant Power Amplifiers** (Wysokosprawne układy zasilające prądu stałego z rezonansowymi wzmacniaczami mocy w.cz.).
Jan Ebert Prof., D.Sc.,
M. Mikołajewski, J. Modzelewski, A. Wajs
29.05.2000 – 30.04.2001

An analysis and optimisation of a novel resonant dc/dc converter with double-switch synchronous regulators have been done. Due to zero-voltage switching of transistors and diodes in the converter it can operate with high efficiency at a high and constant frequency. Theoretical results have been verified in a laboratory model of the converter operating at a constant frequency f=1MHz and delivering maximum output power 240W/V_o= 12V/I_o=20A with efficiency 89%.

[Pro10] **Ferroelectrics – Measurement Method and its Applications in an Antenna Techniques** (Ferroelektryki - metody pomiarów i ich zastosowanie w technice antenowej).
Krzysztof Derzakowski Ph.D.,
J. Modelski, Y. Yashchyshyn
29.05.2000 – 30.04.2001

The measurement method of a permittivity and a loss tangent of ferroelectrics are described. The method is based on the coaxial resonator. On the base of a theoretical solution the program for calculations of the material parameters has been elaborated. The measuring holder has been elaborated and made. The method and holder will be used to measure

ferroelectrics produced at the Warsaw University of Technology. In the second part of this work the ferroelectric material has been used to design a microstrip antenna. The microstrip antenna with ferroelectrics can be applied in an antenna array. The fullwave solution of the microstrip antenna has been given. The results very well agree with the other methods.

Projects granted by the Rector

[Pro11] **Optimisation of the Straw Chamber Detector** (Optymalizacja toru detekcji cząstek z komorą słomkową).
Janusz Marzec, Ph.D.,
20.06.2000 – 31.05.2001

Analysis of the electromagnetic field transparency of the straw tube chamber was done. New theoretical model of the straw electric properties was proposed. The model shows dependency of the straw construction (type of the foil, the way of foil strip winding and gluing) on the cathode shielding efficiency. Conclusion that all foil straw tubes produced up to now are transparent for the electromagnetic field was formulated. New straw construction, using polyester - Al laminates as a wall material was proposed. Analysis of the electromagnetic field interference (EMI) immunity of the COMPASS wide-angle spectrometer large area tracker was done.

[Pro12] **Design of Microwave Power Amplifiers with Stable Transmittance** (Projektowanie mikrofalowych wzmacniaczy dużych mocy o dużej stałości transmitancji).
Tadeusz Morawski, Prof., D.Sc.,
W. Wojtasiak, D. Gryglewski, R. Michnowski, M. Kukier
20.06.2000 – 31.05.2001

Method of the design of microwave linear A - class power amplifiers with stable transmittance was elaborated and experimentally examined. The design method is based on the electrothermal model of MESFET transistor characterised by small signal parameters.

[Pro13] **Hardware Architectures for Texture Coding of Arbitrarily Shaped Video Objects** (Architektury sprzętowego kodowania tekstury obiektów w obrazie).
Józef Modelski, Prof., D.Sc.,
K. Mroczek
20.06.2000 – 31.05.2001

This work deals with design of high-throughput hardware architectures for texture coding of arbitrarily shaped video objects. Several most popular algorithms were considered such as Stasiński-Konrad algorithm for generic shape-adaptive orthogonal transforms, MPEG-4 v.1 low pass extrapolation (LPE) padding technique for standard DCT coding and Sikora-Makai shape-adaptive DCT (SA-DCT) and IDCT (SA-IDCT). The high-throughput pipelined architectures for Stasiński-Konrad algorithms were designed with computation time of the order O(N) and O(2N +C), as well as projection onto 1D systolic architecture was shown. The cost-effective and high-throughput architecture for LPE padding filtering was designed. This architecture was modelled in VHDL, implemented and simulated. The high-throughput, cost-effective dedicated core architectures for shape-adaptive DCT, IDCT and SA-DCT/IDCT were designed both for CCIR and HDTV MPEG-4 object video coding. From VLSI point of view these architectures are modular, regular and easy-routed with simple control, therefore high system clock frequency can be achieved and memory requirements are small. Complete loose processor coupling SA-DCT and SA-IDCT cores for MPEG-4 CCIR video were designed and modelled in VHDL. Synthesis results for PLD devices are better than for reported ASIC solutions. Both software programmes and hardware simulators were used for simulations. Fixed-point error simulations and word length optimisations were performed for SA-DCT/IDCT core. A modification of SA-DCT algorithm (1DDCS-SA-DCT) was presented, which has high coding efficiency and good computation characteristic for hardware.

[Pro14] **The Elaboration of a Computation Method of the Radiated Acoustic Field from the Surface Sources in Free Space and its Implementation on an IBM PC Computer.** (Opracowanie metody obliczeniowej promieniowania pola akustycznego powierzchniowych źródeł akustycznych w swobodnej przestrzeni i jej implementacja na komputerze klasy IBM PC).
Jerzy Narkiewicz – Jodko, Ph.D.,
M. Tajchert, G. Kustra
20.06.2000 – 31.05.2001

Analysis of the radiation of acoustic sources is based on the integral Kirchoff's expression that gives the acoustic potential in a defined point of observation. Assumed that the surface of the source consists of an infinite number of pulsating points - elementary sources of zero order - placed in an infinitely great baffle. This is a specific case but one can easily generalise it to other cases. With this assumption is possible to simplify the Kirchoff's expression so the acoustic potential in point P can be calculated as the sum of potentials originating from elementary sources of the surface. After suitable transformations the expression enables to calculate acoustic pressure produced in a half space by a source of given parameters, placed in an infinite baffle as the function of frequency, distance and angle of incidence. Moreover, the expressions for unite acoustical radiation impedance of source as a function of frequency, and the calculation of power acoustic radiated by a given source can be also obtained. The elaborated programme was used to illustrate the calculations and for analysis several examples of the acoustic fields produced in the different conditions by typical sources. It's very useful software tool to different acoustic sources of radiation analysis and acoustic sets.

[Pro15] **Indoor Propagation Channel Measurements in the 2 GHz Frequency Range and Characterisation of the Building Material Electrical Properties** (Pomiary właściwości propagacyjnych kanału radiowego wewnątrz budynku w zakresie 2GHz, wraz z oceną elektryczną parametrów materiałów konstrukcyjnych budynku).
Tomasz Kosiło, Ph.D.,
K. Kurek
20.06.2000 – 31.05.2001

The importance of mobile systems applications inside buildings is growing up very fast. Cellular systems, wireless data networks, ISM, Bluetooth applications can be indicated as examples. Because of this the interest of indoor propagation modelling and measurements is growing up as well. The main subject of this study was to measure the influence of people moving inside building on the properties of radio channels. The method and results of measurements are presented and discussed. The second subject was the methodology of reflection coefficient measurements of walls inside building. Developed methodology and element of measuring equipment are described.

[Pro16] **Organ Blood Flow Modelling – Theoretical Models for Quantitative Perfusion Imaging** (Modelowanie przepływu krwi – tworzenie podstaw teoretycznych dla ilościowych metod obrazowania ukrwienia).
Piotr Bogorodzki, Ph.D.,
A. Piątkowski, E. Piątkowska – Janko, T. Wolak, M. Orzechowski
20.06.2000 – 31.05.2001

Perfusion relevant images called either parametric or functional images can be obtained from X-ray computed tomography (CT), Magnetic Resonance Imaging (MRI), Electron Beam Tomography (EBT) modalities, through a special sequential scanning after injection of a contrast medium. This kind of examinations, called dynamic study, forms an image sequence, that monitors the first pass transit of injected boluses of the contrast agents, through an organ of interest. In order to assess organ perfusion, physicians need a system which repeatable and robustly relate physical organ flow properties (like for example volume flow in ml/(min*g) with parameters extracted from time stack of images obtained in dynamic scanning procedure. The goal of this project was to develop theoretical models allowing flow estimation. Theoretical basis of operation was originally introduced by Stewart and proven for intravascular tracers by Meier and Zierler for radioactive tracers in nuclear medicine. Flow is estimated from the registered time stack of images using Central Volume Principle - theoretical base of the indicator-dilution methods that have become popular for measurement of flow through an organ or tissue. Both of these two-stage procedures (dynamical scanning protocol and based on CVP theory image generation algorithm) affect the quality of the final parametric image. Weisskoff showed, that CVP does not hold for MR or CT dynamic data of purely intravascular tracers, moreover due to measurement noise, a very time consuming, fitting procedure have to applied to the original data.

[Pro17] **Data Base in DICOM Standard with the WWW Interface for Medical Images** (Opracowanie bazy danych o strukturze zgodnej ze standardem DICOM, z interfejsem WWW dla obrazowych danych medycznych).
Roman Szabatin, Ph.D.,
W. Smolik, P. Brzeski
20.06.2000 – 31.05.2001

The project of computerization of a hospital radiological department including a system for diagnostic studies, archiving and management has been elaborated. The heart of the system is a relative database with the structure including DICOM standard. So the main object in the base is the patient. His personal data are included: identification, demographic and medical data. The structure of the data makes it possible to register his time of stay in the hospital and his plan of medical visits. The access to the medical patient's data is limited to the physicians directed and making any tests. The structure of the database for archiving has also been suggested. It includes tests of various modalities, such as roentgen tomography, magnetic resonance tomography, nuclear medicine and ultrasonography. It is based on DICOM standard. All the results of the tests in form of one, single image or a series of images are coupled with the patient. Hardware of the archiving system has been configured. It consists of the server ADAX, bought by the Nuclear and Electronics and Medical Department (Windows 2000 Server) equipped with the disk matrix. The rules of the communication among the database and other elements of the hospital informatics system have been established. These elements are: patients' registration system, diagnostic devices (for example all kinds of tomographs), imaging systems, systems for data standards, such as DICOM, Interfile and ACR-NEMA. The project makes possible for the physicians, due to the WWW technology and JAVA language, to access to diagnostic files from any places without necessity of installing special software there.

[Pro18] **Design and Implementation of an Adaptive Interpolation Filter in SHARC DSP for Audio Applications** (Implementacja adaptacyjnego, cyfrowego filtru interpolacyjnego na procesorze sygnałowym SHARC do zastosowań fonicznych).
Zbigniew Kulka, Prof. D.Sc.,
P. Nykiel
20.06.2000 – 31.05.2001

The adaptive version of an interpolation audio filter based on the symmetrical structures of polyphase FIR digital filters has been designed. The pulse response of the FIR filters were optimised using the criterion of the input signal transient content. In the first step, the input signal is analysed according to heuristic program implemented in the transient analysis block, next the criterion of performance is evaluated and the calculation of the coefficients of two interpolation subfilters is performed. One of them

is optimised due to the pulse response (e.g. in the time domain) and second one due to the attenuation of the signal over audio band components (e.g. in the amplitude domain). The designed adaptive algorithm was implemented in SHARC DSP and built in to the high end CD player. Finally, the subjective sound quality tests employing the conventional and adaptive version of interpolation filter were performed.

Projects granted by the Dean

[Pro19] **Application of Time-Frequency Transforms for Suppression of Narrowband Interference in CDMA Systems** (Wykorzystanie przekształceń czasowo – częstotliwościowych do redukcji zakłóceń wąskopasmowych systemów CDMA).
Jacek Cichocki, Ph.D.,
J. Kołakowski, D. Grabowski, S. Maszczyk
13.07.2000 – 31.05.2001

The project resulted in two methods for interference suppression. The first of them consists in calculation of the signal transform, removal of the interfering signal in the time-frequency plane and signal reconstruction. The second one requires identification and reconstruction of the interfering signal and its substraction from the original signal. Both methods were investigated using a developed software model of transmission path. Obtained results confirmed efficiency of the methods.

[Pro20] **Method for Estimating All Terminal Reliability of a Network** (Wyznaczanie niezawodności sieci).
Jack Wojciechowski, Prof., D.Sc.,
P. Kopyt, R. Majkowski
13.07.2000 – 31.05.2001

The problem of All Terminal Reliability (ATR) in networks with perfect nodes and line failures is considered. Calculating ATR is a *NP*-hard problem. An approximate method based on the Monte Carlo technique is introduced and efficient algorithm for network connectivity selected. Special techniques tuned to the cases of high and low ATR's are presented and results of tests reported. A generator of random networks is discussed.

[Pro21] **Audio Test Signals Elaborations and CD Test Design for Behavioural Tests of Hearing in Small Children** (Opracowanie sygnałów testujących i wykonanie płyty testowej CD do badania właściwości słuchu małych dzieci).
Andrzej Leszczyński, Ph.D.,
P. Nykiel, R. Smoliński, H. Siedlecka
13.07.2000 – 31.05.2001

The main purpose of the project was to elaborate relevant tool for behavioural methods of hearing tests for small (from birth to 3 years old) children. In the first step, the investigations of sound samples due to their natural pitch, frequency spectra and recognition capability by small children were performed. On that base, two CDs containing 6 groups of scaled level sound samples, of 10 second duration time and 5 second of repetition time each, were recorded, The sounds were scaled in level from – 60 dB up to 0 dB, with 5 dB step. The main signals were supported by calibration signals of single tones; 250 Hz, 1000 Hz and 4000 Hz, as well as sample of white noise. As an introduction to the sound tests, some samples of relaxing music were recorded and added at the beginning.

[Pro22] **Design of Active Circuits with New Technology Silicon Bipolar Transistors** (Projektowanie mikrofalowych układów aktywnych z krzemowymi tranzystorami bipolarnymi nowej generacji).
Tadeusz Morawski, Prof., D.Sc.,
W. Wojtasiak, J. Zborowska,
D. Gryglewski, R. Michnowski, M. Kukier
13.07.2000 – 31.05.2001

The main goal of grant was investigation of new type of silicon, bipolar transistors and estimation if they can be applied to professional devices designed in Microwave and Radiolocation Engineering Division. After investigation we can say, that the new type of bipolar transistor has very good parameters and can be used to apply to professional circuits. The main obstacle of using bipolar transistors has been the low frequency of work up to now. The new solutions of bipolar transistors move the limit up to X band. The prices of new bipolar transistors are about one hundred times smaller than MESFET transistors, which were the typical solution in professional design. The elaboration of design procedures of amplifiers and oscillators with new type bipolar transistors is the second effect of the grant. The procedures were positively verified during design of real devices.

[Pro23] **A New Software Environment for Distributed Measuring Systems Designing** (Wykorzystanie nowych technologii programowych do projektowania rozproszonych sytemów pomiarowych).
Wiesław Winiecki, Ph.D.,
K. Adamowicz, P. Bobiński, M. Karkowski, R. Leoniak, R. Łukaszewski, A. Trawiński
13.07.2000 - 31.05.2001

The main goal of this work was elaboration of the software environment, which is completely independent from a client's computer platform and allows full access to the measurement system via Internet using a computer provided only with a standard Internet explorer, without necessity of installation a dedicated measurement application. The additional goal was methodology of designing measurement controls eleboration (i.e. graphical elements of GUI network measurement system panels), building a programme of network measurement devices of IEEE-488 standard. Finally, practical verification of elaborated tols by realization of measurement application was done.

[Pro24] **Example Implementations of Telemedicine Services** (Rozwój i pilotowe implementacje technik telemedycznych).
Piotr Bogorodzki, Ph.D.,
Z. Pawłowski, A. Piątkowski, P. Brzeski, T. Jamrógiewicz, M. Kazubek, E. Piątkowska-Janko, A. Przelaskowski, W. Smolik, R. Szabatin, T. Wolak, K. Zaremba, R. Kurjata
13.07.2000 - 31.05.2001

The demand for improved health care is worldwide, and growing rapidly. A significant part of that demand can be met using telemedicine expertise, services and products. The goal of the project was to create example implementation of telemedicine applications. These examples include:

- *Development of multicenter medical Image Archiving and Communication network*

The work was done in Biomedical and Nuclear Computer Systems Laboratory (BINSK). The goal of the project was to organize a specialised computer network dedicated to teleradiology. Beside BINSK project involved: Medical University of Warsaw / Department of Clinical Radiology II in Warsaw, Medical Centre of Postgraduate Education, Poland, LKH - Universitätskliniken Graz, Austria, Technische Universitat Graz, Institut für Elekro und Biomedizinische Technik, Graz, Austria.

- *An example implementation of ultrasound data archiving and transmitting system*

The work was done in Image Processing & Pattern Recognition Laboratory. The goal of the project was to implement database server with dynamic data (like ultrasound) handling capability. The motivation for the project was, that ultrasound equipment is still the widest spread in Polish hospitals.

- *Internet access to medical image server*

The World Wide Web (WWW) is having a significant impact upon the way in which telemedicine can be delivered. The work was done in Nuclear Medicine Laboratory. The goal of the project was to allow Internet users to access medical data stored in DICOM format by means of standard web browsers. The application was created: "Dicomed" and "Medic DataCenter".

