

Silesian University of Technology
Faculty of Automatic Control, Electronics and Computer Science

Annual Review 2008

Institute of Electronics



Akademicka 16, 44-100 Gliwice, Poland
phone: (+48) 32 2371495, (+48) 32 2371529
fax: (+48) 32 2372225, e-mail: instytut.elektroniki@polsl.pl
<http://iele.polsl.pl>

Compiled by
Zdzisław Filus and Edward Hryniewicz

Edited by
Maria Drelichowska

Institute of Electronics, March 2009

FOREWORD

The Institute of Electronics is a part of the Faculty of Automatic Control, Electronics and Computer Science, one of the 12 faculties of the Silesian University of Technology, founded in 1945. The University is located in Gliwice and has about 32,000 students at present. The Faculty of Automatic Control was founded in 1964, and after a few reorganisations it changed its name to the Faculty of Automatic Control, Electronics and Computer Science. Since its creation in 1974 the Institute of Electronics has been involved in various research and teaching activities. The Institute has about 100 members of academic staff and consists of six divisions:

- ◆ *Division of Electronics Fundamentals*
- ◆ *Division of Digital and Microprocessor Systems*
- ◆ *Division of Circuit and Signal Theory*
- ◆ *Division of Telecommunication*
- ◆ *Division of Biomedical Electronics*
- ◆ *Division of Microelectronics and Biotechnology*

The Institute specialises in such advanced fields of engineering as analogue and digital electronic systems, including biomedical systems, production of telecommunication and electronic systems etc. Research in these areas ranges from component to system level, encompassing practical and theoretical investigations with the application of both hardware and software techniques. Research groups are supported by a wide range of test and instrumentation equipment together with computer facilities, which can run with programming languages of all levels and offer various application software. Many of the Institute's research programmes are carried out in close co-operation with industry in order to satisfy the needs of the region, which is the main industrial centre of Poland.

The Institute offers two-stage five-year courses leading to the degree of MSc, which is obtained on the basis of a project and a report, presented during a final examination. After the first stage of study, lasting three and a half years, students can complete their education and leave the university with the BSc degree. Since 2007 two-stage courses in Biomedical Engineering are also run. The Institute participates also in a five-year MSc course in Automatic Control, Electronics and Computer Science, run by the Faculty, in which all teaching is in the English language. In 2007 this course was changed to the two-stage form. The courses normally consist of lectures, laboratories, seminars and projects, and are followed by examinations. Apart from this, the Institute offers five-year courses at evening studies, leading to the degree of BSc. The curricula of the courses run by the Institute are designed for people who want to achieve both theoretical knowledge and practical skills in electronics. At present, the total amount of students is about 1,000. Other didactic activities include postgraduate and PhD studies.

The following pages provide detailed information regarding the research carried out as well as the subjects taught in each division.

CONTENTS

FOREWORD	5
DIRECTORS OF THE INSTITUTE	9
DIVISION OF ELECTRONICS FUNDAMENTALS	11
DIVISION OF DIGITAL AND MICROPROCESSOR SYSTEMS	13
DIVISION OF CIRCUIT AND SIGNAL THEORY	15
DIVISION OF TELECOMMUNICATION	17
DIVISION OF BIOMEDICAL ELECTRONICS	19
DIVISION OF MICROELECTRONICS AND BIOTECHNOLOGY	21
STATUTORY ACTIVITES OF THE INSTITUTE OF ELECTRONICS	23
TITLE OF PROFESSOR	23
PHD DEGREES CONFERRED ON STAFF MEMBERS AND PHD STUDENTS OF THE INSTITUTE OF ELECTRONICS	23
RESEARCH GRANTS	24
GRANTS AWARDED BY THE COMMISSION OF EUROPEAN COMMUNITIES	25
INDIVIDUAL RESEARCH GRANTS AWARDED BY THE MINISTRY OF SCIENCE AND HIGHER EDUCATION TO STAFF MEMBERS OF THE INSTITUTE	27
INTERNATIONAL CO-OPERATION	27

SCIENTIFIC CONFERENCES ORGANISED AND CO-ORGANISED BY THE INSTITUTE OF ELECTRONICS _____	28
STAFF MEMBERS PARTICIPATING IN SCIENTIFIC AND ORGANISING COMMITTEES OF CONFERENCES AND SYMPOSIA _____	28
<i>International</i> _____	28
<i>National</i> _____	29
REVIEWERS _____	30
OTHER IMPORTANT AFFILIATIONS _____	32
PATENTS AND PATENT APPLICATIONS _____	36
OTHER IMPORTANT INFORMATION _____	36
LIBRARY RESOURCES OF THE INSTITUTE OF ELECTRONICS _____	36
LIST OF PUBLICATIONS - 2008 _____	37
BOOKS AND CHAPTERS IN BOOKS _____	56
ABSTRACTS OF SELECTED RESEARCH PROJECTS ____	57
DIVISION OF ELECTRONICS FUNDAMENTALS _____	57
DIVISION OF DIGITAL AND MICROPROCESSOR SYSTEMS ____	59
DIVISION OF CIRCUIT AND SIGNAL THEORY _____	61
DIVISION OF TELECOMMUNICATION _____	64
DIVISION OF BIOMEDICAL ELECTRONICS _____	67
DIVISION OF MICROELECTRONICS AND BIOTECHNOLOGY _____	70

DIRECTORS OF THE INSTITUTE



Director of the Institute:

Prof. Edward HRYNKIEWICZ

Vice Director of the Institute for Research:

Prof. Zdzisław FILUS

Vice Director of the Institute for Teaching:

Asst. Prof. Adam BŁASZKOWSKI

DIVISION OF ELECTRONICS FUNDAMENTALS

Head of Division: Prof. Zdzisław Filus, PhD, DSc

Research staff

Prof. Zdzisław FILUS, PhD, DSc

Prof. Andrzej KARWOWSKI, PhD, DSc

Prof. Leon LASEK, PhD, DSc

Asst. Prof. Adam BŁASZKOWSKI, PhD

Asst. Prof. Władysław CIAŻYŃSKI, PhD

Andrzej BŁONAROWICZ, PhD

Jacek CHEĆCIŃSKI, PhD

Jerzy FIOŁKA, PhD

Zenon KIDONŃ, PhD

Adam KRISTOF, PhD

Sławomir LASOTA, PhD

Mirosław MAGNUSKI, PhD

Andrzej MALCHER, PhD

Artur NOGA, PhD

Wojciech OLIWA, PhD

Zbigniew RYMARSKI, PhD

Maciej SURMA, PhD

Włodzimierz SZMELCER, PhD

Tomasz TOPA, PhD

Grzegorz WIECZOREK, PhD

Dariusz WÓJCIK, PhD

Piotr ZASTAWNIK, MSc

Research fields

- Electronic circuits synthesis
- Symbolic methods of electronic circuits analysis
- Electronic circuits for automotive applications
- Measurement of selected physical quantities based on eddy current methods
- Power electronic circuits
- Microprocessor-based measurement systems
- Computational electromagnetics
- Numerical modelling of radiating and scattering wire objects
- Linear antenna theory
- Electromagnetic compatibility
- Optoelectronics, Fiberoptics

Courses

- Semiconductor Devices
- Analogue Electronic Circuits
- Analogue Circuits Design
- Electronic Measurement Techniques
- Switching Circuits
- Special Semiconductor Devices and Circuits
- Materials Technology and Electronic Equipment Design
- Field and Wave Electromagnetics
- Introduction to Radio Communication
- Radio Engineering Systems
- Fields, Waves and Antennas
- Wireless Computer Networks
- Design of Radio Electronic Devices
- High-Frequency Engineering Fundamentals
- Electromagnetic Compatibility

DIVISION OF DIGITAL AND MICROPROCESSOR SYSTEMS

Head of Division: Prof. Edward HRYNKIEWICZ, PhD, DSc

Research staff

Prof. Edward HRYNKIEWICZ, PhD, DSc

Prof. Andrzej HŁAWICZKA, PhD, DSc

Asst. Prof. Zdzisław POGODA, PhD

Mirosław CHMIEL, PhD

Robert CZERWIŃSKI, PhD

Tomasz GARBOLINO, PhD

Krzysztof GUCWA, PhD

Eugeniusz KOSEK, PhD

Józef KULISZ, PhD

Adam MILIK, PhD

Adam PAWLAK, PhD

Krzysztof PUCHER, PhD

Tomasz RUDNICKI, PhD

Wojciech SAKOWSKI, PhD

Dariusz STACHAŃCZYK, PhD

Krzysztof TABOREK, PhD

Bernard WYRWOŁ, PhD

Dariusz POŁOK, MSc

PhD Students

Jan MOCHA, MSc

Danuta PAMUŁA, MSc

Research fields

- Testing and testability of digital systems
 - * Generation of test patterns
 - * I_{DDQ} testing
 - * Design for testability
 - * Built-in self-tests and concurrent testing
 - * Pseudorandom techniques for built-in tests for VLSI circuits and design of standard P1149 compatible chips
 - * Microcomputer signature analysis
- Design of systems with CPLDs, FPGAs and programmable controllers
 - * Design of support software
 - * Logic synthesis
 - * Implementation of logic structures in CPLDs, FPGAs and pSoCs

- * Fast operating CPU structures of programmable controllers and methods of PLC programming
- * Distributed structures of PLCs
- * PLC applications
- Frequency multipliers based on digital techniques
- Laboratory and industrial data acquisition and control systems
 - * Signal conditioning
 - * Analogue-to-digital and digital-to-analogue converters with optical isolation and fibre optic transmission systems
- Multiprocessor systems
 - * Pipelining and parallel processing
 - * Systems with global memory and arbitration
 - * Statistical analysis of performance for pipelining processing
- ASIC design
 - * High level design methodologies
 - * System modelling and simulation (using VHDL and Verilog)
 - * IP-core design
 - * Distributed design methodologies based on Internet

Courses

- Digital Systems Fundamentals
- Design of Digital Devices
- Microprocessors Fundamentals
- Microprocessor Systems
- Reliability and Testing of Electronic Devices
- Computer Aided Design of Integrated Circuits
- Programmable Logic Devices
- Programmable Controllers

DIVISION OF CIRCUIT AND SIGNAL THEORY

Head of Division: Prof. Jerzy RUTKOWSKI, PhD, DSc

Research staff

Prof. Jerzy RUTKOWSKI, PhD, DSc

Tomasz GOLONEK, PhD

Tadeusz GRABOWIECKI, PhD

Damian GRZECHCA, PhD

Lucjan KARWAN, PhD

Jacek KONOPACKI, PhD

Jan MACHNIEWSKI, PhD

Katarzyna MOŚCIŃSKA, PhD

Andrzej PUŁKA, PhD

PhD Students

Łukasz CHRUSZCZYK, MSc

Piotr JANTOS, MSc

Piotr KYZIOŁ, MSc

Research fields

- Computer-aided electronic circuits analysis and design
 - * Failure diagnostics in analogue electronic circuits
 - * Application of sensitivity methods to the analysis and synthesis of electronic circuits
 - * Modelling and simulation of digital and mixed analog-digital circuits in VHDL language
 - * System level design in SystemC
 - * Application of artificial intelligence methods and genetic algorithms to circuit theory and electronics
 - * Common-sense reasoning modelling and application of AI techniques to circuits models generation and verification
- Digital signal processing focused on digital filters design and application
- Signal processing and basic research into neural networks (analysis, synthesis and optimisation) and their application to engineering practice
 - * Application of neural networks to image processing and recognition, including texture images
 - * Application of wavelet techniques to signal processing
- Web – based education

Courses

- Circuit Theory
- Signal Theory
- Fundamentals of Electrical Engineering
- Information Theory and Coding
- Computer-Aided Design of Electronic Circuits
- Digital Signal Processing
- Neural Networks

DIVISION OF TELECOMMUNICATION

Head of Division: Dr. Jacek IZYDORCZYK

Research staff

Jacek IZYDORCZYK, PhD

Prof. Dariusz KANIA, PhD, DSc

Adam DUSTOR, PhD

Maria DZICZKOWSKA, PhD

Leszek DZICZKOWSKI, PhD

Grzegorz DZIWIKI, PhD

Piotr KŁOSOWSKI, PhD

Marcin KUCHARCZYK, PhD

Andrzej KUKIEŁKA, PhD

Jerzy WOJTUSZEK, PhD

Piotr ZAWADZKI, PhD

PhD Students

Mariusz BAŁK, MSc

Wojciech SUŁEK, MSc

Research fields

- Digital commutation in modern telecommunication systems
 - * Construction of telephone exchanges
 - * Supervisory software for telephone exchanges
 - * Special services (e.g. teleconferences)
 - * Implementation of digital networks with integrated services (ISDN, B-ISDN, ATM)
- Application of digital signal processing to telecommunication
 - * Compression of speech signal with the application of DSPs
 - * Speech synthesis
 - * Speech and speaker recognition
 - * Application of artificial neural networks to signal processing
 - * Design, testing and implementation of error correcting and modulating codes
 - * Design of modern local area networks
 - * Implementation and testing of new services in the Internet
 - * xDSL technology

- Electromagnetic field engineering
 - * Radiation and scattering of electromagnetic waves
 - * Lightning protection
- Modems

Courses

- Fundamentals of Analogue and Digital Communication
- Fundamentals of Commutation
- Switching Nodes and Exchanges
- Principles of Transmission
- Communication Systems
- Signal Theory
- Information Theory and Coding
- Digital Signal Processing
- Computer-Aided Analysis of Electronic Circuits
- Digital Signal Processors (DSP)
- Neural Networks
- Computer Networks
- Internet
- Modems
- Introduction to Cryptography