4.2. Projects granted by the State Committee for Scientific Research (KBN)

[Pro25] **Resonant h.f. Converters with Synchronous Regulators** (Rezonansowe przetworniki energii wielkiej częstotliwości z regulatorami synchronicznymi).
Jan Ebert, Prof. D.Sc.,
A. Wajs
01.06.2000-31.10.2001

Research concerns the following topics:

- Analysis and optimisation of novel resonant h.f. ZVS synchronous regulators circuits operating with a constant frequency and with different kinds of loads e.g.: a resistance, a series resonant circuit and a load with rectifier;
- Elaboration of designing procedures of resonant h.f. converters with synchronous regulators and resonant Class E amplifier applied as a h.f. energy source;
- Practical verification of the laboratory models of the proposed circuits.

[Pro26] **Multidimensional Wigner Distributions and Ambiguity Functions for Analytic Signals. The Extension of the Theory and Applications** (Wielowymiarowe rozkłady Wignera i funkcje nieoznaczności dla sygnałów analitycznych. Rozwinięcie teorii oraz zastosowania).
Stefan Hahn, Prof., D.Sc.,
J. Jarkowski, K. Snopek, G. Hahn
23.06.99 - 31.12.2001

The Wigner distribution of *n*-dimensional complex signals was firstly defined in 1932. The subject of the project is to study the properties of this distribution for *n*-dimensional analytic signals defined in 1992 by S. Hahn. The *n*-D Wigner distribution is related by a 2*n*-D Fourier transformation to the *n*-D ambiguity function. In the theory of radiolocation the 2-D ambiguity function is known as the Woodward function. The purpose of the project is to find practical applications of 4-D Wigner distributions and 4-D ambiguity functions. The visualisation of 4-D functions will be performed using the animation technique given, for example, by Matlab.

[Pro27] **Optimisation of High-Efficiency High-Frequency dc/dc Converters** (Doskonalenie wysokosprawnych przetwornic napięcia stałego z przetwarzaniem energii wielkiej częstotliwości).
Mirosław Mikołajewski, Ph.D.,
J. Ebert, K. Puczko, A. Wajs, A. Owczarek
01.06.2000 - 31.10.2001

The project concerns an analysis and optimisation of high-frequency high-efficiency resonant dc/dc converters with synchronous regulators. Measurement of selected soft ferrites for determinations of their power losses in the MHz range have also been made. Methods of designing planar inductors and transformers have been proposed. Novel dc/dc converters have been verified experimentally.

[Pro28] **Wavelet-Based Low-Bit Rate Hybrid Video Coding** (Kodowanie sekwencji obrazów z dużym stopniem kompresji z zastosowaniem analizy wielorozdzielczej).
Józef Modelski, Prof., D.Sc.,
G. Siemek
01.06.2000 - 01.08.2001

The purpose of this work is to check the applicability of the wavelet transform for coding the motion compensated signal error in the block-based hybrid video-coding scheme. In related publications the wavelet transform was performed on the whole motion compensated frames. For the low bit rates such solution produces poor results because in well motion compensated regions the residual signal is small, thus transformed and quantified to zero. In our approach the wavelet transform is performed on the block basis. The transform coefficients are coded with the embedded strategy. The work includes the

research on the optimal video coder syntax, video coding algorithms and bit rate allocation stately.

[Pro29] **Algorithms for Digital Signal Processing of Measurement Data, Dedicated to Applications in Environmental and Industrial Monitoring** (Algorytmy cyfrowego przetwarzania danych pomiarowych dla zastosowań w monitoringu środowiska naturalnego i w monitoringu przemysłowym).
Roman Z. Morawski, Prof., D.Sc.,
A. Miękina, A. Podgórski
10.12.1999 - 30.06.2002

The project is on the methods and algorithms of digital signal processing of measurement data, aimed at the solution of some fundamental problems related to the development of information infrastructure of environmental and industrial monitoring, such as:
- expanding the set of measurable quantities;
- improving the resolution, accuracy, speed or reliability of measuring quantities important for monitoring;
- decreasing the costs of instrumentation via its specialisation or software substitution of its hardware.

The research goal of the project is to develop new algorithms for measurand reconstruction and calibration of measurement channels, making it possible to analyse multicomponent substances, i.e. to determine the estimates of concentrations, as well as uncertainties of those estimates, on the basis of:
- spectrophotometric data;
- data provided by selected sensors and transducers used in monitoring.

The results of the research accomplished have been presented in several papers.

[Pro30] **Optimisation of Radiographic Imaging Sensors Dedicated for Osteoporosis Diagnostics** (Optymalizacja sensorów obrazów do radiograficznych systemów obrazowania przeznaczonych do diagnozowania osteoporozy).
Zdzisław Pawłowski, Prof., D.Sc.,
J. Marzec, K. Zaremba, B. Konarzewski, G. Domański, E. Demczuk
14.07.2000 - 30.06.2002.

The purpose of this work is to select cheap and effective techniques of bone mineral density measurement using scintillating detectors. Theoretical analysis of bone mineral measurement by absorptiometry will be presented in the work. The applicability of two potential systems for forearm bones screening will be checked: the first one using digitized radiographs and the second one using linear scanner with scintillating head optically coupled with matrix of semiconductor photodiodes. The optimization of each system will be made by means of theoretical analysis and experiment, taking the minimization of radiation dose for fixed precision as the main criterion of the optimization.

[Pro31] **Methods of Medical Image Data Optimisation Applied to Archiving and Telemedical Transmission** (Metody optymalizacji reprezentacji medycznych danych obrazowych do archiwizacji i transmisji telemedycznej).
Artur Przelaskowski, Ph.D.
01.02.2001 - 31.12.2001

The general purpose of this project is to design and construct the efficient tools for medical image archiving, fast retrieval and communication in telemedicine systems. Complete package of lossy and lossless compression algorithms included in one compression system (COMSYS) and several separate procedures dedicated to different applications are predicted to be applied and tested in clinical conditions. Foundations of compression scheme is built as JPEG2000-like code extended to hybrid coder for effective lossless archiving and optimized wavelet coder for lossy archiving. Eight physicians will be involved in a system quality and usefulness evaluation tests conducted on a group of radiology images compressed by the COMSYS. This project is intended to be finalizing research and will end in a form of qualifying thesis and journal papers

[Pro32] **Analysis of Wideband Properties of the Indoor Propagation Channel in Wireless Communication Systems** (Analiza szerokopasmowych właściwości kanału propagacyjnego wewnątrz budynków w systemach łączności bezprzewodowej).
Józef Modelski, Prof., D.Sc.,
K. Kurek
02.01.2001 - 31.03.2002

The analysis of the indoor propagation channel, based on measurements and ray tracing simulations, has been used to determine dependence of the channel properties on scenario conditions such as: dimensions of the room, location and kind of antennae, existence of visibility between antennae for situation when both antennae are placed in the same room. Using results of the analysis statistical model of the channel impulse response considering influence of propagation scenario has been proposed. Model bases on an exponential approximation of envelope of the average impulse response and dependence of slope factor on scenario conditions.

[Pro33] **Hardware for Movement Estimation Algorithms and Image Texture Coding by Means of Methods Based on Orthogonal Transformations** (Realizacje sprzętowe algorytmów estymacji ruchu oraz kodowania tekstury obrazu metodami transformacji ortogonalnych).
Józef Modelski, Prof., D.Sc.,
K. Mroczek
02.01.2001 - 30.12.2001

The purpose of this work is to check the possibilities of implementations for image texture coding algorithms by means of orthogonal transformation methods and local movement estimations, taking into account preprocessing system for regions of the objects varying in shapes. There are considered two algorithms: shape-adaptive DCT and Stasiński-

Konrad algorithm for generic shape-adaptive orthogonal transforms. The work also includes the research on the processor for S.A.-DCT/IDCT algorithm, which can be used in construction of coder for MPEG-4 standard.

[Pro34] **Application of Novel Software and Communication Technologies in Distributed Virtual Instruments Design** (Wykorzystanie nowoczesnych technologii programowych i komunikacyjnych w projektowaniu sieciowych, wirtualnych przyrządów pomiarowych).
Wiesław Winiecki, Ph.D.,
A. Podgórski, T. Kosiło, R.Łukaszewski, M.Karkowski, P. Bilski, R. Leoniak
01.07.2001 - 30.06.2003

The project concerns application of novel software and communication technologies in metrology. Main activity is focused on new kind of measuring virtual instruments, named distributed (or network) virtual instruments. Such instruments can be controlled via wire or wireless networks. The main objectives of the project are related to application of novel software tools, such as: integrated environments (e.g. LabView, Measurement Studio, HPVEE), Java, C+SCPI, Data Socket, ActiveX, HTML, XML, WML, Flash, i.e.), and novel wire and wireless communication technologies, such as: Internet, GSM, GPRS, WAP, UMTS, Bluetooth, Wireless Ethernet, i.e., in distributed virtual instruments designing.

[Pro35] **Improved Model of Adaptive Antenna Controlled by Means of Genetic Algorithm** (Badanie anten inteligentnych sterowanych algorytmem genetycznym).
Marcin Piasecki, M.Sc.,
01.07.2001 - 30.06.2002

This project presents results of research on the influence of real antenna parameters like mutual couplings on the overall antenna radiation pattern. Two different approaches to adaptation of such antenna simulated with the use of genetic algorithm are also presented. The first one is a standard phase adaptation while in the second one radiation characteristic of each element is modified with new hardwareless technique.

[Pro36] **Design of High-Power Microwave Amplifiers Regarding the Newest Achievements of Semi-Conductor Technology** (Projektowanie mikrofalowych wzmacniaczy dużych mocy z uwzględnieniem najnowszych osiągnięć technologii półprzewodników).
Tadeusz Morawski, Prof., D.Sc.,
W. Wojtasiak, J. Zborowska, D. Gryglewski, R. Michnowski, M. Kukier, M. Lubiejewski
02.04.2001 - 31.12.2002

Chosen types of high-power microwave amplifiers regarding the newest achievements of semiconductor technology have been designed and experimentally examined.

4.2.a. International projects

[Pro37] **COMPASS Experiment at CERN - Design of the Apparatus, Collecting and Analysis of Data** (Eksperyment COMPASS w CERN-ie - Budowa aparatury, zbieranie i analiza danych).
Krzysztof Zaremba, Ph.D.,
Z. Pawłowski, J. Marzec, B. Konarzewski, G. Domański
01.01.2001 - 31.12.2003

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 (Genewa). The project deals with the design and optimisation of the straw chambers, which are the main component of the large area tracking system in the experiment, as well as, with the design of the read-out electronics for these detectors. Group from the Institute is also responsible for the performance of chambers and electronics in terms of the noise and electromagnetic interference pick up. The Institute is also involved in the applications of the „soft computing" methods (neural networks, genetic algorithms etc.) in the experimental data analysis.

[Pro38] **Perfusion Monitoring System for Controlling of Surgical, Interventional and Pharmacological Treatments** (System monitorowania perfuzji podczas zabiegów chirurgicznych interwencyjnych i farmakologicznych).
Piotr Bogorodzki, Ph.D.,
A.Piątkowski, E. Piątkowska-Janko
EUREKA project No. 2427
01.01.2001 - 31.12.2003

The goal of the project is to design a radiological imaging system capable of quantitatively monitoring organ flow/perfusion. This information is essential for the improvement of several surgical (including minimal invasive intervention procedures) and pharmacological treatment techniques so that they will be generally less costly and less traumatic to the patient, involving smaller incisions, less pain, and shorter hospital stays.

[Pro39] **Microwave Thawing Optimisation Software to Strengthen the Competitiveness of Food Industry and Software Companies** (Opracowanie oprogramowania do optymalizacji procesu mikrofalowego rozmrażania i grzania żywności pod kątem poprawy jakości i bezpieczeństwa mikrobiologicznego).
Wojciech Gwarek, Prof., D.Sc.,
W. Wojtasiak, R. Michnowski, D. Gryglewski, P. Kopyt
EUREKA project No. 2602
01.01.2001 - 01.01.2004

The overall objective of the project is to develop innovative, industrially evaluated software tools for real-time simulation and optimization of microwave thawing and heating of frozen convenience food and methods - based on this unique software - for finding the optimal design of such food products.

4.3 Other projects

[Pro40] **Specific Problems of UMTS Mobile Station Measurements- Analysis of Measurement Requirements and Capabilities** (Specyfika pomiarów stacji ruchomych systemu UMTS - analiza potrzeb i możliwości pomiarowych).
Jacek Cichocki, Ph.D.,
22.10.2001 - 08.12.2001
Fund by Office of Telecommunications Regulations (Urząd Regulacji Telekomunikacji).

The project covers analysis of standards for measurements of UMTS mobile station radio interface parameters as well as instruments for performing such measurements. The report contains results of analysis and review of market offer concerning measurement equipment.

[Pro41] **Application Study of TP S.A. for the Healthcare in Poland** (Studium możliwości wdrożenia specjalistycznych usług TP S.A. przewidywanych do świadczenia na rzecz służby zdrowia).
Marian Kazubek, Ph.D.,
T. Jamrógiewicz, E. Piątkowska-Janko, P. Bogorodzki, R. Szabatin, W. Smolik
19.07.2001 - 15.12.2001
Fund by Polish Telecommunications (TP S.A.).

The study identifies technical, legal and economical factors that must be taken into account in evaluating telemedicine services in Poland.

[Pro42] **The Comparative Testing of Service Measuring Apparatus for Grunding Poland Ltd.** (Badania porównawcze przyrządów serwisowych firmy Grunding Polska).
Bogdan Kwiatkowski, M.Sc.,
08.05.2001 - 26.06.2001
Fund by Grunding Poland Ltd.

The properities of signals generated for TV sets were examined in order to check their quality. The parameters of voltage and current meter were verified experimentally, as well.

[Pro43] **Recordings and Processing of Sound in ZEA Studio** (Przeprowadzenie nagrań oraz wykorzystanie urządzeń i aparatury do obróbki nagrań w studiu ZEA)
Zbigniew Kulka, Prof., D.Sc.,
P. Nykiel, R. Smoliński
10.07.2001
Fund by Central Examination Commission (Centralna Komisja Egzaminacyjna)

In Electroacoustics Division (ZEA) studio and anechoic chamber the sound materials in which very high level of speech intelligibility is necessary to record. In this year we recorded foreign language lectors (English, German, Spanish, Russian, French, Italian and Slovakian) using special tube microphones constructed in ZEA. These recordings were used during trial, new - formula examination for the secondary-school certificate in September 2001.

[Pro44] **Technical and Exploitation Requirements Including Economical Analysis of Modernization and Digitization of Mobile Railway Systems According to European Union Requirements** (Wykonanie założeń technicznych i eksploatacyjnych oraz analizy ekonomicznej modernizacji i cyfryzacji systemów radiołączności kolejowej przy spełnieniu wymagań Unii Europejskiej).
Józef Modelski, Prof., D.Sc.,
T. Kosiło, C. Woźniak
07.08.2001 - 30.10.2001
Fund by Railways Scientific and Technical Centre (Centrum Naukowo - Techniczne Kolejnictwa).

The main subject of the study is to define a configuration and costs of the GSM-R for Polish railway network. The analysis includes present and future (concerned with ETCS) railway operator needs. Only the basic structure of the net will be defined. Then the implementation cost of GSM-R network will be calculated, basing on these assumptions. The general cost balance in 10 - 20 year's scale will be calculated.

[Pro45] **Expertise of Protective Plate in Controlling - Steering Panel of Accelerator** (Ekspertyza płytki zabezpieczającej w panelu kontrolno-sterującym akceleratora).
Roman Szabatin, Ph.D.,
L. Padee
09.01.2001
Fund by Soltan Instutute for Nuclear Studies (Instytut Problemów Jądrowych, Świerk).

The aim of this project was to examine the parameters of protective plate in accelerator's controlling - steering panel in order to confirm the suitable conditions of its work.

[Pro46] **Modification of the Unique Research Stand for Process Tomography for Image Reconstruction and Analysis** (Modyfikacja unikatowego stanowiska badawczego do PT z komputerem PC do rekonstrukcji i analizy obrazów).
Roman Szabatin, Ph.D.,
T. Olszewski, W. Smolik
30.11.2001
Fund by Institute of Organic Industry (Instytut Przemysłu Organicznego)

The Process Tomography (PT) is based on measurement of the electrical parameters such as impedance or capacitance of the object (fluid, mixtures, loose mass, etc.). The main application of the PT is imaging of dynamic technological processes. The goal of the work is to modify the main electronics modules of the process tomograph.