DIVISION OF BIOMEDICAL ELECTRONICS

Head of Division: Prof. Jacek ŁĘSKI, PhD, DSc

Research staff

Prof. Jacek ŁĘSKI, PhD, DSc

Prof. Ewa PIĘTKA, PhD, DSc

Paweł BADURA, PhD

Robert CZABAŃSKI, PhD

Arkadiusz GERTYCH, PhD

Norbert HENZEL, PhD

Jerzy IHNATOWICZ, PhD

Jacek KAWA, PhD

Marian KOTAS, PhD

Tomasz PANDER, PhD

Stanisław PIETRASZEK, PhD

Sylvia POŚPIECH-

KURKOWSKA, PhD

Tomasz PRZYBYŁA, PhD

Dominik SPINCZYK, PhD

Ewa STRASZECKA, PhD

Wojciech WIĘCŁAWEK, PhD

Piotr ZARYCHTA, PhD

PhD Students

Michał JEŻEWSKI, MSc

Joanna CZAJKOWSKA, MSc

Marcin RUDZKI, MSc

Research fields

- Biocybernetics and biomedical engineering - processing of information in medicine
 - * Processing of biomedical signals
 - * Image processing and analysis
 - * Fuzzy sets and systems, neuro-fuzzy systems
 - * Pattern recognition
 - * Cybernetics
 - * Computer assisted medical diagnosis
 - * Hospital information system
 - * Picture archiving and communications systems
 - * Medical information systems integration
 - * Expert systems in medicine
 - * Time-frequency analysis of biomedical signals
 - * Multirate signal processing
 - * Evolutionary computations

- * Artificial neural networks
- * Data mining
- * Artificial intelligence

- Design, construction and testing of electronic medical apparatus
 - * Design and construction of amplifiers for biological signals and data acquisition systems co-operating with computers
 - * Testing of electromedical apparatus
 - * Design of electronic devices for data acquisition

Courses

- Electromedical Metrology
- X-ray and Nuclear Imaging
- Medical Information Systems
- Cybernetics
- Electromedical Equipment
- Pattern Recognition
- Principles of Knowledge Engineering
- Diagnostic Imaging Systems
- Biocybernetics
- Computers in Medicine
- Diagnostic Cardiological Systems
- Computer Aided Medical Diagnosis
- Materials Science and Principles of Construction of Electronic Equipment
- Probability Theory and Mathematical Statistics
- Numerical Methods
- Biomedical Information Processing

DIVISION OF MICROELECTRONICS AND BIOTECHNOLOGY

Head of Division: Prof. Ewaryst TKACZ, PhD, DSc

Research staff

Prof. Ewaryst TKACZ, PhD, DSc

Prof. Sławomir KONCZAK, PhD, DSc

Weronika IZYDORCZYK, PhD

Dariusz KOMOROWSKI, PhD

Paweł KOSTKA, PhD

Piotr KOWALIK, PhD

Zbigniew PRUSZOWSKI, PhD

Jerzy ULJANOW, PhD

Krzysztof WACZYŃSKI, PhD

Edyta WRÓBEL, PhD

PhD Students

Wojciech FILIPOWSKI, MSc

Artur GINTROWSKI, MSc

Research fields

- Biotechnology and bioinformatics
 - * Analysis of gene expressions
 - * Computer assisted medical diagnosis
 - * Time-frequency analysis of biomedical signals
 - * Multirate signal processing
 - * Evolutionary computations
- Design of electronic devices for data acquisition
- Application of organosilicon compounds to the production of doped glasses for semiconductor technology
- Special hybrid circuits made in thick (thin) film technology
 - * Hermetic sealing of hybrid circuits based on epoxy plastics
 - * Manufacture and stability testing of resistance ladders based on pastes of Polish production
 - * Vapour deposition of metallic layers applied to hybrid circuits
- Chemical compounds for thick- and thin-film sensors
- Solar cells and photovoltaic systems

Courses

- Materials Science and Principles of Construction of Electronic Equipment
- Electromedical Metrology
- Bionics
- Computers in Medicine
- Biotechnology in Medicine
- Computer Assisted Diagnostics in Medical Care
- Artificial Organs
- Microelectronics
- Physics of Microfabrication
- Electronic Devices, Semiconductor Structures and Circuits
- Sensors
- Principles of Electron Technology
- Semiconductor Devices
- Special Semiconductor Devices
- Thin-Film Technology
- Thick-Film Technology
- Design of Thick/Thin-Film Circuits
- Hybrid Circuit Technology
- Hermetic Sealing
- Solid-State Physics
- Physics
- Physics in Medicine

STATUTORY ACTIVITIES OF THE INSTITUTE OF ELECTRONICS

TITLE OF PROFESSOR

1. The President of Poland conferred the title of professor on **Ewaryst Tkacz**, PhD, DSc, on 22 October 2007.

PHD DEGREES CONFERRED ON STAFF MEMBERS AND PHD STUDENTS OF THE INSTITUTE OF ELECTRONICS

1. **Katarzyna Wierzbowska**, Studies of electronic and sensing properties of epitaxial InP surfaces for applications in gas sensor devices, PhD advisor: Prof. Bogusława Adamowicz, 29 January 2008 (defended in LASMEA, University of Clermont-Ferrand, France, on 14 December 2007)
2. **Maciej Witczyński**, Design of integrated electronic circuits like „System on a Chip” within a virtual engineering enterprise, PhD advisor: Prof. Edward Hrynkiewicz, 26 February 2008 (with honours)
3. **Weronika Izydorzycyk**, Studies of an influence of surface states on the electronic properties of SnO₂ sensor layers, PhD advisor: Prof. Bogusława Adamowicz, 15 July 2008, (with honours)
4. **Ireneusz Kurowski**, Use of neural networks to analog fault detection and location, PhD advisor: Prof. Jerzy Rutkowski, 15 July 2008

RESEARCH GRANTS

Research activities of the Institute of Electronics are mainly financed by the Ministry of Science and Higher Education within the frames of a general research programme:

- *Development of new research areas in electronics, telecommunication and signal processing*

Apart from this, each division of the Institute carries out its own research in the following general areas, which are further subdivided into individual research projects:

Division of Electronics Fundamentals:

- *Electronic components, circuits and systems - development of measurement methods, analysis and synthesis*

Division of Digital and Microprocessor Systems:

- *Multiprocessor systems, application specific integrated circuits programmable logic devices and systems - analysis, design and testing*

Division of Circuit and Signal Theory:

- *Computer-aided methods of analysis, synthesis and testing of electronic systems and their selected applications*

Division of Telecommunication:

- *Development of methods and applications of digital channel commutation and transmission of digital signals, theoretical and experimental methods of examination of bodies radiating and dissipating electromagnetic waves*

Division of Biomedical Electronics:

- *Acquisition and processing of biomedical information*

Division of Microelectronics and Biotechnology:

- *Application methods of microelectronic technologies and biotechnologies*

In total, forty two individual research projects were completed in 2008.