[Pro47] **C Band T/R Modules Design and Perform** (Opracowanie i wykonanie modeli modułów nadawczo - odbiorczych na pasmo C).
Wojciech Wojtasiak, Ph.D.
D. Gryglewski, M. Lubiejewski, R. Michnowski
2.07.2001 - 30.11.2001
Fund by National Institute of Telecommunication (Państwowy Instytut Telekomunikacji)

The C band T/R module for active phased array radar was designed. The four low-cost and miniature T/R modules with internal supply block were manufactured. The parameters of the devices are as follows:

transmitter: output power at 1dB gain compression point: $P_{1dB} \geq 4W$, gain: $G \geq 30dB$

receiver: noise figure: $NF \leq 2.5dB$, gain: $G \geq 25dB$, isolation: $I \geq 40dB$,

maximum input power level: $P_{in} \leq 4W$.

The aim of this project is to use high-tech semiconductor technology for designing microwave active circuits such us oscillators, low noise amplifiers, high power amplifiers, etc. The utilisation of new components requires working out methods for designing microwave circuits. It is the main subject of this work.

4.3.a. International co-operation

[Pro48] **Modification to Power TV and Broadcast Software for WCS to Achieve Demo Quality**
Władysław Skarbek, Prof., D.Sc.,
A. Buchowicz, K. Ignasiak, R. Pączkowski, P. Bobiński, B. Staniszewski, T. Keller
12.11.2000 - 15.02.2001
Fund by Arris Interactive L.L.C, USA

Specific requirements for Western Cable Show required modifications in core procedures of Broadcom and Power TV software. The project concentrated on adding new functionalities in font management and network data management.

[Pro49] **Video Module Research Project** (Moduł wideo w domowej platformie multimedialnej).
Andrzej Buchowicz, Ph.D.,
W. Skarbek, A. Buchowicz, T. Keller, R. Pączkowski, D. Siemek, P. Daniluk, P. Bugajski, M. Mazurek
22.08.2000 - 10.06.2001
Fund by Arris Interactive L.L.C, USA

The project is defining next generation telecommunication access systems that will be capable of delivering converged (video, data and voice) and interactive services to residences. It aims at development and demonstration of samples of converged services over a proof-of-concept, state-of-the art device that resides on the side of the house or inside customer premises.

[Pro50] **Design of Unique Microwave Device with Microprocessor Control** (Opracowanie unikalnego urządzenia mikrofalowego ze sterowaniem mikroprocesorowym).
Wojciech Gwarek, Prof., D.Sc.,
W. Wojtasiak, D. Gryglewski, W. Winiecki, R. Leoniak, M. Lubiejewski
17.10.2000 - 30.01.2001
Personal Chemistry A.B, Uppsala, Sweden

5. TITLES AND DEGREES AWARDED

5.1. Professor Titles

[Prof1] Stanisław Rosłoniec - promoted to a tenured professor (2 Jan. 2001).

[Prof2] Roman Z. Morawski - promoted to a tenured professor (8 Jun. 2001).

5.2. Ph.D. Degrees

[PhD1] Grzegorz Domański: *"Optymalizacja skaningowych radiograficznych metod badania gęstości tkanek kostnych"* (Optimization of the bone density scanning system methods), Prof. **Z. Pawłowski** (tutor), Warsaw, 19 Jun. 2001.

[PhD2] Daniel Gryglewski: *"Minimalizacja zmian transmitancji mikrofalowych impulsowanych wzmacniaczy mocy klasy A"* (The minimization of microwave transmittances changes for microwave impulse high power A class amplifiers), Prof. **T. Morawski** (tutor), Warsaw, 8 Jun. 2001.

[PhD3] Marek Kukier: *"Wielowrotowe przełączane układy do pomiaru macierzy rozproszenia"* (Switched multiport circuits for measuring of scattering matrix), Prof. **T. Morawski** (tutor), Warsaw, 6 Nov. 2001.

[PhD4] Ewa Piątkowska-Janko: *"Wielowymiarowa analiza dyskryminacyjna w zastosowaniu do badania w dziedzinie czasu niestabilności elektrycznej serca"* (Multidimensional analysis of variance and discrimination for evaluation of electrical instability of the heart), Prof. **Z. Pawłowski** (tutor), Warsaw, 12 Jun. 2001.

[PhD5] Grzegorz Siemek: *"Kodowanie obrazów wideo z niskim kosztem bitowym"* (The low bit rate video coding), Prof. **J. Modelski** (tutor), Warsaw, 25 Jun. 2001.

5.3. M.Sc. Degrees

[MSc1] Bogumiła Bartecka: *„Wirtualny oscyloskop z wykorzystaniem karty pomiarowej Lab-PC-1200 i środowiska LabWindows/CVI"* (Virtual oscilloscope base on Lab-PC-1200 DAQ card and LabWindows/CVI), Assist. Prof. **W. Winiecki** (tutor), (5).

[MSc2] Robert Bielawski: *„Korektor brzmienia dźwięku zrealizowany przy pomocy cyfrowych filtrów adaptacyjnych"* (Sound equalizer based on digital adaptive filters), Assist. Prof. **M. Tajchert** (tutor), (5).

[MSc3] Piotr Bilski: *„Projekt wirtualnego analizatora widma przy użyciu zintegrowanego środowiska programowego"* (Project of virtual spectrum analyzer using integrated programming environment), Assist. Prof. **W. Winiecki** (tutor), (5, honours).

[MSc4] Tomasz Błażejczyk: *"System telemedyczyny dla mammografii"* (Telemedical system for mammography), Assist. Prof. **A. Przelaskowski** (tutor), (4).

[MSc5] Michał Borowski: *„Komputerowe stanowisko do wyznaczania krzywych jednakowego poziomu głośności"* (System for equal loudness level contours measurements and determination based on PC computer), Assist. Prof. **A. Leszczyński** (tutor), (5).

[MSc6] Piotr Buczma: *"Projekt kolimatora do napromieniowania nowotworów gałki ocznej"* (Project of retinoblastoma treatment colimator), Assist. Prof. **W. Scharf** (tutor), (5).

[MSc7] Robert Czyż: *"Opracowanie programu do pomiaru jittera przetworników C/A metodą analizy widmowej"* (Elaboration of the jitter measurement program of D/A converters using spectrum analysis method), Prof. **Z. Kulka** (tutor), (4.5).

[MSc8] Marek Czyżewski: *"Przetwarzanie sygnałów w interfejsie WCDMA systemu UMTS"* (Signal processing in WCDMA interface of UMTS system), Prof. **J. Wojciechowski** (tutor), (5).

[MSc9] Małgorzata Dębowska: *„System ekspercki dla potrzeb diagnostyki niestabilności elektrycznej serca"* (Expert system for electrical heart instability diagnostics), Prof. **A. Piątkowski** (tutor), (5).

[MSc10] Adam Dwulit: *„Program kliniczny do analizy przepływu krwi w mózgu w badaniach SPECT"* (Clinical application for support SPECT analysis of brain blood flow), Assist. Prof. **P. Brzeski** (tutor), (4).

[MSc11] Jerzy Dyrda: *"Miernik prędkości przepływu"* (Pulse wave Doppler ultrasonic flowmeter), Assist. Prof. **P. Bogorodzki** (tutor), (5).

[MSc12] Aureliusz Głażewski: *„System odbioru sygnałów elektrookulograficznych. Realizacja i analiza możliwości"* (System for receiving the electrooculography signals. Realisation and analysis of possibilities), Assist. Prof. **J. Marzec** (tutor), (5).

[MSc13] Arkadiusz Godlewski: *"Miernik wysokiego napięcia lampy rentgenowskiej"* (The meter for X-tube high voltage measurement), Assist. Prof. **K. Zaremba** (tutor), (4.5).

[MSc14] Robert Gosik: *„Problemy zachowania wysokiej jakości odwzorowań w badaniach planarnych, Whole Body i SPECT na przykładzie gammakamery Omega 500"*

(Problems of preserving high quality images in planar examinations, whole body and SPECT exemplified by Omega 500 gammacamera), Assist. Prof. **R. Szabatin** (tutor), (5).

[MSc15] Eryk Goś: *"Cyfrowy odbiornik do tomografu rezonansu magnetycznego - część sprzętowa"* (Free induction decay signal receiver - hardware), Prof. **A. Piątkowski** / Assist. Prof. **P. Bogorodzki** (tutor), (5).

[MSc16] Paweł Granicki: *"Badanie możliwości wykorzystania turbokodów w systemach radiokomunikacyjnych w oparciu o pakiet SPW"* (SPW performance analysis of turbocodes on radiocommunication system), Prof. **J. Wojciechowski** (tutor), (5).

[MSc17] Dominik Janus: *"Pomiary sprzętu audio hi-fi z wynikami w formie internetowej bazy danych"* (Measurements of hi-fi audio equipment with the results in Internet database), Prof. **Z. Kulka** (tutor), (5).

[MSc18] Konrad Jastrząb: *"Cyfrowy odbiornik do tomografu rezonansu magnetycznego - oprogramowanie"* (Free induction decay signal receiver - software), Assist. Prof. **P. Bogorodzki** (tutor), (5).

[MSc19] Sylwester Jaworski: *„System akwizycji i przetwarzania sygnałów pomiarowych"* (Acquisition and processing measurement signals system), Assist. Prof. **K. Adamowicz** (tutor), (5).

[MSc20] Cezary Jóźwicki: *Wykorzystanie filtracji cyfrowej do oceny sąsiedniokanałowych nadajników radiokomunikacyjnych FM"* (The employment of digital filtering in FM radio transmitters adjacent channel power measurement), Assist. Prof. **J. Cichocki** (tutor), (5).

[MSc21] Andrzej Kamiński: *"Modułowy system monitorowania wykorzystujący magistralę USB. Moduł nieinwazyjnego pomiaru ciśnienia"* (Modular monitoring system using USB interface. Non-invasive blood pressure meter module), Assist. **T. Jamrógiewicz** (tutor), (4.5).

[MSc22] Piotr Kania: *„Zastosowanie transformaty falkowej do kompresji danych na pokładzie satelity"* (Research on discreet wavelet transform for data compression in satellite systems), Assist. Prof. **K. Derzakowski** (tutor), (4.5).

[MSc23] Roman Kasprzewski: *„Cyfrowy filtr medianowy"* (The digital median filter), Assist. **T. Smakuszewski** / Prof. **J. Modelski** (tutors), (5).

[MSc24] Tomasz Kawalec: *"System do wspomagania diagnostyki raka sutka"* (Simple digital preprocessing system for the digitized mammography picture analysis), Assist. Prof. **A. Przelaskowski** (tutor), (5).

[MSc25] Marcin Kierwiński / Paweł Bargieł: *"Uniwersalny sprzęg sieciowy dla potrzeb telemedycyny"* (Universal network connection for use in telemedicine), Prof. **A. Piątkowski** (tutor), (5).

[MSc26] Marcin Kizior: *„Badania urządzeń głośnikowych studia ZEA z wykorzystaniem techniki MLS"* (Investigations of ZEA studio loudspeakers by means of MLS technique), Assist. Prof. **A. Leszczyński** (tutor), (4.5).

[MSc27] Piotr Kolczyński: *"Sieci neuronowe w zastosowaniu do klasyfikacji chorych z nadciśnieniem tętniczym na podstawie analizy załamka T w EKG wysokiej rozdzielczości"* (Neural networks for classification of patients with hypertension based on T-wave parameters in high resolution ECG), Prof. **A. Piątkowski** (tutor), (5).

[MSc28] Paweł Kopyt: *"Optymalizacja układu grzania mikrofalowego pod względem jednorodności rozkładu mocy"* (Optimisation of microwave heating device for improved uniformity of power distributions), (5), Prof. **W. Gwarek** (tutor), (5).

[MSc29] Daniel Kotow*: "Zestaw nadawczo-odbiorczy z modulacją FSK do studenckiego laboratorium radiokomunikacji"* (FSK transceiver set for students' laboratory of radiocommunications), Assist. Prof. **K. Radecki** (tutor), (5).

[MSc30] Marek Kozicki: *"Sterowanie robota poprzez łącze podczerwieni (projekt i realizacja)"* (Design and realisation of a robot controlled via IR link), Prof. **Z. Kulka** (tutor), (4.5).

[MSc31] Dawid Koziński: *"Obrazowanie przepływów w badaniach dynamicznych CT, z zastosowaniem algorytmów optymalizacji nieliniowej"* (Imaging of flows in dynamic CT studies applied to algorithms of nonlinear optimisation), Assist. Prof. **A. Przelaskowski** (tutor), (5).

[MSc32] Robert Król: *„Symulacja i analiza tłumienia ech stałych typu MTD"* (Analysis and simulation of circuit of clutter canceler MTD type), Assist. Prof. **K. Derzakowski** (tutor), (5).

[MSc33] Mariusz Kukuryka: *„Badanie interfejsu U_m oraz cel stosowania TMA"* (Tests of the U_m interface and goal of applying the TMA), Assist. Prof. **J. Jarkowski** (tutor), (4).

[MSc34] Rafał Kurman: *„Pomiary stacji ruchomych systemu IS – 95"* (IS – 95 mobile station measurements), Assist. Prof. **J. Cichocki** (tutor), (5).

[MSc35] Mariusz Lechociński: *"Aplikacja służąca do badania składu pierwiastkowego próbek biologicznych na podstawie widm spektrometrycznych uzyskiwanych w rentgenowskiej analizie fluorescencyjnej z dyspersją energii"* (Application for chemical composition estimation of biological specimens, based on Energy Dispersive X-ray Fluorescence Analysis), Assist. Prof. **K. Zaremba** (tutor), (5).

[MSc36] Paweł Lubryczyński: *„Wielowejściowa rezonansowa przetwornica napięcia stałego"* (A multiple - output resonant dc/dc converter), Assist. Prof. **M. Mikołajewski** (tutor), (5).

[MSc37] Paweł Ładocha: *"Symulator systemu IEC - 625.1"* (Simulator for IEC - 625.1), Assist. Prof. **W. Winiecki** (tutor), (5).

[MSc38] Daniel Maciejewski: *„Porównanie i weryfikacja wybranych modeli obszarowych predykcji natężenia pola w terenie miejskim wykorzystywanych przy projektowaniu systemów radiokomunikacji ruchomej lądowej"* (Comparison and verification of selected models of electromagnetic field prediction in urban environment used in radio planning process with moving objects), Assist. Prof. **J. Jarkowski** (tutor), (5).

[MSc39] Radosław Majkowski: *„Automatyzacja wielosygnałowych pomiarów stacji ruchomych GSM"* (Automation of multisignal measurements of mobile GSM stations), Assist. Prof. **J. Cichocki** (tutor), (5).

[MSc40] Krzysztof Malik: *"Uśrednione słuchowe potencjały wywołane"* (Auditory evoke potentials), Assist. Prof. **J. Marzec** (tutor), (5).

[MSc41] Anna Mierzejewska: *„Detekcja załamka T dla oceny procesu repolaryzacji serca"* (The detection of the T - wave for heart repolarization process estimation), Prof. **A. Piątkowski** (5).

[MSc42] Maciej Mikułowski: *"Model wirtualnego tomografu pojemnościowego"* (Model of virtual capacity tomograph), Assist. Prof. **R. Szabatin** (tutor), (4.5).

[MSc43] Jacek Nowak / Sławomir Stanik: *„Metodyka projektowania komputerowych systemów pomiarowych z wykorzystaniem graficznych zintegrowanych środowisk programowych"* (The methodology of design the computer measuring systems with use of graphic integrated environments programmes), Assist. Prof. **W. Winiecki** (tutor), (5).

[MSc44] Grzegorz Oksiutycz: *„Kwantowa wydajność detekcji półprzewodnikowych sensorów obrazów radiograficznych"* (Detective quantum efficiencies of semiconductor sensors of digital radiology images), Prof.**Z. Pawłowski** (tutor), (5).

[MSc45] Marek Ostrowski: *"Reprezentacja obiektów multimedialnych w standardzie MPEG-7"* (Representation of multimedia objects in MPEG-7), Prof. **W. Skarbek** (tutor), (5).

[MSc46] Maciej Olszewski: *"Moduł akwizycji i prezentacji obrazu z wielu kamer"* (Module for aquisition and presentation of picture from few cameras), Assist. Prof. **M. Kazubek** (tutor), (4.5).

[MSc47] Rajmund Pączkowski: *"Domowa platforma multimedialna - wybrane technologie i zastosowania"* (Home multimedia platform - selected technologies and applications), Prof. **W. Skarbek** (tutor), (5).

[MSc48] Krzysztof Piekart: *„Turbokody - kody korekcyjne XXI wieku"* (Turbocodes - corrective codes in XXI century), Assist. Prof. **J. Jarkowski** (tutor), (5).

[MSc49] Marcin Piórek: *„Doskonale dopasowany port dla symulacji elektromagnetycznych 3D FD TD"* (Perfectly matched layer for 3D FD TD electromagnetic simulations), Prof. **W. Gwarek** (tutor), (5).

[MSc50] Jarosław Rupiewicz: *"Zastosowanie algorytmów genetycznych w rekonstrukcji obrazów z projekcji metodą największej wiarogodności w tomografii emisyjnej"* (Application of genetic algorithms for image reconstruction from projections using maximum likelihood method in emission tomography), Assist. Prof. **W. Smolik** (tutor), (5).

[MSc51] Przemysław Ryczak: *"Komunikacja sieciowa między medycznymi urządzeniami obrazującymi a obrazową bazą danych na podstawie standardu DICOM"* (Network communication between medical imaging devices and imaging database based on DICOM standard), Assist. Prof. **W. Smolik** (tutor), (4.5).

[MSc52] Robert Samotyjek: *„Generowanie syntezy podpowiedzi dźwiękowych (synteza mowy) dla użytkowników aplikacji systemu Microsoft Windows"* (Generating voice aids for Microsoft Windows users), Assist. Prof. **T. Buczkowski** (tutor), (4.5).

[MSc53] Rafał Sancewicz: *"Pomiar dobroci cewek indukcyjnych na rdzeniach ferrytowych w warunkach wielosygnałowych"* (Measurements of the Q-factor of inductors with ferrite cores in high-level operation), Assist. Prof. **J. Modzelewski** (tutor), (5).

[MSc54] Bogusław Staniszewski: *"Analiza usług multimedialnych w TV cyfrowej"* (Analysis of multimedia services in digital television), Prof. **W. Skarbek** (tutor), (5).

[MSc55] Krzysztof Stasiak: *„Regulacja napięcia wyjściowego w rezonansowym wzma-*

cniaczu mocy klasy D_uZVS metodą modulacji częstotliwości" (Output - voltage control by frequency modulation in class D_u ZVS tuned power amplifier), Assist. Prof. **J. Modzelewski** (tutor), (5).

[MSc56] Piotr Stomma: *„Zagnieżdżony koder obrazów medycznych wykorzystujący transformatę falkową"* (Embedded medical image coder using wavelet transform), Assist. Prof. **A. Przelaskowski** (tutor), (5).

[MSc57] Jakub Strycharz: *"Zastosowanie metody różnic skończonych w dziedzinie czasu do analizy anten o symetrii osiowej"* (Applicaton of the finite-difference time-domain method to the analysis of axisymmetrical antennae), Assist. Prof. **M. Celuch-Marcysiak** (tutor), (5).

[MSc58] Robert Sulej: *"Selekcja przypadków fuzji fotonowo gluonowej w eksperymencie COMPASS z wykorzystaniem technik sieci neuronowych"* (Selection of photon gluon fusion events in COMPASS experiment with neural network techniques), Assist. Prof. **K. Zaremba** (tutor), (5).

[MSc59] Renata Szczęśniak: *„Komputerowe metody analizy ukrwienia wątroby na podstawie badań scyntygraficznych"* (Computer method for analysis of liver blood flow based on scintigraphic studies), Assist. Prof. **P. Brzeski** (tutor), (4.5).

[MSc60] Robert Szelenbaum: *„Generator koherentnych impulsów wielkiej częstotliwości z wewnętrzną dwustanową modulacją fazy"* (High-frequency coherent impulse generator with interior two-state phase modulation), Prof. **S. Rosłoniec** (tutor), (5).

[MSc61] Leszek Szewczyk: *„Generator sygnałów medycznych zaprojektowany dla przebiegu EKG"* (Generator of medical signals designed for ECG wave), Assist. **T. Jamrógiewicz** (tutor), (5).

[MSc62] Rafał Szewczyk: *"System pozycjonowania głowicy ultrasonograficznej"* (Spacial localization system of ultrasound probe), Assist. Prof. **M. Kazubek** (tutor), (4).

[MSc63] Dariusz Tabor: *"Cyfrowa zwrotnica głośnikowa na procesorze SHARC"* (Digital crossover network), Prof. **Z. Kulka** (tutor), (5).

[MSc64] Igor Tański: *„Badania systemu czteromikrofalowego o zmiennej charakterystyce kierunkowej"* (Examinations of the four-channel microphones system of variable characteristics of directivity), Assist. Prof. **A. Leszczyński** (tutor), (5).

[MSc65] Michał Trzmiel: *"Propozycja i ocena algorytmu stratnej kompresji dźwięku"* (Proposal and evaluation of lossy audio compression algorithm), Prof. **Z. Kulka** (tutor), (4.5).

[MSc66] Grzegorz Woźniak: *„Detekcja zmian nowotworowych w badaniach mammograficznych przy pomocy analizy czas – częstotliwość"* (Detection of masses in digitized mammograms using time frequency analysis), Assist. Prof. **A. Przelaskowski** (tutor), (4.5).

[MSc67] Waldemar Wróblewski: *„Laboratoryjny system do pomiarów akustycznych zintegrowany w sieci komputerowej"* (Laboratory measurement system dedicated for acoustical test based on local computer network), Assist. Prof. **A. Leszczyński** (tutor), (5).

[MSc68] Jacek Zadrożny: *"Wykorzystanie przełączanego układu wielowrotowego do pomiaru transmitancji mikrofalowych dwuwrotników"* (Switch multiport system measurement for transmittance of microwave two-port systems), Assist. Prof. **J. Zborowska** (tutor), (4.5).

[MSc69] Robert Zawadzki: *„Koncepcja i realizacja miernika / reduktora jittera w interfejsie S/PDIF audio"* (Concept and realization of a measurer / reducer of jitter in S/PDIF audio interface), Prof. **Z. Kulka** (tutor), (5).

[MSc70] Michał Zieliński: *„Mikroprocesorowy system sterowania trójfazowymi silnikami prądu przemiennego z wykorzystaniem przestrzennej modulacji wektorowej SVM"* (Microcontroller - based control system for three - phases induction motors using space vector modulation), Assist. Prof. **T. Kosiło** (tutor), (5).

[MSc71] Michał Zygowski: *"Symulacja Monte Carlo propagacji światła w luminescencyjnych sensorach obrazów radiograficznych"* (Monte Carlo simulation of light transport in luminescent sensors of radiographic images), Prof. **Z. Pawłowski** (tutor), (5).

5.4. B.Sc. Degrees

[BSc1] Michał Andruszkiewicz: *"Budowa i zastosowanie głośników o modach rozłożonych - NXT"* (Technology and application of NXT distributed - mode loudspeakers), Assist. Prof. **J. Narkiewicz-Jodko** (tutor), (4.5).

[BSc2] Agata Arciszewska – Gliwińska: *"Aplet do nauki języka XML"* (Applet for learning XML language), Assist. Prof. **A. Krupiczka** (tutor), (5).

[BSc3] Konrad Bałabuch: *„Opracowanie algorytmów detekcji ramek kluczowych w sekwencji obrazów"* (A survey of key - frame detection algorithms), Assist. Prof. **A. Krupiczka** (tutor), (5).

[BSc4] Dariusz Bis: *"Program do obsługi wielokanałowego analizatora amplitudy"* (Software to service multichannel analyzer of amplitude), Assist. Prof. **B. Konarzewski** (tutor), (5).

[BSc5] Mirosław Brus: *"Sprzęg USB aparatury wykorzystywanej do wyzwalania tomografu rezonansu magnetycznego sygnałem spirometrycznym"* (USB interface for triggering the magnetic resonance tomograph with spirometer signal), Assist. Prof. **P. Bogorodzki** (tutor), (5).

[BSc6] Piotr Cymerman: *"Projekt i wykonanie pasywnej, trójdrożnej zwrotnicy głośnikowej"* (Design and construction of passive, three-ways crossover), Prof. **Z. Kulka** (tutor), (5).

[BSc7] Paweł Czarnociński: *„Badanie zrozumiałości mowy z ochronnikami słuchu z regulowanym tłumieniem"* (Speech recognition with wearing amplitude sensitive ear muffs), Assist. Prof. **E. Kotarbińska** (tutor), (5).

[BSc8] Maciej Dąbrowski: *"Oprogramowanie minispektrofotometru SpectraMatch GT - moduł wzorcowania i odtwarzania"* (Software for SpectraMatch minispectrophotometer - module of standarization and reconstruction), Assist. Prof. **A. Miękina** (tutor), (5).

[BSc9] Robert Dudzik: *"Nadajnik z modulacją OOK na pasmo 433,92 MHz o małym poborze mocy"* (Low power transmitter with OOK modulation for 433.92 MHz band), Assist. Prof. **W. Kazubski** (tutor), (5).

[BSc10] Marlena Dylewska - Górzyńska: *"Pomiar przepływu krwi w lewej komorze serca metodą scyntygraficzną"* (Blood flow measurement in heart left chamber using gamma-camera), Asist. Prof. **P. Brzeski** (tutor), (5).

[BSc11] Bartłomiej Filipski: *"Krótkie łącze radiowe w paśmie ISM"* (Short-range wireless link in ISM band), Asist. Prof. **T. Kosiło** (tutor), (4).

[BSc12] Sławomir Gajowniczek: *"Pomiary akustycznych impulsów przewodzących z wzorcowego źródła dźwięku"* (Measurement of acoustic impulse generated from membrane sound source), Assist. Prof. **E. Kotarbińska** (tutor), (4.5).

[BSc13] Leszek Giza: *"Baza danych obrazów z klipów medycznych z użyciem technologii Microsoft"* (Image and video medical database with usage of Microsoft technology), Assist. Prof. **M. Kazubek** (tutor), (5).

[BSc14] Łukasz Kluczyński: *"Skomputeryzowane stanowisko do pomiaru paramerów głośników z wykorzystaniem systemu Audio Precision i techniki bramkującej"* (Computer system for loudspeakers measurements by the use of Audio Precision and gating technique), Assist. Prof. **A. Leszczyński** (tutor), (5).

[BSc15] Dorota Kochanowska: *"Projekt osłony do akceleratora radioterapeutycznego CLINAC 600C"* (A project of radiological shield for medical accelerator CLINAC 600C), Assist. Prof. **W. Scharf** (tutor), (4.5).

[BSc16] Krzysztof Kolbrecki: *"Interfejs USB – RS485"* (USB - RS 485 interface), Assist. **T. Jamrógiewicz** (tutor), (4.5).

[BSc17] Piotr Kołtun: *"Demodulator FSK"* (FSK demodulator), Assist. Prof. **W. Kazubski** (tutor), (4).

[BSc18] Krzysztof Kowalczyk: *"Wykorzystanie odbiornika GPS do synchronizacji lokalnej skali czasu"* (Using GPS receiver for synchronization of local time scale), Assist. Prof. **K. Czerwiński** (tutor), (4.5).

[BSc19] Michał Kowalik: *"Program transmisji danych z tomografu Siemens Somatom DR do komputera klasy PC"* (A programme for data transmission from Siemens Somatom DR CT to PC class computer), Assist. Prof. **W. Smolik** (tutor), (4).

[BSc20] Adam Kozłowski: *„Cyfrowy częstościomierz – czasomierz z interfejsem IEC – 625"* (Digital frequency and time meter with IEC-625 interface), Assist. Prof. **K. Adamowicz** (tutor), (5).

[BSc21] Mariusz Krasuski: *„Badanie audiometrów tonowych – metodyka i pomiary"* (Tone audiometers testing - methodology and measurements), Assist. Prof. **A. Leszczyński** (tutor), (4).

[BSc22] Marcin Królikowski: *"Fantom do badań sono-mammograficznych"* (Phantom for ultrasonography and mammography), Assist. **T. Jamrógiewicz** (tutor), (4.5).

[BSc23] Adam Laskowski: *"Interfejs USB do wzmacniacza sygnałów biologicznych BA - 8"* (USB interface to biological signals BA - 8 amplifier), Assist. **T. Jamrógiewicz** (tutor), (4).

[BSc24] Grzegorz Lenarcik: *„Opracowanie algorytmu dekodowania dźwięku wielokanałowego w systemie Dolby Digital"* (Design of algorithm for multichannel sound decoding in Dolby Digital system), Prof. **Z. Kulka** (tutor), (5).

[BSc25] Robert Machel: *„Wirtualny woltomierz cyfrowy w oparciu o kartę akwizycji danych Lab PC 1200 firmy National Instruments z wykorzystaniem zintegrowanego środowiska pomiarowego"* (Virtual digital voltometer with National Instruments data acquisition board Lab PC 1200 and

development system for building virtual instruments LabWindows/CVI), Assist. Prof. **W. Winiecki** (tutor), (4.5).

[BSc26] Piotr Maciejewski: *"Elektroniczny stetoskop z interfejsem USB"* (Electronic stetoscope with USB interface), Assist. **T. Jamrógiewicz** (tutor), (5).

[BSc27] Marcin Mądry: *"Projekt i wykonanie subwoofera aktywnego do zastosowań w zestawach kina domowego"* (Designing and constructing active subwoofer as an application for home theatre set), Assist. Prof. **J. Narkiewicz-Jodko** (tutor), (5).

[BSc28] Joanna Michalska: *"Wyznaczanie charakterystyk promieniowania anten rezonatorowych z okien o określonym rozkładzie współczynnika przezroczystości"* (Tracing of radiation field patterns of resonator antennas from windows of a given transparency factor), Assist. Prof. **J. Jarkowski** (tutor), (5).

[BSc29] Rafał Miklaszewski: *"Radiowe łącze transmisji danych na bazie układów firmy Gran-Jansen"* (Radio link for data transmission based on Gran-Jansen's tranceiver), Assist. Prof. **T. Kosiło** (tutor), (5).

[BSc30] Marcin Molenda: *"Realizacja projekcji typu rentgenowskiego za pomocą skanera USG"* (Realisation of Roentgen type projection by means of USG scanner), Assist. **T. Jamrógiewicz** (tutor), (4.5).

[BSc31] Elżbieta Najmuł: *"Projekt osłony radiologicznej bomby kobaltowej Co - 60 dla Laboratorium Wtórnych Wzorców Dozymetrycznych Zakładu Fizyki Medycznej znajdującym się w Centrum Onkologii - Instytucie im. Marii Skłodowskiej - Curie"* (A project of radiological screen for cobalt bomb Co-60 for secondary standard dosimetry laboratory in the Maria Skłodowska - Curie Memorial Cancer Center and Institute of Oncology), Assist. Prof. **W. Scharf** (tutor), (4.5).

[BSc32] Jacek Olszewski: *„Badania aparatów słuchowych wykorzystujących do transmisji dźwięku system FM"* (The investigation of the hearing aids, with FM transmission system), Assist. Prof. **A. Leszczyński** (tutor), (5).

[BSc33] Michał Otroszczenko: *"System medycyny nuklearnej"* (Nuclear medicine system), Assist. Prof. **Szabatin** (tutor), (4.5).

[BSc34] Artur Paziewski: *"Program wymiany danych klient-serwer w HTML i XML"* (Client-server data exchange programme in HTML and XML), Assist. Prof. **M. Kazubek** (tutor), (4).

[BSc35] Marcin Pilarski: *"Generator sygnału EKG oparty o interfejs szeregowy USB"* (ECG signal generator on USB interface), Assist. Prof. **P. Bogorodzki** (tutor), (4.5).

[BSc36] Michał Piórkowski: *"Projekt rozproszonego systemu zbierania danych z przetwarzaniem z wykorzystaniem karty akwizycji danych"* (Designing of remote acquisition system using plug-in acquisition card and graphical integrated programme environment), Assist. Prof. **W. Winiecki** (tutor), (5).

[BSc37] Krzysztof Płatek: "Multiservise traffic analysis in mobile broadband system", Assist. Prof. **T. Kosiło** (tutor), (5), (thesis has been published in English).

[BSc38] Paweł Prekurat: *„Statyczna reprezentacja sekwencji obrazów"* (Static representation of video sequences), Assist. Prof. **A. Krupiczka** (tutor), (5).

[BSc39] Mikołaj Radziewicz: *"Transmisja obrazów USG za pomocą technologii Windows Media"* (The transmission of USG images using visual Windows Media technology), Assist. Prof. **M. Kazubek** (tutor), (5).

[BSc40] Marcin Remboch: *"Badanie i symulacja drgań promieniujących do domków jednorodzinnych"* (Research and simulation of vibrations penetrate to the small houses), Assist. Prof.**J. Narkiewicz-Jodko** (tutor), (4.5).

[BSc41] Wojciech Rosłoniec: *„System antenowy cichego radaru nawigacyjnego na pasmo L"* (Antenna system for a quiet navigation radar operating at L band), Prof. **S. Rosłoniec** (tutor), (5).

[BSc42] Marcin Rzepka: *"Karta PCI do laboratorium studenckiego"* (PCI card for students' laboratory), Assist. Prof. **P. Bogorodzki** (tutor), (4.5).

[BSc43] Piotr Sawicki: *"Oprogramowanie do prezentacji obrazów scyntygraficznych"* (Software for scintigraphic images presentation), Assist. Prof. **W. Smolik** (tutor), (4).

[BSc44] Konrad Stefański: *"Badanie i analiza propagacji fal radiowych za pomocą oprogramowania komputerowego"* (The radiowaves propagation analysis and research with computer software), Assist. Prof. **Y. Yashchyshyn** (tutor), (5).