GRANTS AWARDED BY THE COMMISSION OF EUROPEAN COMMUNITIES

1. MAPPER Project (Model-based Adaptive Product and Process Engineering), 6th Framework Programme of European Union) - FP6-2004-IST-NMP-2, Project 016527 (Dr. A. Pawlak)

The MAPPER project (*mapper.eu.org*) after 30 months of its operation completed its works in the first quarter of 2008. In the final period of project activities consortium's efforts concentrated on:

- Deployment of the project R&D results at industrial users sites (CR Fiat, Evatronix, advICo, Kongsberg Automotive);
- Verification, demonstration, as well as documentation of visual knowledge models of processes, products and resources in all three application scenarios of the project;
- Finalisation of works on new services that are provided by the MAPPER collaborative platform and which have been developed by the technological partners of the project (Active Knowledge Modelling, FernUni Hagen, Fraunhofer IGD, Silesian Univ. of Technology).

The important result of the group from SUT (Institute of Electronics) constitutes elaboration and coordination of works on the three project reports:

- D15 *Collaborative design process – model, analysis and evaluation,*
- D17 *Final Plan for using and disseminating knowledge, and*
- D19 *Evaluation of impacts of exploitation and dissemination.*

The D15 report summarised R&D efforts of the Use Case - *Collaborative IP-based SoC design* that were conducted essentially by Evatronix SA (Gliwice), advICo GmbH (Recklinghausen, Germany) and SUT. They were supported by technology providers, namely: AKM, FernUni Hagen, as well as the Social Sciences Department of the University of Trento (Italy) and the Vienna

University of Technology. The last two partners were conducting ethnographic research among the engineers at Evatronix. The main objective of the report was to demonstrate application of the active (visual) knowledge modelling technique to computer aided design of an electronic system, as well as evaluation of pros and cons for use of the collaborative platform of user configurable services for supporting designing in a distributed engineering team. The objective of the design experiment was an IP component, namely: USB High Speed OTG Transceiver (PHY, physical layer). D15 reports also the final works on the version 2 of TRMS (Tool Registration and Management Services) which have been developed at SUT.

The D17 report comprises the final plan for exploitation and promotion of project results. Similarly, the D19 report looks to the future “impact” of these MAPPER results. In the meantime, SUT has overtaken from the Norwegian company AKM responsibility for the project public portal <http://mapper.eu.org> and enriched it with the new contents. This portal comprises numerous project resources, like: public reports, publications list, significant project presentations, overview of the project spin-off companies and products.

Detailed information on the project results including availability of tools, papers and reports is available upon email request at *Adam.Pawlak@polsl.pl*.

INDIVIDUAL RESEARCH GRANTS AWARDED BY THE MINISTRY OF SCIENCE AND HIGHER EDUCATION TO STAFF MEMBERS OF THE INSTITUTE

1. **Prof. E. Tkacz**, Elaboration of the New Methodology for Electrogastrographic Signals Examination Concerning Identification of Human Multi-channel EGG Characteristic Parameters Repeatability
2. **Prof. E. Piętka**, Computer aided evaluation of the demyelination process in multiple sclerosis
3. **Prof. E. Piętka**, Photodynamic image archiving, analysis and communication system in cancer diseases
4. **W. Izydorzyc (MSc)** (PhD grant, advisor: Prof. B. Adamowicz), Studies of an influence of surface states on the electronic properties of SnO₂ sensor layers
5. **T. Topa MSc** (PhD grant, advisor: Prof. A. Karwowski), An effective hybrid method MoM-FDTD for wide-band analysis of radiating and scattering objects
6. **W. Sułek (MSc)**, (PhD grant, advisor: Prof. D.Kania), LDPC codes effectively decoded with programmable logic devices

INTERNATIONAL CO-OPERATION

1. Technical University of Ostrava, Department of Measurements and Control, Czech Republic (Prof. E. Hryniewicz)
2. University of Southern California (Prof. E. Piętka)
3. SECTRA – Sweden (Prof. E. Piętka)
4. Technical University of Prague, Institute of Bioengineering, Czech Republic (Prof. E. Tkacz)
5. Technical University of Stuttgart, Institute of Bioengineering, Germany (Prof. E. Tkacz)
6. California University, Department of Electrical Engineering and Computer Science, Berkeley, USA (Dr. A. Pułka)
7. Université Henri Poincaré, Nancy, France (Dr. N. Henzel)

SCIENTIFIC CONFERENCES ORGANISED AND CO-ORGANISED BY THE INSTITUTE OF ELECTRONICS

1. The 9th International Conference Symbiosis 2008, 11-13 June 2008, Kamień Śląski, Prof. E. Tkacz
2. International Conference on Information Technology in Biomedicine, 16-18 June 2008, Kamień Śląski, Prof. E. Piętka
3. The 7th International PhD Students' Workshop Control & Information Technology - IWCIT 2008, 18-19 September 2008, Gliwice, Prof. Z. Filus

STAFF MEMBERS PARTICIPATING IN SCIENTIFIC AND ORGANISING COMMITTEES OF CONFERENCES AND SYMPOSIA

International

1. **Prof. Z. Filus**, Chairman, Of Program Committee and Organizing Committee, 7th International PhD Students' Workshop on Control and Information Technology, IWCIT, 18-19 September 2008, Gliwice
2. **Dr T. Garbolino**, Chairman and Program Committee, 11th IEEE Workshop on Design and Diagnostics of Electronic Systems, DDECS 2008, 16-18 April 2008, Bratislava, Slovakia
3. **Prof. A. Hławiczka**, Steering Committee Honorary Member and Program Committee, 11th IEEE Workshop on Design and Diagnostics of Electronic Systems, DDECS 2008, 16-18 April 2008, Bratislava, Slovakia
4. **Prof. E. Hryniewicz**, Steering Committee and Program Committee, 11th IEEE Workshop on Design and Diagnostics of Electronic Systems, DDECS 2008, 16-18 April 2008, Bratislava, Slovakia
5. **Prof. E. Hryniewicz**, Program Committee on 7th International PhD Students' Workshop on Control and Information Technology, IWCIT, 18-19 September 2008, Gliwice
6. **Prof. J. Łęski**, Conference on Information Technology in Biomedicine, 16-18 June 2008, Kamień Śląski
7. **Dr. A. Pawlak**, Steering Committee and Program Committee, 11th IEEE Workshop on Design and Diagnostics of Electronic Systems, DDECS 2008, 16-18 April 2008, Bratislava, Slovakia
8. **Dr. A. Pawlak**, Program Committee, 9th IFIP Working Conference on Virtual Enterprises, 8-10 September 2008, Poznań

9. **Dr. A. Pawlak**, Program Committee, IEEE Third Symposium on Industrial Embedded Systems, 11- 13 June 2008, Montpellier, La Grande Motte, France
10. **Dr. A. Pawlak**, Program Committee of 11th IEEE Workshop on Design and Diagnostics of Electronic Circuits and Systems, 16-18 April 2008, Bratislava, Slovakia
11. **Dr. A. Pawlak**, Program Committee of 11th EUROMICRO Conference on Digital System Design (DSD), 3-5 September 2008, Parma, Italy
12. **Prof. E. Piętko**, 9th International Conference SYMBIOSIS 2008, 11-13 June 2008, Kamień Śląski
13. **Prof. E. Piętko**, Conference on Information Technology in Biomedicine, 16-18 June 2008, Kamień Śląski
14. **Prof. J. Rutkowski**, Program Committee of International Conference on Signals and Electronic Systems ICSES'08, 14-17 September 2008, Cracow
15. **Prof. J. Rutkowski**, Program Committee of 7th International PhD Students' Workshop on Control and Information Technology, IWCIT, 18-19 September 2008, Gliwice
16. **Prof. E. Tkacz**, Chairman of 9th International Conference SYMBIOSIS 2008, 11-13 June 2008, Kamień Śląski
17. **Prof. E. Tkacz**, Conference on Information Technology in Biomedicine, 16-18 June 2008, Kamień Śląski