[BSc45] Artur Stułka: *"Oprogramowanie wspomagające pomiary wybranych charakterystyk radiotelefonii UKF - FM"* (Software for measurements of parameters of UKF-FM radiotelephone), Assist. Prof. **J. Cichocki** (tutor), (5).

[BSc46] Tomasz Szcześniak: *"Czterokanałowy moduł akwizycji sygnałów wizyjnych"* (Four-channel video signal acquisition module), Assist. Prof. **K. Adamowicz** (tutor), (4).

[BSc47] Rafał Szumny: *„Realizacja wybranych algorytmów przetwarzania obrazów z wykorzystaniem pakietu Java Advanced Imaging”* (Realization of selected image processing algorithms using Java Advanced Imaging package), Assist. Prof. **A. Buchowicz** (tutor), (5).

[BSc48] Paweł Świeboda: *"Opracowanie elementów radiowego systemu do odczytu liczników energii elektrycznej. Terminal"* (Making components for radio system to read out electric meter. Terminal), Assist. Prof. **K. Czerwiński** (tutor), (5).

[BSc49] Dominik Trepka: *"Projekt dwupasmowej anteny Uda-Yagi na pasma GSM 900/1800 MHz"* (The GSM dual-band Uda-Yagi antenna project), Assist. Prof. **Y. Yashchyshyn** (tutor), (5).

[BSc50] Piotr Uściński: *“Uniwersalny moduł kontrolno – pomiarowy z interfejsem USB”* (Universal device for measurement and control with USB interface), Assist. **T. Jamrógiewicz** (tutor), (4.5).

[BSc51] Artur Walecki: *"Biblioteka procedur do symulacji metodą Monte Carlo oddziaływania promieniowania X i gamma z materią"* (A Monte Carlo library for interactions of X and gamma rays with matter), Assist. Prof. **B. Konarzewski** (tutor), (5).

[BSc52] Renata Wojtaszek: *“Projekt osłony do akceleratora radioterapeutycznego CLINAC 600C z materiału LEDITE”* (A project of radiological shield for medical accelerator CLINAC 600C with LEDITE material), Assist. Prof. **W. Scharf** (tutor), (4.5).

[BSc53] Krzysztof Wójtowicz: *„Wykorzystanie krótkiego łącza radiowego do zdalnego odczytu liczników energii elektrycznej”* (Remote reading of electric energy counters with short range radio link devices), Assist. Prof. **K. Czerwiński** (tutor), (4).

[BSc54] Piotr Zdanowski: *"Opracowanie elementów systemu do zdalnego odczytu liczników energii elektrycznej drogą radiową - moduł licznika"* (Electric energy meter for radio link remote reading system), Assist. Prof. **K. Czerwiński** (tutor), (4).

[BSc55] Patryk Zradziński: *“Symulacja metodą Monte Carlo rozkładu promieniowania rentgenowskiego w tkankach miękkich”* (Monte Carlo simulation of spatial distribution of absorbed doses of X-ray radiation in tissue), Prof. **Z. Pawłowski** (tutor), (4).

[BSc56] Grzegorz Żebrowski: *“Wykorzystanie metody aktywnych konturów do przetwarzania obrazów w regionach zainteresowania”* (Exploitation of active contour model in image transformation in ROI), Assist. Prof. **M. Kazubek** (tutor), (5).

5.4.a. Engineering Evening Studies on Radiocommunications - B.Sc. Degrees

[BSc57] Waldemar Adamowicz: *“Konwerter kodu DTMF na kod CCIR przeznaczony do łączności RRL”* (Converter of DTMF code to CCIR code intended to Radio Mobiles Units), Assist. Prof. **K. Czerwiński** (tutor), (5).

[BSc58] Mirosław Bajorek: *“Projekt systemu radiowego dostępu abonenckiego z wykorzystaniem urządzeń firmy ALCATEL”* (Radio system of the user's access project with the use of the Alcatel firm devices), Assist. Prof. **K. Radecki** (tutor), (4).

[BSc59] Antoni Biernacki: *“Aspekty automatyzacji pomiarów transmisji wizji nadajnika telewizyjnego systemu PAL D/K"* (The aspects of automation video quality measurements for TV transmitter of PAL D /K system), Assist. Prof. **K. Radecki** (tutor), (5).

[BSc60] Marek Bobowski / Zbigniew Kołodziej: *“Wymagania techniczne na system pomiarowo – kontrolny emisji radiowych w zakresie od 100 kHz do 3 GHz”* (Technical requirements of the measuring and supervising of the broadcast control system in the range of 100 kHz to 3 GHz), Assist. Prof. **J. Jarkowski** (tutor), (5).

[BSc61] Zbigniew Bocianiak: *"Nowoczesne rozwiązanie systemu telekomunikacyjnego w oparciu o światłowodowy system dostępowy"* (The modernisation of a telecommunication system on the basis of introducting an optical fibre access system), Assist. Prof. **R. Nowak** (tutor), (5).

[BSc62] Wojciech Czeżyk: *"Opis systemu DGPS. Programowy modulator poprawek różnicowych"* (Reference of DGPS system. The programme simulator of differential corrections), Assist. Prof. **T. Buczkowski** (tutor), (4).

[BSc63] Marcin Dalkowski / Marek Włodarczyk: *"Projekt optokomunikacyjnej linii kablowej relacji miejscowość A - miejscowość B"* (Project of optotelecommunication cable line for the particular numbering area), Prof. **K. Holejko** (tutor), (3).

[BSc64] Anna Delowska / Krzysztof Figaszewski: *"Badanie pokrycia sygnałami telewizji publicznej terenu w strefie przygranicznej, ze wskazaniem miejsc cienia elektromagnetycznego pod budowę Pomocniczych Stacji Retransmisyjnych. Analiza przyczyn ograniczenia odbioru programów*

*radiowych i telewizyjnych na wskazanym obszarze" (*The research of the cover by signals of public television of border ground in the range of border zone placing emphasis on the places of electromagnetic shadows under construction of Auxiliary Television Stations. Analysis of the causes of the limits of programmes R and TV reception in the indicated area), Assist. **H. Chaciński** (tutor), (5).

[BSc65] Lucjan Depko / Krzysztof Polowiec: *"Mikroprocesorowy kontroler częstotliwości nośnych nadajników TV i UKF w Radiowo – Telewizyjnym Centrum Nadawczym w Tarnawatce"* (Microprocessor – controlled TV and UHF transmitters' frequency meter), Assist. Prof. **T. Buczkowski** (tutor), (5).

[BSc66] Andrzej Gajewski: *"Rozbudowa i modernizacja sieci transmisyjnej warstwy lokalnej i dostępnej dla wybranego obszaru działania operatora telekomunikacyjnego"* (Extension and modernization of transmission network of local layer and available to a selected area of telecommunication operator), Assist. Prof. **S. Kula** (tutor), (5).

[BSc67] Marek Gierełło: *"Modernizacja układu załączania blokady i sygnalizacji nadajnika radiowego UKF"* (The modernization of the switching on, blockade and signalling system of UKF radio transmitter), Assist. Prof. **T. Buczkowski** (tutor), (4).

[BSc68] Zbigniew Groński: *"Światłowodowa sieć CATV dla miasta Orzysz"* (The optical - wired net CATV for the town of Orzysz), Assist. Prof. **R. Nowak** (tutor), (3.5).

[BSc69] Jarosław Grzywacz / Dariusz Grabiński: *"Projekt sieci dostępowej dla powiatu działdowskiego"* (The project for provide network access for the administrative district of Działdowo), Assist. Prof. **S. Kula** (tutor), (4.5).

[BSc70] Włodzimierz Hejduk: *"Szyk antenowy dla systemu radiowego SRDA DECT link"* (Aerial array for SRDA DECT link), Prof. **S. Rosłoniec** (tutor), (4.5).

[BSc71] Robert Hochel: *"Projektowanie sieci abonenckiej na przykładzie wybranego obszaru województwa świętokrzyskiego"* (Designing a subscription network on the basis of selected area in Świętokrzyskie province), Assist. Prof. **S. Kula** (tutor), (5).

[BSc72] Marek Hys: *"Multiplekser sygnałów TV"* (TV signal multiplexer), Assist. **T. Krzymień** (tutor), (5).

[BSc73] Robert Jakubowski: *"Mikroprocesorowy generator połączeń do central telefonicznych miejskich typu E – 10"* (Microprocessor generator of connections for telephone city centers type E - 10), Assist. Prof. **K. Czerwiński** (tutor), (4).

[BSc74] Wojciech Jakubowski: *"Aplikacje multiplekserów z Mb/s w warstwie dostępowej - projekt koncepcyjny"* (Designing of transmission system based on optical waveguide and Mb/s multiplexers in access layer - conceptual project), Assist. Prof. **S. Kula** (tutor), (4.5).

[BSc75] Mirosław Jarosz: *"Koncepcja rozbudowy i projekt sieci miejscowej"* (The concept and the project of the network access), Assist. **A. Kalinowski** (tutor), (3.5).

[BSc76] Jacek Jaskóła: *"Internetowy interfejs dla bilingowej bazy danych"* (The Internet interface for the biling database), Assist. Prof. **W. Smolik** (tutor), (5).

[BSc77] Marek Jędrzejczyk: *"Zdalne sterowanie urządzeń przez linię telefoniczną za pomocą wybierania tonowego"* (The remote control of equipments by a telephone line using dual – tone multiple frequency dialling), Assist. Prof. **K. Czerwiński** (tutor), (5).

[BSc78] Mariusz Jurkiewicz / Marek Tomaszewski: *"Projekt sieci optotelekomunikacyjnej pracującego w pętli SDH"* (Telecommunication optical fibres network presently working at STM-1 and STM-4 system in SDH net), Prof. **K. Holejko** (tutor), (4).

[BSc79] Marek Karolewicz: *"Projekt techniczny magistrali światłowodowej w sieci telewizji kablowej w Ełku"* (A technical design of an optical fibre track in cable television network in Ełk), Assist. Prof. **R. Nowak** (tutor), (5).

[BSc80] Andrzej Kloc: *"Pomiary kontrolne radiowego systemu dostępowego DECT link"* (Measurement supervisory of radio-access system DECTlink), Assist. **A. Kalinowski** (tutor), (4).

[BSc81] Elżbieta Kobylińska: *"Predykcje propagacji w planowaniu nowych sieci i systemów radiokomunikacji ruchomej lądowej"* (Propagation prediction in mobile terrestrial telecommunications networks and system planning), Assist. Prof. **T. Buczkowski** (tutor), (5).

[BSc82] Sławomir Kocyba: *"Antena nadawczo-odbiorcza typu DELTA LOOP na pasmo 80 m, pracująca w przedziale częstotliwości 3,5 MHz - 3,8 MHz"* (Antenna Delta LOOP with the range of transmission 3,5 - 3,8 MHz), Assist. Prof. **J. Jarkowski** (tutor), (4).

[BSc83] Mariusz Kostun: *"Filtr z rezonatorem dielektrycznym na częstotliwość 5 GHz"* (Filter with dielectric resonator by 5 GHz), Assist. Prof. **K. Derzakowski** (tutor), (5).

[BSc84] Bogdan Kozołup: *"Transwerter 1296 MHz / 144 MHz - część nadawcza"* (Transverter 1296 MHz / 144 MHz – transmitting part), Assist. Prof. **W. Kazubski** (tutor), (4).

[BSc85] Dariusz Kurowski: *"Przenośny system do podstawowych pomiarów parametrów sieci telewizji kablowych"* (Hand-held measurement system for basic CATV parameters), Assist. Prof. **J. Kołakowski** (tutor), (5).

[BSc86] Grzegorz Luterek / Adam Łopucki: *"Układ regulacji i kontroli mocy nadajnika UKF-FM"* (Output power control of VHF-FM radio transmitter), Assist. Prof. **J. Modzelewski** (tutor), (5).

[BSc87] Adam Łakomy: *"Wykorzystanie kontrolnych linii pomiarowych do analizy parametrów transmisyjnych nadajników telewizyjnych"* (Implementation of test lines in analysis of transmission parameters of television transmitters), Assist. Prof. **T. Buczkowski** (tutor), (4.5).

[BSc88] Andrzej Marciniak: *"Rozbudowa sieci miejskiej – rozdzielczej – rejon szafki 2A w miejscowości Lipno"* (Project of the expansions of a distribution network in Lipno), Assist. **A. Kalinowski** (tutor), (4).

[BSc89] Paweł Marcinkowski: *"Model człowieka przeznaczony do oceny wpływu użytkownika na własności propagacyjne anten pracujących na częstotliwościach powyżej 150 MHz"* (Human dummy design to access user's influence on propagation properties of over 150 MHz aerials), Assist. Prof. **T. Buczkowski** (tutor), (3.5).

[BSc90] Andżelika Matulka: *"Zagadnienia kompatybilności elektromagnetycznej w transgranicznej koordynacji wykorzystywania częstotliwości radiowych"* (Electromagnetic compatibility in transborder co-ordination of radio-frequency usage), Assist. Prof. **T. Buczkowski** (tutor), (4).

[BSc91] Barbara Matusewicz: *"Badanie niestabilności wyników pomiarów natężenia pola sygnałów nadajników w systemie pomiarowym URT"* (Investigations of instability of broadcasting transmitter field strength measurements in URT measuring system), Assist. Prof. **J. Cichocki** (tutor), (5).

[BSc92] Andrzej Michalski: *"Oprogramowanie wspomagające pracę w biurze obsługi klienta w telekomunikacji"* (Work support software for telecommunication client's service office), Assist. Prof. **W. Smolik** (tutor), (5).

[BSc93] Jacek Miętus: *"Mikroprocesorowe stanowisko pomiarowe do badania długofalowych systemów transmisji danych"* (Microprocessor - controlled stand for testing long - wave data transmission system), Assist. Prof. **T. Buczkowski** (tutor), (5).

[BSc94] Janusz Mirosław: *"Analiza wpływu treści wizyjnej na wyniki pomiarów nadajników TV wykonywanych na liniach kontrolnych"* (Analysis of influence of video contents on TV transmitters measurement results carried out using control lines signals), Assist. Prof. **T. Buczkowski** (tutor), (5).

[BSc95] Tomasz Młynarski: *"Komputerowy system monitorowania parametrów nadajników radiofonicznych UKF z wykorzystaniem urządzeń pomiarowych z łączem GPLB"* (Computer system for monitoring the parameters of FM transmitters using devices equipped with GPLB), Assist. Prof. **W. Smolik** (tutor), (5).

[BSc96] Włodzimierz Mrozowski: *"Zastosowanie wyświetlaczy graficznych LCD w systemach pomiarowych - część sprzętowa"* (Application of graphic LCD displays in measuring system - hardware part), Assist. Prof. **R. Nowak** (tutor), (4.5).

[BSc97] Sławomir Niezgoda: *"Niskoszumowy przedwzmacniacz mikrofalowy do systemu antenowego kontroli emisji radiowych na pasmo 1,6 - 2,6 GHz"* (The 1.6 - 2.6 GHz low noise microwave amplifier for the Spectrum Control System), Assist. Prof. **W. Wojtasiak** (tutor), (4).

[BSc98] Katarzyna Nowacka: *"Projekt dostępowej sieci abonenckiej w gminie Lesznowola z wykorzystaniem cyfrowych systemów dostępu abonenckiego"* (Project of access subscriber network in commune Lesznowola by means of digital access systems), Assist. **A. Kalinowski** (tutor), (3.5).

[BSc99] Marcin Olszewski: *"System UMTS - projekt sieci radiowej"* (UMTS system - a project of radio network), Assist. Prof. **T. Kosiło** (tutor), (5).

[BSc100] Krzysztof Opasiński: *"Projekt budowy sieci dostępu radiowego w oparciu o system WLL®CDMA firmy Motorola"* (Project of bulding the network of wireless access basis of Will®CDMA by Motorola), Assist. **A. Kalinowski** (tutor), (4.5).

[BSc101] Marek Ostojski: *"System nadzoru nad stanami alarmowymi central telefonicznych"* (The alarm supervision system for telephone exchange), Assist. Prof. **K. Czerwiński** (tutor), (5).

[BSc102] Janina Pawlak: *"Analiza i ocena dokładności pomiarów CD za pomocą różnych metod pomiarowych"* (Analysis of precision in CD radios measurements with the use of different measuring methods), Assist. Prof. **W. Kazubski** (tutor), (3.5).

[BSc103] Andrzej Piskiewicz: *"Cyfrowy kontroler linii telefonicznej"* (Digital tester of a phone line), Assist. Prof. **W. Kazubski** (tutor), (4).

[BSc104] Grzegorz Polasik: *"Symetryczny dzielnik mocy"* (Symmetrical power divider), Assist. Prof.**K. Derzakowski** (tutor), (3.5).

[BSc105] Robert Poniatowski: *"Synchronizacja i dystrybucja sygnałów synchronizacji na przykładzie wybranego obszaru sieci telekomunikacyjnej"* (Synchronization and distribution of synchronous signals for the selected telecommunication network), Assist. Prof. **S. Kula** (tutor), (4).