National

1. **Prof. Z. Filus**, 7th National Electronics Conference, 2-4 June 2008, Dąbrowa Górnicza
2. **Prof. A. Hławiczka**, Conference Computer Networks, 17-20 June 2008, Zakopane
3. **Prof. E. Hryniewicz**, 11th National Conference Reprogrammable Digital Circuits RUC 2008, 15-16 May 2008, Szczecin
4. **Prof. E. Hryniewicz**, 7th National Electronics Conference, 2-4 June 2008, Dąbrowa Górnicza
5. **Prof. E. Hryniewicz**, 5th Scientific Conference „Computer Science – Art. Or Craft?” and Training Workshop of the Institute of Computer Science and Electronics of the Zielona Góra University, 23-26 June 2008, Szklarska Poręba

6. **Prof. D. Kania**, 11th National Conference Reprogrammable Digital Circuits RUC 2008, 15-16 May 2008, Szczecin
7. **Prof. L. Lasek**, 7th National Electronics Conference, 2-4 June 2008, Darłówko Wschodnie
8. **Prof. E. Piętka**, Conference Databases – Applications and Systems, 27-30 May 2008, Ustroń
9. **Prof. J. Rutkowski**, 7th National Electronics Conference, 2-4 June 2008, Darłówko Wschodnie
10. **Prof. J. Rutkowski**, Conference Computer Networks, 17-20 June 2008, Zakopane
11. **Prof. J. Rutkowski**, Conference Databases – Applications and Systems, 27-30 May 2008, Ustroń

REVIEWERS

1. **Dr. R. Czabański**, Fuzzy Sets and Systems; IET Control Theory & Applications; Hindawi Publishing Corporation; Applied Mathematics and Computer Science
2. **Dr. T. Garbolino**, reviewer of EU project proposals
3. **Dr. T. Golonek**, IEEE Transactions on Circuits and Systems-Part II; International Journal of Modelling and Simulation; International Journal of Circuit Theory and Applications
4. **Prof. A. Hławiczka**, grant proposals for the Czech Grant Agency (since 2000)
5. **Prof. E. Hryniewicz**, grant proposals for the Czech Grant Agency (since 2000); International Journal on Applied Mathematics and Computer Science; IFAC PdeS, IEEE – ICSES, IFAC Congress 2008, IEEE DDECS Symposium, Conference on Reprogrammable Digital Devices
6. **Dr. J. Izydorczyk**, reviewer of conference papers: 6th International Conference on Education and Information Systems, Technologies and Applications: EISTA 2008, and journal contributions: Physica Status Solidi; IEEE Transactions on Magnetics
7. **Prof. A. Karwowski**, IET Proceedings Microwaves, Antennas & Propagation (London); Electronic Letters; IEEE Transactions on Antennas and Propagation; IEEE Transactions on Microwave Theory

and Techniques; International Symposium and Exhibition on Electromagnetic Compatibility (EMC)

8. **Dr. P. Kłosowski**, reviewer of conference papers: The 6th International Conference on Education and Information Systems, Technologies and Applications: EISTA2008
9. **Dr. J. Konopacki**, IEEE Signal Processing Letters; IEEE Transactions on Circuits and Systems-Part II; IEEE Transactions on Signal Processing; IEEE Transactions on Circuits and Systems I
10. **Dr. M. Kotas**, IEEE Transactions on Biomedical Engineering; Computer Methods and Programs in Biomedicine; Biomedical Signal Processing and Control
11. **Prof. J. Łęski**: Medical Technology w Medical Science Monitor; IEEE Trans. Neural Networks; International Journal Applied Mathematics and Computer Sciences; IEEE Trans. Systems, Man & Cybernetics; Journal of Applied Computer Science; European Journal of Operational Research, Fuzzy Sets and Systems; Pattern Recognition Letters; IEEE Trans. Biomedical Engineering; IEEE Trans. Fuzzy Systems; Journal of Theoretical and Applied Mechanics; IEEE Trans. Signal Processing; Computational Statistics and Data Analysis; Bulletin of the Polish Academy of Sciences; BioMedical Engineering OnLine.
12. **Prof. E. Piętko**, CARS – Computer Assisted Radiology and Surgery; EuroPACS (European PACS Society); CORES; IEEE Transactions on Medical Imaging; Computerised Medical Imaging and Graphics; Medical Science Monitor; European Journal of Operational Research; Modelling and Simulation in Engineering VLSI Design
13. **Dr. A. Pawlak**, Special issue of the International Journal of Services and Operations Management (IJSOM)) devoted to the theme of "Modeling and management of knowledge in collaborative networks", Special issue of the Journal of Production Research from Taylor&Francis, devoted to the theme of "Virtual Enterprises - Methods and Approaches for Coalition Formation", EU projects and project proposals concerning nanoelectronics and networked enterprises
14. **Dr. A. Pułka**, reviewer of EU projects and project proposals
15. **Prof. J. Rutkowski**, IEEE Transactions on Computer Aided Design (CAD)

16. **Dr. E. Straszecka**, Information Sciences, International Journal Elsevier
17. **Prof. E. Tkacz**, grant proposals for the Czech Grant Agency, IEEE Transactions on Biomedical Engineering; Elsevier Signal Processing

OTHER IMPORTANT AFFILIATIONS

1. **Prof. Z. Filus**, member of the section Electronics at the Katowice Branch of the Polish Academy of Sciences
2. **Prof. Z. Filus**, Section on Signals, Circuits and Systems of the Electronics and Telecommunication Committee, Polish Academy of Sciences
3. **Prof. A. Hławiczka**, member of the Steering Committee of the European Dependable Computing Conference (EDCC) and the European Workshop (EWDC)
4. **Prof. E. Hrynkiewicz**, member of the Electronics and Telecommunication Committee, Polish Academy of Sciences
5. **Prof. E. Hrynkiewicz**, Chairman of the section Electronics at the Katowice Branch of the Polish Academy of Sciences
6. **Prof. E. Hrynkiewicz**, Section on Signals, Circuits and Systems of the Electronics and Telecommunication Committee, Polish Academy of Sciences
7. **Prof. E. Hrynkiewicz**, Microelectronics Section of the Electronics and Telecommunication Committee, Polish Academy of Sciences
8. **Prof. E. Hrynkiewicz**, Member of IFAC Technical Committee TC 4.1 on Components and Technologies for Control
9. **Dr. J. Izydorczyk**, Chairman of Computer Society Chapter, Poland Section IEEE
10. **Dr. J. Izydorczyk**, member of the section Electronics at the Katowice Branch of the Polish Academy of Sciences
11. **Prof. D. Kania**, member of the section Electronics at the Katowice Branch of the Polish Academy of Sciences
12. **Prof. D. Kania**, Section on Signals, Circuits and Systems of the Electronics and Telecommunication Committee, Polish Academy of Sciences

13. **Prof. A. Karwowski**, founder and Chairman of the Polish Chapter of the IEEE Electromagnetic Compatibility Society
14. **Prof. A. Karwowski**, Member of the International Steering Committee of EMC Europe -- International Symposia and Workshops on Electromagnetic Compatibility
15. **Prof. A. Karwowski**, Vice-Chairman of the Antennas and Propagation Society, AP/AES/MTT Joint Chapter of the IEEE Poland Section
16. **Prof. A. Karwowski**, member of the 4th Workgroup (WG 4) "Characterization of high frequency electromagnetic fields and SAR produced by specific sources", Technical Committee 106 "Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure" of the International Electrotechnical Commission (IEC)
17. **Prof. A. Karwowski**, member of the Project Team (PT) 62209 "Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices - Human models, Instrumentation, and Procedures", Technical Committee 106, IEC
18. **Prof. A. Karwowski**, member of the Project Team (PT) 62232 "EM fields from base stations for mobile telephone", Technical Committee 106, IEC
19. **Prof. A. Karwowski**, member of the Technical Committee 104 for Electromagnetic Compatibility of the Polish Standardisation Committee
20. **Prof. A. Karwowski**, member of the Electromagnetic Compatibility Section, Electronics and Telecommunication Committee, Polish Academy of Sciences
21. **Prof. A. Karwowski**, member of the Microwave Section, Electronics and Telecommunication Committee, Polish Academy of Sciences
22. **Dr. J. Konopacki**, Secretary of the section Electronics at the Katowice Branch of the Polish Academy of Sciences
23. **Prof. J. Łęski**, member of the division Fuzzy Logic and Neural Networks at the section Automatics and Robotics of the Polish Academy of Sciences, Polish Biomedical Engineering Society
24. **Prof. J. Łęski**, member of the IEEE Computational Intelligence Society
25. **Prof. J. Łęski**, member of the IEEE EMBS Society

26. **Prof. J. Łęski**, member of the IEEE Signal Processing Society
27. **Prof. J. Łęski**, member of the IEEE Systems, Man and Cybernetics Society.
28. **Prof. J. Łęski**, member of the Polish Society of Theoretical and Applied Electrotechnics
29. **Prof. J. Łęski**, member of the Polish Society of Biomedical Engineering
30. **Prof. J. Łęski**, member of the Scientific Committee of the Biomedical Engineering Centre
31. **Prof. J. Łęski**, member of the Scientific Committee of the Institute of Medical Technology and Equipment
32. **Prof. J. Łęski**, member of the section Electronics at the Katowice Branch of the Polish Academy of Sciences
33. **Prof. J. Łęski**, member of the Steering Committee at the Gliwice-Opole Branch of the Polish Society of Theoretical and Applied Electrotechnics
34. **Prof. J. Łęski**, senior Member IEEE
35. **Dr. A. Pawlak**, member of IFIP (International Federation for Information Processing) W.G. 10.5 "Electronic Systems Description and Design Tools"
36. **Dr. A. Pawlak**, correspondent of EUROMICRO Association, IFIP (International Federation for Information Processing) W.G. 10.5 "Electronic Systems Description and Design Tools"
37. **Dr. A. Pawlak**, member of the Telecommunication Board at the Office of Electronic Communications
38. **Dr. A. Pawlak**, ECSI (European CAD Standardization Initiative) supported by the Institute of Electron Technology, Warsaw
39. **Dr. A. Pawlak**, member of the Steering Committee of the European Workshop on Design and Diagnostics of Electronic Circuits and Systems (DDECS)
40. **Prof. E. Piętka**, IEEE Poland Section - Engineering in Medicine and Biology - chair of the EMS Chapter
41. **Prof. E. Piętka**, member of the Board of European PACS Society (EuroPACS)
42. **Prof. E. Piętka**, member of the Programme Committee of Computer Assisted Radiology and Surgery

43. **Prof. E. Piętka**, member of the Programme Committee of European Congress of Radiology
44. **Prof. E. Piętka**, member of the Section Electronics at the Katowice Branch of the Polish Academy of Sciences
45. **Dr. A. Pułka**, member of Chess (Center for Hybrid and Embedded Software Systems) at the University of California
46. **Prof. J. Rutkowski**, member of IEEE CAS (Circuits and Systems) Society
47. **Prof. J. Rutkowski**, member of IEEE IAM (Instrumentation and Measurements) Society
48. **Prof. J. Rutkowski**, member of the Polish Society of Theoretical and Applied Electrotechnics (PTETIS)
49. **Prof. J. Rutkowski**, Section on Signals, Circuits and Systems of the Electronics and Telecommunication Committee, Polish Academy of Sciences
50. **Prof. J. Rutkowski**, member of the Electronics and Telecommunication Committee of the Polish Academy of Sciences - Microelectronics Section
51. **Prof. J. Rutkowski**, member of the Accreditation Commission of Technical Universities in Poland - Electronics and Telecommunication Section
52. **Prof. J. Rutkowski**, Steering Committee member of the Electronics and Telecommunication Panel of the Polish Academy of Sciences
53. **Prof. E. Tkacz**, member of the International Advisory Board of the Annual Journal of Medical Informatics and Technology published by the University of Silesia
54. **Prof. E. Tkacz**, member of the Section Electronics at the Katowice Branch of the Polish Academy of Sciences
55. **Prof. E. Tkacz**, IEEE/EMBS (Engineering in Medicine and Biology Society)
56. **Prof. E. Tkacz**, EUROSIM – BIOSIGNAL, TTK (Polish Cardiac Society)
57. **Prof. E. Tkacz**, ECS (European Cardiac Society)

PATENTS AND PATENT APPLICATIONS

1. **Grzegorz Wieczorek (PhD), Piotr Szyngiera (MSc)**, Patent No. 201251, 26 September 2008, "Method and apparatus for electromagnetic anomaly detection and identification"
2. **Adam Kristof (PhD)**, Patent application No. 386534 of 17 November 2008, "Circuit Structure and Method of Biasing and Linearization of the Amplifier's Power-Stage Vacuum Tubes"
3. **Mirosław Magnuski (PhD)**, Patent application No. 386731 of 8 December 2008, "Measurement procedure and microwave test set for measurement of amplitudes and phase angle of scattering waves or correlation coefficient of noise scattering waves"

OTHER IMPORTANT INFORMATION

Dr. Piotr Badura's PhD thesis was awarded in a competition for the best thesis organised by the Polish Society of Image Processing

Dr. Jacek Izydorczyk's, article entitled „Moore's law and bounds of electron technology" published in the March 2007 issue of Telecommunication Review and Telecommunication News was honoured in 2008 with the third award in the best paper competition held by SEP (Polish Institute of Electrical Engineers)

Dr. Piotr Kłosowski was awarded for the best session paper presented on the 6th International Conference on Education and Information Systems, Technologies and Applications: EISTA2008 in the context of the 2nd International Multi-Conference on Society, Cybernetics and Informatics: IMSCI2008, Orlando, Florida, USA, 2008)

Wojciech Sułek (MSc), PHD student in the Telecommunication Division of the Institute, won the first award in the competition for the best paper submitted by a young participant of the National Symposium on Telecommunication and Teleinformatics KSTiT 2008

LIBRARY RESOURCES OF THE INSTITUTE OF ELECTRONICS

Total number of book titles	6846
Number of subscribed national journals	8
Number of subscribed foreign journals	20

LIST OF PUBLICATIONS - 2008

The Institute publishes its own publication, *Zeszyty Naukowe Pol. Śl. ELEKTRONIKA*, edited by Asst. Prof. Zdzisław Pogoda. Fourteen issues have been published up to now.