[BSc106] Krzysztof Prusaczyk: *"Realizacja połączeń światłowodowych za pomocą złącz rozłączalnych"* (Realization of optical wave-guide's fastenings through the temporary fastenings), Assist. Prof.**R. Nowak** (tutor), (4).

[BSc107] Paweł Przybyła: *"Kontroler mocy wyjściowej w.cz. nadajników TV i UKF"* (Power output monitoring system of high-frequency TV & UKF transmitters), Assist. Prof. **K. Czerwiński** (tutor), (3).

[BSc108] Sławomir Purzycki: *"Mikroprocesorowy generator sygnałów tonowych DiSEqC™"* (Microprocessor generator for tone DiSEqC™ signals), Assist. **T. Krzymień** (tutor), (5).

[BSc109] Jacek Rosikiewicz: *"Pomiar częstotliwości impulsów synchronizacji poziomej w procesie monitorowania nadajników telewizyjnych"* (Line repetition frequency measurements in the process of television transmitter monitoring), Assist. Prof. **J. Cichocki** (tutor), (5).

[BSc110] Paweł Rosochadzki: *"Pomiary uruchomieniowe jednomodowych kablowych linii optokomunikacyjnych"* (The pre-starting measurements of single mode cable opto-telecommunication lines), Prof. **K. Holejko** (tutor), (4).

[BSc111] Jacek Rowiński: *"Automatyzacja pomiarów toru nadawczego"* (Automation of transmitter link measurements), Assist. Prof. **J. Kołakowski** (tutor), (5).

[BSc112] Grzegorz Rzążewski: *"Efektywność zastosowania zwielokrotnienia w cyfrowych systemach dostępu abonenckiego po kablu miedzianym"* (Effectivness of multiplexing application in digital subscriber's access systems by means of copper wire in the selected area of subscriber's line), Assist. **A. Kalinowski** (tutor), (5).

[BSc113] Maciej Sadowski: *"Mikroprocesorowy symulator stacji bazowej RSŁA – 4"* (Microprocessor simulator for RSŁA – 4 radio access base station), Assist. **T. Krzymień** (tutor), (4.5).

[BSc114] Norbert Smoliński: *"Tester kodu DTMF i poprawności transmitancji V.23 stosowanych przy prezentacji numeru abonenta dzwoniącego w sieci PSTN"* (Tester of the DTMF code and correctness of V.23 transmission using in presentation of subscriber's number in PSTN network), Assist. Prof. **K. Czerwiński** (tutor), (5).

[BSc115] Sławomir Stachura: *"Internetowy serwer dla bazy danych rozmów telefonicznych w oparciu o technologie ACTIVE SERVER PAGES (ASP)"* (The Internet server database for telephone calls based on technology ACTIVE SERVER PAGES (ASP), Assist. Prof. **W. Smolik** (tutor), (4.5).

[BSc116] Piotr Stasio: *"Synchronizacja central cyfrowych w wybranym obszarze telekomunikacji"* (Synchronization of digital telephone exchanges in a selected telecommunication area), Assist. Prof. **S. Kula** (tutor), (4.5).

[BSc117] Beata Struska / Teresa Gola: *"Badanie i analiza zaburzeń radioelektrycznych"* (Investigation and analysis of the emitted radioelectric disturbances), Assist. Prof. **K. Radecki** (tutor), (5).

[BSc118] Janusz Sypek: *"Edytor monitora DiSEqC"* (The editor of DiSEqC monitor), Assist. **T. Krzymień** (tutor), (5).

[BSc119] Helena Szafaryn: *"Synchronizacja sieci telekomunikacyjnej – projekt synchronizacji dla sieci lokalnej wybranego obszaru krajowej sieci teletransmisyjnej"* (Synchronization of telecommunication network - project of synchronization for selected local area of country teletransmission network), Assist. Prof. **S. Kula** (tutor), (5).

[BSc120] Lucyna Sztafińska: *"Wtórny wzorzec częstotliwości do synchronizacji teletransmisyjnych urządzeń cyfrowych"* (The secondary frequency standard for synchronization of digital transmission equipment), Assist. Prof. **T. Buczkowski** (tutor), (4).

[BSc121] Narcyz Ulbrich: *"Niskoszumowy szerokopasmowy wzmacniacz abonencki CATV"* (Low-noise wide band subscriber's amplifier for CATV), Assist. **T. Krzymień** (tutor), (4.5).

[BSc122] Radosław Urbaniak: *"Cyfrowe linie abonenckie HDSL"* (Digital subscriber lines HDSL), Assist. **A. Kalinowski** (tutor), (5).

[BSc123] Andrzej Wojtasik: *"Automatyzacja pomiarów parametrów sieci radiotelefonicznych UKF-FM z wykorzystaniem testera radiokomunikacyjnego CMS-54"* (The automation of radiocommunication

transceiver measurements with the use of CMS-54 radiocommunication tester), Assist. Prof. **J. Kołakowski** (tutor), (5)

[BSc124] Zbigniew Woźniak: *"Kontrola częstotliwości nośnych nadajników telewizyjnych i radiowych"* (Radio and television transmitter carrier frequency controller), Assist. Prof. **T. Buczkowski** (tutor)

[BSc125] Paweł Żądło: *"Układ akwizycyjny do monitorowania komend DiSEqC"* (Arrangement of canvassing to monitoring commands), Assist. **T. Krzymień** (tutor).

[BSc126] Eugeniusz Żak: *"Transweter 1296 MHz/144MHz - część odbiorcza"* (Transveter 1296 MHz/144 MHz - receiving part), Assist. Prof. **W. Kazubski** (tutor), (4.5)

6. PUBLICATIONS

6.1. Scientific and technical books, chapters in books

[Pub1] W. Wieszczycka, W. Scharf: "Proton Radiotherapy Accelerators", *World Scientific Publishing. Pte.Ltd* (ISBN 981-02-4528-9), 318 pp.

[Pub2] W. Winiecki, J. Nowak, S. Stanik: „Graficzne, zintegrowane środowiska programowe do projektowania komputerowych systemów pomiarowo-kontrolnych", (Graphical Integrated Software Environments for Computer-based Measuring Systems Design), Ed. *MIKOM*, Warsaw, 2001, Issue I, (ISBN 83-7279-178-3), 288 pp.

[Pub3] J. M. Wojciechowski: "Piecewise Ellipsoidal Approximation", *Wydawnictwa Komunikacji i Łączności* (ISBN 83-206-1406-6), 103 pp.

[Pub4] W. Skarbek (Ed.): "Computer Analysis of Images and Patterns", *Lecture Notes in Computer Science* 2124, *Springer*, (Sept. 2001), (ISBN 3-540-42513-6), 743 pp.

6.2. Other books, chapters in books

[Pub5] J. S. Bober, R. Z. Morawski (Ed.): "Profesorowie i docenci Wydziału Elektroniki i Technik Informacyjnych Politechniki Warszawskiej 1951-2001" (Professors and Associate Professors of the Faculty of Electronics and Information Technology, 1951-2001). Zbiór not biograficznych wydany z okazji Jubileuszu Pięćdziesięciolecia Wydziału (Biographies Published on the Occasion of the Fiftieth Anniversary of the Faculty), Oficyna Wydawnicza Politechniki Warszawskiej, (Academic Publishing House), Warsaw 2001, (ISBN 83-914580-3-2), 268 pp.

[Pub6] R. Z. Morawski (Ed.): "Wczoraj, dziś i jutro Wydziału Elektroniki i Technik Informacyjnych Politechniki Warszawskiej, 1951-2001" (Yesterday, Today and Tomorrow of the Faculty of Electronics and Information Technology, 1951-2001). Zbiór esejów wydany z okazji Jubileuszu Pięćdziesięciolecia Wydziału (Collection of Essays Published on the Occasion of the Fiftieth Anniversary of the Faculty), Oficyna Wydawnicza Politechniki Warszawskiej (Academic Publishing House), Warsaw 2001, (ISBN 83-914580-4-0), 244 pp.

[Pub7] R. Z. Morawski: "Od redaktora zbioru" (From the Editor). In: *"Wczoraj, dziś i jutro Wydziału Elektroniki i Technik Informacyjnych Politechniki Warszawskiej, 1951-2001*" (Yesterday, Today and Tomorrow of the Faculty of Electronics and Information Technology, 1951-2001). Zbiór esejów wydany z okazji Jubileuszu Pięćdziesięciolecia Wydziału (Collection of Essays Published on the Occasion of the Fiftieth Anniversary of the Faculty), Oficyna Wydawnicza Politechniki Warszawskiej (Academic Publishing House), Warsaw 2001, (ISBN 83-914580-4-0), pp. 3-5.

[Pub8] R. Z. Morawski: "Wydział w perspektywie historycznej". (The Faculty in Historical Prospect). In: *"Wczoraj, dziś i jutro Wydziału Elektroniki i Technik Informacyjnych Politechniki Warszawskiej, 1951-2001"* (Yesterday, Today and Tomorrow of the Faculty of Electronics and Information Technology, 1951-2001). Zbiór esejów wydany z okazji Jubileuszu Pięćdziesięciolecia Wydziału (Collection of Essays Published on the Occasion of the Fiftieth Anniversary of the Faculty), Oficyna Wydawnicza Politechniki Warszawskiej (Academic Publishing House), Warsaw 2001, (ISBN 83-914580-4-0), pp. 7-57.

[Pub9] R. Z. Morawski: "Refleksja jubileuszowa, czyli pytanie o przyszłość" (Jubilee Reflection, or the Question about the Future). In: *"Wczoraj, dziś i jutro Wydziału Elektroniki i Technik Informacyjnych Politechniki Warszawskiej, 1951-2001"* (Yesterday, Today and Tomorrow of the Faculty of Electronics and Information Technology, 1951-2001). Zbiór esejów wydany z okazji Jubileuszu Pięćdziesięciolecia Wydziału (Collection of Essays Published on the Occasion of the Fiftieth Anniversary of the Faculty), Oficyna Wydawnicza Politechniki Warszawskiej, (Academic Publishing House), Warsaw 2001, (ISBN 83-914580-4-0), pp. 237-241.

[Pub10] R. Z. Morawski, J. Woźnicki: „Finansowanie szkolnictwa wyższego" (Financing Higher Education), In: *"Dziesięciolecie Polski niepodległej, 1989-1999"*, (Tenth Anniversary of Poland's Independence, 1989-1999), (Ed.: W. Kuczyński), *United Pub. & Prod.*, Warsaw, (2001), pp. 434-436.

6.3 Scientific and technical papers in journals

[Pub11] P. Bogorodzki, T. Wolak, M. Orzechowski, A. Piątkowski: „Obrazowanie parametryczne z wykorzystaniem dynamicznych badań tomograficznych" (Parametric Imaging Based on Dynamic Scanning Protocols), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z.130 (2001), pp. 73-89.

[Pub12] M. Celuch-Marcysiak, B. Wappling-Raaholt, P. O. Risman, "Letter to Editor", *Journal of Microwave Power and Electromagnetic Energy*, Vol. 35, No. 3 (2001), pp. 134.

[Pub13] J. Cichocki: "Instytut Radioelektroniki. Od radioelektroniki do multimedialnego świata łączności bezprzewodowej" (Institute of Radioelectronics. From Radio-Engineering to the World of Wireless Multimedia), *Przegląd Telekomunikacyjny i Wiadomości Telekomunikacyjne*, No. 10/2001, pp. 693-696.

[Pub14] G. Domański, Z. Pawłowski, J. Marzec, K. Zaremba, B. Konarzewski, A. Borecki: „Skaner scyntylacyjny do badań przesiewowych osteoporozy" (A Scintillating Scanner for Osteoporosis Screening), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z. 130 (2001), pp. 57-71.

[Pub15] S. L. Hahn, K. M. Snopek: "Winger Distributions and Ambiguity Functions in Image Analysis", In: *Computer Analysis of Images and Patterns*, (Ed.: W. Skarbek*), Lecture Notes in Computer Science* 2124, *Springer*, (Sept. 2001), pp. 537-546.

[Pub16] T. Jamrógiewicz: „K-SEP-I-0014 Nowa Uniwersalna Magistrala Szeregowa USB-2", (K-SEP-I-0014 New Universal Serial Bus USB 2), *Centralny Ośrodek Szkolenia i Wydawnictw*, (2001), pp. 1-38.

[Pub17] S. Karczmarewicz, D. Janusek, T. Buczkowski, R. Gutkowski, P. Kułakowski: "Influence of Mobile Phones on Accuracy of ECG Interpretation Algorithm in Automated External Defibrillator", *Elsevier, Resuscitation* No. 51 (2001), pp. 173-177.

[Pub18] B. Konarzewski, Z. Pawłowski, G. Domański, J. Marzec, K. Zaremba: „Monte Carlo Modelling of Radiographic Luminescent Receptors", *Biocybernetics and Biomedical Engineering*, No 1, Vol. 21 (2001), pp. 37-52.

[Pub19] M. Kukier, T. Morawski: "Przełączany układ pięciowrotowy do pomiaru macierzy rozproszenia" (Switched Five-Port Circuit for Scattering Matrix Measurement), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z.130 (2001), pp. 5-17.

[Pub20] J. L. Kulikowski, K. Łukaszewicz, D. Włoskowicz, K. W. Radecki, W. Kazubski, T. Buczkowski: "Esot Radio Frequency Beacon System as the Mobility Aid for the Blind", *Proc. ESEM 2001: 6th Biennal Conference of the European Society for Engineering in Medicine* (Belfast, May 3-5, 2001), *Technology and Health Care*, Vol. 9, No. 1-2, pp. 61-63.

[Pub21] J. L. Kulikowski, K. Łukaszewicz, K. W. Radecki: "Phone Communication by means of Synthetic Speech for Deaf-Mute People", *Proc. ESEM 2001: 6th Biennal Conference of the European Society for Engineering in Medicine* (Belfast, May 3-5, 2001), *Technology and Health Care*, Vol. 9, No. 1-2, pp. 58-60.

[Pub22] Z. Kulka: „Czy 1-bitowy format DSD degraduje jakość dźwięku?" (Does 1-bit DSD Format Deteriorates Sound Quality ?), *Audio Video*, No. 1/2001, pp. 6-11.

[Pub23] Z. Kulka: „Przedwzmacniacz/korektor cyfrowy TACT RCS 2.0" (TACT RCS 2.0 Digital Room Correction System), *Audio Video*, No. 2/2001, pp. 18-20.

[Pub24] Z. Kulka: „Odtwarzacz DVD A/V firmy JVC" (JVC DVD Audio/Video Player XV-D723GD), *Audio Video*, No.4/2001, pp. 66-67.

[Pub25] Z. Kulka: „Dekodery i przetworniki c/a foniczne nowej generacji firmy Cirrus Logic" (New Generation of Audio Decoders and C/A Converters from Cirrus Logic), *Audio Video,* No. 5/2001, pp. 62-66.

[Pub26] Z. Kulka: „Konwertery częstotliwości próbkowania", część 1 i 2 (Sample Rate Converters, Parts 1 and 2), *Audio Video,* No. 6/20001, pp. 62-65, No. 7/2001, pp. 60-63.

[Pub27] Z. Kulka: „Cyfrowe wzmacniacze mocy do zastosowań audio", część 1-3 (Digital Power Amplifiers, Parts 1-3), *Audio Video,* No.10/2001, pp. 66-68, No. 11/2001, pp. 68-72, No. 12/2001, pp. 64-67.

[Pub28] K. Kurek, D. Janusek, T. Kosiło, J. Modelski: "Characteristics of the Indoor Propagation Channel in 1.9 GHz Band", *Journal of Telecommunications and Information Technology*, 4/2001, (Warsaw, Dec. 2001), pp. 56-59.

[Pub29] R. Kurjata: „Zdalny pomiar nasycenia krwi tlenem" (Remote Blood Oxygenation Measurement Device), *Elektronizacja* No. 10 (2001), pp. 5-6.

[Pub30] P. Kwiecień, „Formaty zapisu dźwięku przestrzennego" (Multichannel Sound Recording Formats), *Audio Video,* No. 4/2001, pp. 29-33.

[Pub31] Z. Lonc, K. Parol, J. Wojciechowski: "On the Number of Spanning Trees in Directed Circulant Graphs", *Networks,* Vol. 37(3) (2001), pp. 129-133.

[Pub32] J. Modelski, Y. Yashchyshyn: "Sterowane anteny paskowe na podłożu z dielektrykiem nieliniowym" (Controlled Microstrip Antenna on the Nonlinear Dielectric Substrate), *Prace Naukowe Politechniki Warszawskiej, Elektronika,* z.129 (2001), pp. 33-50.

[Pub33] J. Modelski, Y. Yashchyshyn: "New Type of Microstrip Antenna with Ferroelectric Layer", *Journal of Telecommunications and Information Technology* 4/2001, Warsaw, (Dec. 2001), pp. 37-40.