1. Adamowicz B., **Izydorczyk W., Izydorczyk J.**, Klimasek A., Jakubik J., Żywicki J., Response of an optimized SnO₂-based gas sensor to oxygen, Elsevier, Vacuum 82 (2008), pp. 966-970
2. **Badura P., Kawa J., Piętka E.**, Fuzzy Connectedness-based Lung Nodule CAD, Proc. 94th Scientific Assembly and Annual Meeting of the Radiological Society of North America, RSNA, Chicago, 2008
3. **Badura P., Piętka E.**, Lung Nodule CAD Integrated with PACS and eAtlas, Int. J. Computer Assisted Radiology and Surgery, 2008, pp.396-397
4. **Badura P., Piętka E.**, Pre- and Postprocessing Stages in Fuzzy Connectedness-Based Lung Nodule CAD, in: Piętka E., Kawa J. (Eds.) Information Technologies in Biomedicine, Advances in Soft Computing, Springer-Verlag Berlin Heidelberg, 2008, pp. 192-199 (reprint from IEEE Conference on "Information Technologies in Biomedicine", Kamień Śląski, 16-18 June 2008)
5. **Badura P., Więclawek W., Zarychta P., Piętka E.**, Multistage didactic process on the basis of biomedical information processing, Inżynieria Biomedyczna, Acta Bio-Optica et Informatica Medica, vol.14, No. 3/2008, pp. 30-34, ISSN 1234-5563 (1st National Conference Biomedical Engineering - Education, OKIBEDu2008, Cracow, 6 June 2008)
6. **Bąk M., Dustor A.**, The Application of Support Vector Machine in Speaker Verification, ed. P. Gaj, B. Pochopień, S. Kozielski, Contemporary aspects of computer networks, WKiŁ, Warsaw 2008, pp. 299-308
7. **Bąk M.**, Elimination of Indiscriminative Fragments of the Utterance in Automatic Speaker Recognition, Proceedings of X International PhD Workshop OWD 2008, Wisła, 2008, Conference Archives PTETiS 2008, vol. 25, pp. 23-28

8. **Bąk M.**, Robust Cepstral Features for Analysis of Oligonucleotide Microarrays, The Seventh International PhD Students' Workshop Control & Information Technology IWCIT'08, Gliwice, 18-19 September 2008, pp. 151-156
9. **Bąk M.**, Robust Cepstral Features for Speaker Verification, The Seventh International Workshop – Control and Information Technology, IWCIT, Gliwice, 18-19 September 2008, pp. 124-129
10. Bujak P., **Henzel N.**, Matlengiewicz M., Microstructure Study of Methyl Methacrylate/n-Butyl Acrylate Copolymer by ¹³C NMR Spectroscopy, International Journal of Polymer Analysis and Characterization, 2008, 13:3, pp. 149-162
11. **Chmiel M.**, **Hryniewicz E.**, Fast Operating Bit-Byte PLC, Proceedings of the 17th World Congress, The International Federation of Automatic Control, Seoul, Korea, 6-11 July, 2008, pp. 14810-14815 (DVD-ROM)
12. **Chmiel M.**, Mularczyk W., Electromagnetic compatibility in an intrinsically safe device, Elektronika No. 11, 2008, pp. 37-140
13. **Chojcan J.**†, **Izydorczyk J.**, **Kukielka A.**, Sensitivity analysis of transfer functions of active affined two-ports, XXXI IC-SPETO, Gliwice-Wisła, 28-30 May 2008, pp. 61–62
14. **Chruszczyk Ł.** **Rutkowski J.**, Excitation Optimization in Fault Diagnosis of Analog Electronic Circuits, 11th IEEE Workshop on Design and Diagnostics of Electronic Systems, DDECS 2008, 16-18 April 2008, Bratislava, Slovakia, pp. 279-282
15. **Chruszczyk Ł.**, **Rutkowski J.**, Enhancement of parametric faults diagnosis, Elektronika, No. 11, 2008, pp. 163-166
16. **Chruszczyk Ł.**, **Rutkowski J.**, Specialised Excitation and Wavelet Feature Extraction in Fault Diagnosis of Analogue Electronic Circuits, International Conference Mixed Design of Integrated Circuits and Systems (MIXDES), 19-21 June 2008, Poznań, Poland
17. **Chruszczyk Ł.**, **Rutkowski J.**, Optimal excitation in fault diagnosis of analog electronic circuits, IEEE International Conference on Electronics, Circuits, and Systems (ICECS), The 2nd European Computing Conference, ECC'08, Sponsored by WSEAS, New Aspects on Computing Research, WSEAS Press, Malta, Malta, 31 July – 3 September 2008

18. **Czabański R., Jeżewski M.,** Wróbel J., Horoba K., Jeżewski J., A neuro-fuzzy approach to the classification of fetal cardiocograms, IFMBE Proceedings of the 4th Nordic-Baltic Conference on Biomedical Engineering and Medical Physics, Vol. 20, 2008, pp. 446-449
19. **Czabański R., Jeżewski M.,** Wróbel J., Kupka T., **Łęski J.,** Jeżewski J., The prediction of the low fetal birth weight based on quantitative description of cardiocographic signals, Journal of Medical Informatics and Technologies, 2008, vol. 12, pp. 97-102
20. **Czabański R., Przybyła T., Pander T.,** Eyes position detection based on electrooculography signal analysis, The Eighth International Conference on Artificial Intelligence and Soft Computing 2008, Zakopane, 22-26 June 2008
21. **Czajkowska J.,** Automated Lung Segmentation For Automated Method of Lung Cancer Detection In Thoracic CT Images, X International PhD Workshop OWD 2008, Wisła, Conference Archives PTETiS, Vol.25, pp. 53-56
22. **Czajkowska J., Rudzki M.,** Czajkowski Z., A new fuzzy support vector machine for biomedical data classification, Engineering in Medicine and Biology Society, 2008, EMBS 2008. 30th Annual International Conference of the IEEE 20-25 August 2008, pp. 4676-4679
23. **Dustor A., Szwarc P.,** Automatic Spoken Language Recognition Based on Speech Features, National Symposium on Telecommunication and Teleinformatics KSTiT 2008, Bydgoszcz, 10 – 12 September 2008, pp. 986 – 993
24. **Dustor A., Szwarc P.,** Spoken Language Recognition Based on Speech Features, ed. P. Gaj, B. Pochopień, S. Kozielski, Contemporary aspects of computer networks, WKiŁ, Warsaw 2008, Vol. 1, pp. 309-318
25. **Dziczkowska M.,** A Mathematical Model to Determine Optimum Conditions for Measurements of Conductivity Exhibited by Multi-Layer Structures With Use of the Eddy-Current Method. Mašinstroenie i Technosfera XXI veka. Sbornik Trudov XV Meždunarodnoj Naučno-techničeskoj Konferenciji, Donieck, Russia, 2008, Vol. 4, pp. 96-100
26. **Dziczkowski L.,** A definition of eddy current penetration depth useful for flaw detection and conductivity measurement, Annual Meeting of