[Pub34] R. Z. Morawski: "Are Measurement-Oriented Courses Getting Too Difficult for Polish Students?", *Measurement - Journal of IMEKO*, (Dec. 2001).

[Pub35] R. Z. Morawski: "Wydział Elektroniki i Technik Informacyjnych Politechniki Warszawskiej (1951-2001)" (Faculty of Electronics and Information Technology, Warsaw University of Technology, 1951-2001), *Przegląd Telekomunikacyjny i Wiadomości Telekomunikacyjne*, No. 10 (2001), pp. 663-672.

[Pub36] T. Morawski, J. Zborowska: "Projektowanie szerokopasmowych przesuwników fazy z diodami waraktorowymi" (Design of Broad-Band Varactor Phase Shifter), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z.130 (2001), pp. 19-32.

[Pub37] K. Mroczek: "Shape-Adaptive DCT Algorithm - Hardware Optimized Redesign", In: *Computer Analysis of Images and Patterns*, (Ed.: W. Skarbek), *Lecture Notes in Computer Science 2124*, *Springer*, (Sept. 2001), pp. 125-133.

[Pub38] Z. Pawłowski, G. Domański, B. Konarzewski, J. Marzec, K. Zaremba: „Kwantowa wydajność detekcji promieniowania i funkcja przenoszenia modulacji luminescencyjnych sensorów obrazów radiograficznych" (Quantum Detective Efficiency and Modulation Transfer Function of Luminescent Radiographic Screens), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z.130 (2001), pp. 37-56.

[Pub39] E. Piątkowska-Janko, A. Piątkowski, G. Opolski: „Filtry cyfrowe do analizy późnych potencjałów serca metodami wysokorozdzielczej elektrokardiografii", (Digital Filters for Heart Late Potential Analysis in High-Resolution Electrocardiography), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z.130 (2001), pp. 21-35.

[Pub40] A. Podgórski, R. Nedwidek, M. Pochmara: „Stanowisko do badania filtrów cyfrowych dla potrzeb Laboratorium Sygnałów" (Set for Investigations of Digital Filters for the Purpose of Signals Laboratory), *Zeszyty Naukowe Politechniki Łódzkiej ELEKTRYKA,* z. 98, No. 886 (2001), pp. 191-200.

[Pub41] A. Przelaskowski: "Lossless Encoding of Medical Images: Hybrid Modification of Statistical Modelling-based Conception", *Journal of Electronic Imaging*, Vol. 10 (2001), issue 4, pp. 966-976.

[Pub42] A. Przelaskowski: "Hybrid Lossless Coder of Medical Images with Statistical Data Modelling", In: *Computer Analysis of Images and Patterns*, (Ed.: W. Skarbek), *Lecture Notes in Computer Science 2124*, *Springer*, (Sept. 2001), pp. 92-101.

[Pub43] A. Przelaskowski: "Lifting-based Reversible Transforms for Lossy-to-lossless Wavelet Coders", In: *Computer Analysis of Images and Pattern*, (Ed.: W. Skarbek), *Lecture Notes in Computer Science 2124*, *Springer*, (Sept. 2001), pp. 61-70.

[Pub44] A. Przelaskowski: "Today's and Tomorrow's Medical Imaging", In: *Computer Analysis of Images and Patterns*, (Ed.: W. Skarbek), *Lecture Notes in Computer Science 2124*, *Springer*, (Sept. 2001), pp. 236-237.

[Pub45] A. Przelaskowski: "Effective Integer-to-integer Transforms for JPEG2000 Coder ", *SPIE Conference: Wavelets: Applications in Signal and Image Processing IX, Proc. SPIE*, Vol. 4478 (2001), pp. 299-310.

[Pub46] A. Przelaskowski: „Elastyczność koderów falkowych w systemach archiwizacji i transmisji medycznych danych obrazowych", (Functionality of Wavelet Coders in Medical Archiving and Data Transmission System), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z.130 (2001), pp. 105-122.

[Pub47] A. Przelaskowski: „Techniki optymalizacji falkowej reprezentacji obrazów medycznych", (Coding of Wavelet Medical Image Data Representation), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z.130 (2001), pp. 123-142.

[Pub48] G. Radzikowski: "Metody identyfikacji w środowisku" (Methods of Identification in Environment), *It Security Magazine*, No. 6-7 (22-23), (Jun.- Jul. 2001), pp. 41-46.

[Pub49] G. Radzikowski, J. Wojciechowski: "Bezprzewodowy handel" (Mobile Electronic Commerce), *Infotel,* No. 9/2001, (ISSN 1429-0200), (Sept. 2001), pp. 42-45.

[Pub50] J. Rudnicki, M. Sypniewski, M. Celuch-Marcysiak, W. Gwarek, A. Więckowski: "Wielowątkowe algorytmy FDTD do przyspieszania analizy układów

mikrofalowych", (Multithread FDTD Schemes for Faster Microwave Circuit Analysis) *Prace Naukowe Politechniki Warszawskiej, Elektronika*, z.129 (2001), pp. 51-73.

[Pub51] G. Siemek: "The Coefficient Based Rate Distortion Model for the Low Bit Rate Video Coding", In: *Computer Analysis of Images and Patterns*, (Ed.: W. Skarbek), *Lecture Notes in Computer Science 2124*, *Springer*, (Sept. 2001), pp. 118-124.

[Pub52] W. Skarbek: "Rough Sets for Enhancements of Local Subspace Classifier", *Neurocomputing 36* (2001), *Elsevier,* pp. 67-83.

[Pub53] W. Smolik: „Zastosowanie algorytmów genetycznych w rekonstrukcji obrazów z projekcji w tomografii emisyjnej metodą największej wiarygodności", (The Application of Genetic Algorithms in Image Reconstruction from Projections in Emission Tomography Using the Maximum Likelihood Method), *Prace Naukowe Politechniki Warszawskiej „Elektronika"*, z.130 (2001), pp. 91-104.

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[Pub55] T. Szafrański, R. Z. Morawski: "Efficient Estimation of Uncertainty in Weakly Non-Linear Algorithms for Measurand Reconstruction", *Measurement - Journal of IMEKO*, No. 1 (Jan. 2001), pp. 77-85.

[Pub56] M. Tajchert, „Ocena słuchowa jakości dźwięku" (Subjective Evaluation of Sound Quality), *Audio Video*, No.3/2001, pp. 17-19.

[Pub57] A. Wajs: "Dc/dc Resonant Converter with a One-switch Synchronous Regulator", *Bulletin of the Polish Academy of Sciences Technical Sciences* Vol. 49 (2001), No. 1, pp. 101-117.

[Pub58] W. Wojtasiak: "Transmisyjne przesuwniki fazy z liniami niejednorodnymi" (Nonuniform Transmission Phase Shifters), *Prace Naukowe Politechniki Warszawskiej "Elektronika"*, z.129 (2001), pp. 75-95.

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[Pub137] M. Wiśniewski, R. Z. Morawski, A. Barwicz: "Calibration of a Minispectrophotometer Using a Neural-network-based Interpolator", *Proc. IEEE Instrum. & Meas. Technol. Conf. – IMTC '2001* (Budapest, Hungary, May 21-23, 2001), pp. 111-115 (or CD-ROM).

[Pub138] W. Wojtasiak, D. Gryglewski, R. Leoniak: "Syntezer na pasmo S z funkcją śledzenia częstotliwości" (S-band Synthesizer with Frequency Watching Function), *Mat. XII Konferencji Naukowej: Sterowanie w Radiolokacji i Obiektach Latających* (Proc. XII Scientific Conference: Steering in Radiolocation and Flying Objects), (Jelenia Góra, Poland, Jun. 20-22, 2001), Vol. III, pp. 43-51.

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[Pub142] K. Wnukowicz: "Indeksowanie informacji wideo" (Video Information Indexing), *Mat. Krajowej Konferencji Radiokomunikacji, Radiofonii i Telewizji* (Proc. National Conference on Radiocommunications, Broadcasting and Television), (Poznań, Poland, May 14-16, 2001), pp. 7.1.1- 7.1.4.

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[Pub145] Y. Yaschyshyn, K. Kurek: "Komputerowa analiza kanału propagacyjnego w systemach łączności radiowej" (Computer Analysis of Propagation Channel in Radio-Commmunication System), *Mat. Krajowej Konferencji Radiokomunikacji, Radiofonii i Telewizji* (Proc. National Conference on Radiocommunications, Broadcasting and Television), (Poznań, Poland, May 14-16, 2001), (ISBN 83-907067-0-9), pp. P.17-1 - P.17.4.

6.4 Textbooks

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7. REPORTS

7.1. Research reports

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[Rep2] P. Bogorodzki, Z. Pawłowski, A. Piątkowski, P. Brzeski, T. Jamrógiewicz, M. Kazubek, E. Piątkowska-Janko, A. Przelaskowski, W. Smolik, R. Szabatin, T. Wolak, K. Zaremba, R. Kurjata: *"Rozwój i pilotowe implementacje technik telemedycznych"* (Example Implementations of Telemedicine Services), Final report for the Dean grant, Institute of Radioelectronics, WUT, (No. 503G/1034/4021), Warsaw, May 2001, 18 pp.

[Rep3] A. Buchowicz, W. Skarbek, T. Keller, R. Pączkowski, D. Siemek, P. Daniluk, P. Bugajski, M. Mazurek: *"Moduł wideo w domowej platformie multimedialnej"*, (Video Module Research Project), Final report for Arris Interactive L.L.C, USA, (No. 501E /1034/1336), Warsaw, Jun. 2001, 20 pp.

[Rep4] J. Cichocki: *"Specyfika pomiarów stacji ruchomych systemu UMTS - analiza potrzeb i możliwości pomiarowych"* (Specific Problems of UMTS Mobile Station Measurements - Analysis of Measurement Requirements and Capabilities), Final report for the Office of Telecommunications Regulations (Urząd Regulacji Telekomunikacji), (No. 501E/1034/1345), Warsaw, Dec. 2001, 40 pp.

[Rep5] J. Cichocki, J. Kołakowski, D. Grabowski, S. Maszczyk: *„Wykorzystanie przekształceń czasowo – częstotliwościowych do redukcji zakłóceń wąskopasmowych systemów CDMA"* (Application of Time - Frequency Transforms for Suppresion of Narrowband Interference in CDMA Systems), Final report for the Dean grant, Institute of Radioelectronics, WUT, (No. 503G/1034/4022), Warsaw, Jun. 2001, 32 pp.

[Rep6] K. Derzakowski, J. Modelski, Y. Yashchyshyn: *„Ferroelektryki - metody pomiarów i ich zastosowanie w technice antenowej"* (Ferroelectrics – Measurement Method and its Applications in an Antenna Techniques), Final report for the statutory grant, Institute of Radioelectronics, WUT, (No. 504G/1034/0400) Warsaw, Apr. 2001 22 pp.

[Rep7] J. Ebert, M. Mikołajewski, J. Modzelewski, A. Wajs: *„Wysokosprawne układy zasilające prądu stałego z rezonansowymi wzmacniaczami mocy w.cz."* (High-Efficiency dc/dc Converters with h.f. Resonant Power Amplifiers), Final report for the statutory grant, Institute of Radioelectronics, WUT, (No. 504G/1034/0400), Warsaw, Apr. 2001, 24 pp.

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[Rep11] S. Hahn, J. Jarkowski, K. Snopek, G. Hahn: *"Wielowymiarowe rozkłady Wignera i funkcje nieoznaczności dla sygnałów analitycznych. Rozwinięcie teorii oraz zastosowania"* (Multidimensional Wigner Distributions and Ambiguity Functions for Analytical Signals. The Extension of the Theory and Applications), Final report for the KBN grant, Institute of Radio-electronics, WUT, Warsaw, Dec. 2001, 40 pp.

[Rep12] M. Kazubek, T. Jamrógiewicz, E. Piątkowska-Janko, P. Bogorodzki, R. Szabatin, W. Smolik: *"Studium możliwości wdrożenia specjalistycznych usług TP S.A. przewidywanych do świadczenia na rzecz służby zdrowia"* (Application Study of TP S.A. for the Healthcare in Poland), Final report for Polish Telecommunications (TP S.A.), (No. 501E/1034/1343), Warsaw, Dec. 2001, 166 pp.

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risation of the Building Material Electrical Properties), Final report for the Rector grant, Institute of Radioelectronics, WUT, (No. 503R/1034/3942), Warsaw, Jun. 2001, 166 pp.

[Rep14] Z. Kulka, A. Leszczyński, M. Tajchert, J. Narkiewicz - Jodko, P. Nykiel, G. Kustra: „Projektowanie i badania elektroakustycznych systemów studyjnych i pomiarowych oraz systemów cyfrowego przetwarzania sygnałów fonicznych" (Design and Investigation of Electroacoustic Systems for Recording and Instrumentation Applications and Digital Audio Signal Processing Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, (No. 504G/1034/0400) Warsaw, Apr. 2001, 67 pp.

[Rep15] Z. Kulka, P. Nykiel: *„Implementacja adaptacyjnego, cyfrowego filtru interpolacyjnego na procesorze sygnałowym SHARC do zastosowań fonicznych"* (Design and Implementation of an Adaptive Interpolation Filter in SHARC DSP for Audio Applications), Final report for the Rector grant, Institute of Radioelectronics, WUT, (No. 503R/1034/3939), Warsaw, Jun. 2001, 20 pp.

[Rep16] Z. Kulka P. Nykiel, R. Smoliński: *"Przeprowadzenie nagrań oraz wykorzystanie urządzeń i aparatury do obróbki nagrań w studiu ZEA" (*Recordings and Processing of Sound in ZEA Studio), Final report for Central Examination Commission, (No. 501E/1034/1341/), Warsaw, Jul. 2001, 10 pp.

[Rep17] B. Kwiatkowski *"Badania porównawcze przyrządów serwisowych firmy Grunding Polska"* (Comparative Testing of Service Measuring Apparatus for Grunding Poland Ltd.), Final report for Grunding Poland Ltd., (No. 501E/1034/1339), Warsaw, Jun. 2001, 6 pp.

[Rep18] A. Leszczyński, P. Nykiel, R. Smoliński, H. Siedlecka: *„Opracowanie sygnałów testujących i wykonanie płyty testowej CD do badania właściwości słuchu małych dzieci"* (Audio Test Signals Elaborations and CD Test Design for Behavioral Tests of Hearing in Small Children), Final report for the Dean grant, Institute of Radioelectronics, WUT, (No. 503G/1034/4024) Warsaw, Jun. 2001, 18 pp.

[Rep19] J. Marzec: *"Optymalizacja toru detekcji cząstek z komorą słomkową"* (Optimization of the Straw Chamber Detector), Final report for the Rector grant, Institute of Radioelectronics, WUT, (No. 503R/1034/3941), Warsaw, Jun. 2001, 25 pp.

[Rep20] J. Marzec, K. Zaremba, Z. Pawłowski, B. Konarzewski: „Electromagnetic Interference (EMI) Problems in HEP Experiments", CERN Internal Report - COMPASS Note 2001-1, Mar. 8, 2001, 21 pp.

[Rep21] M. Mikołajewski, J. Ebert, K. Puczko, A. Wajs, A. Owczarek: *"Doskonalenie wysokosprawnych przetwornic napięcia stałego z przetwarzaniem energii wielkiej częstotliwości"* (Optimisation of High-Efficiency High-Frequency dc/dc Converters), Final report for the KBN grant, Institute of Radioelectronics, WUT, Warsaw, Oct. 2001, 170 pp.

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[Rep24] J. Modelski, K. Mroczek: *"Architektury sprzętowego kodowania tekstury obiektów w obrazie"* (Hardware Architectures for Texture Coding of Arbitrarily Shaped Video Objects), Final report for the Rector grant, Institute of Radioelectronics, WUT, (No. 503R/1034/3940), Warsaw, Jun. 2001 126 pp.

[Rep25] J. Modelski, Y. Yashchyshyn: *„Analiza właściwości propagacyjnych w systemach łączności bezprzewodowej"* (Analysis of the Propagation Channel Properties in Wireless Communication Systems), Final report for the statutory grant, Institute of Radioelectronics, WUT, (No. 504G/1034/0400), Warsaw, Apr. 2001, 22 pp.

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[Rep27] R. Z. Morawski, A. Miękina, A. Podgórski, T. Szafrański: *„Realizacja i badanie wybranych algorytmów interpretacji danych pomiarowych"* (Implementation and

Investigation of the Selected Algorithms for Interpretation of Measurement Data), Final report for the statutory grant, Institute of Radioelectronics, WUT, (No. 504G/ 1034/0400), Warsaw, Apr. 2001, 44 pp.

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[Rep32] A. Przelaskowski: *"Metody optymalizacji reprezentacji medycznych danych obrazowych do archiwizacji i transmisji telemedycznej"* (Methods of Medical Image Data Optimisation Applied to Archiving and Telemedical Transmission), Final report for the KBN grant, Institute of Radioelectronics, WUT, Warsaw, Dec. 2001.

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[Rep34] W. Skarbek: *"Incorporating visual typer into MPEG-7",* Final report m 7460, Sydney, Australia, MPEG meeting no. 57, Jul. 2001, 10 pp.

[Rep35] W. Skarbek: *"Optimal intervals for fuzzy categories of colour temperature",* Final report m 7625, Pattaya, Australia, MPEG meeting no. 58, Dec. 2001, 10 pp.

[Rep36] W. Skarbek, A. Buchowicz, T. Keller, K. Ignasiak, R. Pączkowski: *„Domowa platforma multimedialna”* (Home Multimedia Platform), Final report for the statutory grant, Institute of Radioelectronics, WUT, (No. 504G/1034/0400), Warsaw, Apr. 2001, 14 pp.

[Rep37] R. Szabatin, W. Smolik, P. Brzeski: *“Opracowanie bazy danych o strukturze zgodnej ze standardem DICOM, z interfejsem WWW dla obrazowych danych medycznych”* (Data Base in DICOM Standard with the WWW Interface for Medical Images), Final report for the Rector grant, Institute of Radioelectronics, WUT, (No. 503R/1034/3943), Warsaw, Jun. 2001, 35 pp.

[Rep38] R. Szabatin, T. Olszewski, W. Smolik: *"Modyfikacja unikatowego stanowiska badawczego do PT z komputerem PC do rekonstrukcji i analizy obrazów"* (Modification of the Unique Research Stand for Process Tomography for Image Reconstruction and Analysis), Final report for the Institute of Organic Industry, (No. 501E /1034/1344), Warsaw, Nov. 2001, 20 pp.

[Rep39] R. Szabatin, L. Padee: *"Ekspertyza płytki zabezpieczającej w panelu kontrolno-sterującym akceleratora"* (Expertise of Protective Plate in Controlling - Steering Panel of Accelerator), Final report for Soltan Institute for Nuclear Studies (Instytut Problemów Jądrowych, Świerk), No. 501E/1034/1340), Warsaw, Jul. 2001, 6 pp.

[Rep40] W. Winiecki: *“Nowoczesne metody projektowania komputerowych systemów pomiarowych”* (Novel Methods of Computer Systems Designing), Final report for the statutory grant, Institute of Radioelectronics, WUT, (No. 504G/1034/ 0400), Warsaw, Apr. 2001, 128 pp.

[Rep41] W. Winiecki, K. Adamowicz, P. Bobiński, M. Karkowski, R. Leoniak, R. Łukaszewski, A. Trawiński: *"Wykorzystanie nowych technologii programowych do projektowania rozproszonych systemów pomiarowych"* (A New Software Environment for Distributed Measuring Systems Designing), Final report for the Dean grant, Institute of Radioelectronics, WUT, (No. 504G/1034/4023), Warsaw, May 2001, 152 pp.

[Rep42] J. Wojciechowski, J Cichocki, J. Kołakowski, K. Radecki, S. Żmudzin, S. Maszczyk, D. Grabowski, T. Kosiło, T. Buczkowski, K. Czerwiński, W. Kazubski D. Janusek, J. Jarkowski, H. Chaciński: *„Cyfrowa transmisja radiowa"* (Digital Radio Transmission), Final report for the statutory grant, Institute of Radioelectronics, WUT, (No. 504G/1034/0400), Warsaw, Apr. 2001, 38 pp.

[Rep43] J. Wojciechowski, P. Kopyt, R. Majkowski: *„Wyznaczanie niezawodności sieci"* (Method for Estimating All Terminal Reliability of a Network), Final report for the Dean grant, Institute of Radioelectronics, WUT, (No. 503G/1034/4026), Warsaw, Jun. 2001, 6 pp.

[Rep44] W. Wojtasiak D. Gryglewski, M. Lubiejewski, R. Michnowski: *"Opracowanie i wykonanie modeli modułów nadawczo - odbiorczych na pasmo C"* (C Band T/R Modules Design and Perform), Final report for the National Institute of Telecommunications (Państwowy Instytut Telekomunikacji), (No. 501E/1034/1338), Warsaw, Nov. 2001, 10 pp.

8. CONFERENCES, SEMINARS AND MEETINGS

8.1. International conferences

[Con1] *Meeting of IEEE Microvawe Theory and Techniques Society* (Phoenix, USA, Jan. 5-9, 2001), W. Gwarek, J. Modelski (members of the TPC).

[Con2] *CADSM'2001: 6-th International Conference "The Experience of Designing and Application of CAD Systems in Microelecronics"* (Lviv, Ukraine, Feb. 12-17, 2001), D. Janusek, M. Piasecki, Y. Ya-shchyshyn (speakers).

[Con3] *ICASSP'2001* (Utah, USA, May 7-1, 2001), G. Siemek (speaker).

[Con4] *Instrumentation and Measurement Technology Conference: IMTC'2001* (Budapest, Hungary, May 20-24, 2001), R. Z. Morawski (IPC member, session chairman, speaker), W. Winiecki (speaker).

[Con5] *System-Level Indicators for Higher/Tertiary Education*, Invitational Roundtable organised by the Research Institute for Higher Education (RIHE) of Hiroshima University and *the UNESCO European Centre for Higher Education* (Hiroshima, Japan, Jun. 11-13, 2001), R. Z. Morawski (invited speaker).

[Con6] *International Workshop on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications – IDAACS'2001* (Foros, Crimea, Ukraine, Jul. 1-4, 2001), W. Winiecki (speaker).

[Con7] *International Microwave and Optoelectronics Conference* (Belem, Brasil, Aug. 4-13, 2001), J. Modelski (member of the TPC and speaker).

[Con8] *Applied Electronics'2001* (Czech Republic, Pilsen, Sept.4-9, 2001), J. Jarkowski, T. Kosiło (speakers).

[Con9] *9-th International Conference on Computer Analysis of Images and Patterns: CAIP'2001* (Warsaw, Poland, Sept. 5-7, 2001), W. Skarbek (conference chairman), A. Przelaskowski (invited lecturer), K. Ignasiak, (Organizing Committee chair, session chair), A. Buchowicz (session chair, Organizing Committee member), K. Cichoń, P. Bobiński, G. Galiński, R. Seta, K. Wnukowicz (Organizing Committee members). **Conference organized by the Institute.**

[Con10] 8th *International Conference on Microwave and High Frequency Heating AMPERE*, (Bayreuth, Germany, Sept. 2001); M. Celuch-Marcysiak (session chair, speaker).

[Con11] *COMITE'2001* (Pardubice, Czech Republic, Sept. 17-20, 2001), K. Derzakowski (speaker).

[Con12] *International Conference on Signals and Electronic Systems: ICSES'2001*, (Łódź, Poland, Sept. 18-21, 2001), M. Mikołajewski, J. Modzelewski, A. Wajs (speakers).

[Con13] *International Conference on Biomedical Engineering Education* (Prague, Czech Republic, Sept. 19-22, 2001), R. Kurjata, M. Orzechowski, T. Wolak (speakers).

[Con14] *URSI Kleinheubacher Tagung 2001* (Katlenburg-Lindau, Germany, Sept. 23-29, 2001), S. Hahn, J. Jarkowski, K. Sno-pek (speakers).

[Con15] *12-th International Conference on Noise Control* (Kielce, Poland, Sept. 24-26, 2001), E. Kotarbińska, A. Podgórski (speakers).

[Con16] *European Microwave Conference, and European Wireless Congress: EuMC'2001* (London, Great Britain, Sept. 24-28, 2001), J. Modelski (member of the TPC and speaker), W. Gwarek, M. Celuch-Marcysiak, Y. Yashchyshyn, M. Piasecki, K. Kurek (speakers).

[Con17] *International Conference on Image Processing: ICIP-2001* (Thessaloniki, Greece, Oct. 6-11, 2001), A. Przelaskowski (speaker).

[Con18] *International Symposium: Military Communications* (Warsaw, Poland, Oct. 8-9, 2001), J. Modelski (member of TPC), H. Chaciński, T. Keller, G. Siemek (speakers).

[Con19] *IX Międzynarodowe Sympozjum Reżyserii i Inżynierii Dźwięku: ISSET'2001 wraz z VIII Sympozjum: "Nowości w Technice Audio"* (IX-th International Symposium on Sound Engineering and Mastering: ISSET'2001, and VIII-th Symposium: "New Trends in Audio Technology"), (Warsaw, Poland, Oct. 18-20, 2001), Z. Kulka, W. Skarbek (co-chairmen of the Scientific Committee, members of the Organizing Committee), J. Modelski, (member of the Scientific Committee), M. Tajchert (member of the Organizing Committee), A. Aronowski, G. Kustra, M. Mikołowicz, A. Nagórski, P. Nykiel, A. E. Ritz, M. Siek, G. Siemek, R. Smoliński, P. Seta, E. Snitkowska, R. Zawadzki (speakers). **Conference organized by the Institute.**

8.2. Local conferences

[Con20] *Krajowa Konferencja Radiokomunikacji, Radiofonii i Telewizji: KKRRiT 2001* (National Conference on Radiocommunications, Broadcasting and Television) (Poznań, Poland, May 14-16, 2001), J. Modelski (member of the TPC and speaker), W. Skarbek, A. Buchowicz, J. Cichocki, D. Grabowski, K. Ignasiak, P. Kącki, J. Kołakowski, T. Kosiło, K. Kurek, M. Konwicki, T. Keller, A. Krupiczka, T. Krzymień, R. Pączkowski, M. Piasecki, S. Maszczyk, K. Mroczek, K. Radzikowski, G. Siemek, B. Staniszewski, J. Wojciechowski, K. Wnukowicz (participants).

[Con21] *V Szkoła – Konferencja "Metrologia Wspomagana Komputerowo"* (Vth School – Conference: Computer Aided Metrology) (Rynia k/Warszawy, Poland, May 21-24, 2001), R. Łukaszewski, (participant).

[Con22] *III Krajowa Konferencja: Postępy w Elektrotechnice Stosowanej PES-3* (Third National Conference: Advances in Applied Electrotechnics), (Zakopane-Kościelisko, Poland, Jun. 18-22, 2001), M. Mikołajewski, J. Modzelewski, A. Wajs (speakers).

[Con23] *XII Mikrofalowa Wojskowa Konferencja – Sterowanie i Regulacja w Radiolokacji i Obiektach Latających"* (XIIth Microwave Military Conference: Steering and Regulation in Radiolocation and Flying Objects), (Jelenia Góra, Poland, Jun. 19-22, 2001), W. Wojtasiak (speaker).

[Con24] *Krajowy Kongres Metrologii: KKM 2001* (National Congress on Metrology), (Warsaw, Poland, Jun. 24-27, 2001), R. Z. Morawski (NPC member, invited speaker), B. Konarzewski, R. Kurjata A. Podgórski, W. Winiecki (speakers),

[Con25] *XXXIII Międzyuczelniana Konferencja Metrologów: MKM'2001* (XXXIIIrd Inter-University Metrologists' Conference), (Łódź-Arturówek, Poland, Sept. 10-14, 2001), A. Podgórski, W. Winiecki (speakers).

[Con26] *Krajowe Sympozjum Telekomunikacji – KST'2001* (National Symposium on Telecommunications), (Bydgoszcz, Poland, Sept. 12-14, 2001), J. Modelski (member of the TPC and MC), P. Bogorodzki, S. Hahn, K. Snopek, W. Smolik (speakers).

[Con27] *Konferencja Naukowa: Electronic Commerce - Gospodarka XXI wieku*, (Scientific Conference: Electronic Commerce - XXI Century's Economy), (Jastrzębia Góra, Poland, Nov. 9-11, 2001), G. Radzikowski (participant).

[Con28] *XII Krajowa Konferencja Naukowa „Biocybernetyka i Inżynieria Biomedyczna*", (XII National Scientific Conference on Biocybernetics and Biomedical Engineering), (Warsaw, Nov. 28-29, 2001), Z. Pawłowski (chairman), G. Domański (speaker), P. Bogorodzki, B. Konarzewski, R. Kurjata, J. Marzec, M. Orzechowski, T. Wolak, K. Zaremba (participants).

[Con29] *Seminarium firmy Spectris Polska* (New Trends in Audio Measuring Systems of Brüel and Kjaer), (Warsaw, Poland, May 5, 2001), A. Leszczyński, M. Tajchert (participants).

8.3. Schools, seminars and meetings

[Con30] *XLVIII Open Seminar on Acoustics – OSA'2001* (Wrocław – Polanica Zdrój, Poland, Sept. 11-14, 2001), J. Narkiewicz-Jodko (speaker).

[Con31] *1-st Polish-Norwegian Seminar Selected Research Issues at the Polish and Norwegian Universities* (Warsaw, Oct. 18-20, 2001), G. Domański, E. Piątkowska Janko, A. Przelaskowski, W. Smolik (speakers).

[Con32] *II Seminarium Stypendystów Fundacji Radiokomunikacja i Techniki Multimedialne*, (IInd Seminar Scholarship Holders of Fundation for the Development of Radiocommunication and Multimedia Technologies), (Warsaw, Dec. 3, 2001), D.Gryglewski, D.Janusek, J.Kołakowski, K.Kurek, R.Michnowski, A.Miękina, P.Nykiel, A. Przelaskowski, W.Winiecki (speakers).

3. THE PRIZES AND DISTINCTIONS RECEIVED BY THE STAFF

9.1. State Orders and Medals

Jacek Cichocki, Ph.D.,
Tomasz Kosiło, Ph.D.,
Golden Order of Merit

Juliusz Modzelewski, Ph.D.,
Silver Order of Merit

Janina Chmielak
Brown Order of Merit

9.2. Orders and Medals granted by Warsaw University of Technology

Jan Ebert, Prof.,D.Sc.,
Warsaw University of Technology Medal

9.3. Awards of the Rector

Jerzy Kołakowski, Ph.D.,
Individual award (II^0) for the research achievements related to the scope of analysis and measurements of signals and radiocommunication devices.

Zbigniew Kulka, Prof.,D.Sc.,
P. Nykiel, A. Aronowski
Team award (I^0) for the project *"Researches into the influence of environmental agents on the human health and psycho-physical fitness"* (Badania wpływu czynników środowiska na zdrowie i sprawność psychofizyczną człowieka).

9.4. Awards granted by the Foundation for the Development of Radiocommunications and Multimedia Technologies received by the Ph.D. students for the best conference papers

Tomasz Keller, M.Sc.,
Rajmund Pączkowski, M.Sc.,
The first award for the conference paper *Application of Bluetooth standard for interactive Set – Top Box designing* (Wykorzystanie standardu Blutooth przy projektowaniu interaktywnego Set – Top Box'a), Proc. National Conference on Radiocommunications, Broadcasting and Television (Poznań, Poland, May 14-16, 2001).

9.3 Honorary Award

Stefan Hahn, Prof., D.Sc.,
We are kindly informed, that within the National Symposium on Telecommunications (Sept. 12-14, 2001) Prof. Stefan Hahn has been received special prize called "Złoty Cyborg" (Golden Cyborg), and honorary diploma for the outstanding results of scientific researches, and the great deals of effort leading to the development of telecommunications in Poland.

10. STATISTICAL DATA

SPECIFICATION	1999	2000	2001
academic staff total	62,73	60,23	58.83
tenured professors	4,5	4	3.5
professors	6	7	7
assistant professors	42,5	41	41,5
senior lecturers	4,83	6,33	5,33
lecturers	2,9	0,9	0
assistants	2	1	2
Ph.D. students total	39	50	50
regular	28	25	19
regular, the third level studies	3	12	17
part-time	8	13	14
technical and administrative staff total	25,00	24,50	23
R&D associates	14	13,5	12
administrative associates	9	9	9
service workers	2	2	2
space total	2549,1	2549,1	2549,1
laboratories	1172,8	1172,8	1172,8
library	71,2	71,2	71,2
offices of academic staff	1305,6	1305,6	1305,6
computers total	291	334	397
workstations	5	6	3
personal computers	286	328	388
library resources			
books (number of volumes)	13629	14103	14302
books (number of titles)	7624	7765	7894
journals (number of titles subscribed to)	59	125	125
teaching activities			
basic courses	27	27	26
advanced courses	45	51	47
other courses	25	51	70
international projects	2	1	1
research projects total	49	46	53
granted by the University	27	22	24
granted by the State institutions	7	10	14
other projects	15	14	15
titles and degrees awarded			
Prof. titles	0	1	2
Ph.D. degrees	3	1	5
M.Sc. degrees	46	65	72
B.Sc. degrees	10	52+24	56+77
publications total	119	164	146
sci.-tech. books and chapters in books	15	3	4
sci.-tech. papers in journals	23	22	41
sci.-tech. papers in conference proceedings	68	122	83
textbooks	2	1	1
other publications	11	16	6+11
research reports	45	48	44
patents granted	3	0	0
conferences			
number of conferences attended by the staff	39	41	34
number of participants from the Institute	94	140	88