International Association of Applied Mathematics and Mechanics at the campus of the University of Bremen, 31 March - 4 April 2008, Gesellschaft für Angewandte Mathematik und Mechanik (GAMM)

27. **Dziczkowski L.**, An Attempt to Find out Optimum Conditions for Conductance Measurements by Means of the Eddy-Current Method in Multi-Layered Structures, *Mašinstroenie i Technosfera XXI veka. Sbornik Trudov XV Meždunarodnoj Naučno-tehničkeškoj Konferenciji, Donieck, Russia, 2008, Vol. 4, pp. 100-104*
28. **Dziczkowski L.**, Effect of eddy current frequency on measuring properties of devices used in non- destructive measurements of non-ferromagnetic metal plates, *Archives of Materials Science and Engineering, Volume 32, Issue2, August 2008, pp. 77-84*
29. **Dziczkowski L.**, Errors in Conductance Measurements of Two-Layer Structures, *Avtomatizacija: Problemy, Idei, Rešenija, Materiały Meždunarodnoj Naučno-tehničkeškoj Konferenciji, Sevastopol, Russia, 2008, pp. 138-141*
30. **Dziczkowski L.**, Selection of the frequency of eddy currents in non-destructive testing of non-ferromagnetic plates, *Journal of Achievements in Materials and Manufacturing Engineering. Vol. 27, Issue 1, March 2008, pp. 43-46*
31. **Dziwoki G., Kucharczyk M.**, Initialization strategies for prewhitened blind equalization, *IEEE Region 8 International Conference on Computational Technologies in Electrical and Electronics Engineering, 2008, IEEE Region 8 SIBIRCON 2008. Novosibirsk, Russia, 21-25 July 2008, pp. 407-412*
32. **Gawlikowski M., Komorowski D.**, Preliminary investigation regarding the image processing method application to blood volume estimation in pneumatically controlled VAD, *The International Journal of Artificial Organs, Vol. 31, no. 7, 2008, p. 624*
33. **Gintrowski A., Tkacz E.**, Low-Level Analysis, *IEEE Conference on "Information Technologies in Biomedicine", Kamiień Śląski, 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 387-394*
34. **Golonek T., Grzechca D., Rutkowski J.**, Optimization of PWL Analog Testing Excitation, *7th National Electronics Conference KKE'08, Dańówko Wsch., 2-4 June 2008, Vol. 2, pp. 311-316*

35. **Golonek T., Grzechca D., Rutkowski J.**, Optimization of PWL analog testing excitation by means of genetic algorithm, Proc. IEEE ICSES, Krakow, 2008, pp. 541-544
36. **Grzechca D., Golonek T., Rutkowski J.**, Diagnosis of specification parametric faults in FPAA – the RBF neural network approach, The 2nd European Computing Conference, ECC'08, Sponsored by WSEAS, New Aspects on Computing Research, WSEAS Press, Malta, pp. 275-281
37. **Grzechca D., Golonek T.**, The use of reconfigurable arrays FPAA to functional test simulation for analog electronics circuits, Elektronika, No. 11, 2008, pp. 158-162
38. **Grzechca D., Rutkowski J.**, Estimation of the FPAA specification with use of the Artificial Neural Network, 6th IEEE East-West Design & Test Symposium EWDTs 2008, Lviv, Ukraine, 9-13 October 2008, pp. 219-222
39. **Grzechca D., Rutkowski J.**, Use of Artificial Intelligence Techniques to Fault Diagnosis in Analog Systems, The 2nd European Computing Conference, ECC'08, Sponsored by WSEAS, New Aspects on Computing Research, WSEAS Press, Malta, Vol. 1, pp. 267-275
40. **Hławiczka A., Gucwa K., Garbolino T., Kopeć M.** Interconnect Faults Identification and Localization Using Modified Ring LFSR, Proceedings of 2008 IEEE Workshop on Design and Diagnostic of Electronic Circuits and Systems (DDECS), 16-18 April 2008, Bratislava, Slovakia, pp. 247-250
41. **Hławiczka A., Garbolino T.**, On Design of High Speed Test Pattern Generators Based on Ring LFSRs, Electronics and Telecommunications Quarterly, 2008, 54, No. 1, pp. 43-51
42. **Hławiczka A., Gucwa K., Garbolino T.**, Application of Ring-LFSR for Interconnect Faults Detection in FPGA, Pomiar Automatyka Kontrola (PAK), Vol. 54, No. 8, 2008, pp. 594-597
43. **Hławiczka A., Gucwa K., Garbolino T., Kopeć M.**, Application of Modified Ring-LFSR for Interconnect Faults Detection, Proceedings of the 15th International Conference, Mixed Design of Integrated Circuits and Systems (MIXDES), Poznań, 19-21 June 2008, pp. 487-492
44. **Hławiczka A., Gucwa K., Garbolino T., Kopeć M.**, Interconnect Faults Identification and Localization Using Modified Ring LFSRs,

- 11th IEEE Workshop on Design and Diagnostics of Electronic Systems, DDECS 2008, 16-18 April 2008, Bratislava, Slovakia, pp. 247-254
45. Horoba K., Wróbel J., Roj D., **Kotas M., Jeżewski M.**, Jeżewski J., Some development aspects of telemedical system for effective fetal monitoring at home, *Clinician and Technology Journal*, Vol. 38(2), 2008, pp. 105-108
 46. **Hryniewicz E., Milik A., Mocha J.**, Dynamically reconfigurable parallel implementation of logic controller, *Elektronika*, No. 11, 2008, pp. 187-190
 47. **Izydorczyk J., Chojcan J.†**, Higher-Order Sensitivity Invariants for Nonlinear Networks, *Proceedings of IEEE MELECON 2008 Mediterranean Electrotechnical Conference*, Ajaccio (Corsica), France, 5-7 May 2008, pp. 6–11
 48. **Izydorczyk J., Chojcan J.†**, Invariant Sums of Higher Order Sensitivities, *Proceedings of IEEE International Symposium on Circuits and Systems ISCAS 2008*, Seattle, USA, 19-21 May 2008, pp. 1284–1287
 49. **Izydorczyk J., Chojcan J.†, Lasek L.**, Sensitivity analysis of effects of dissipative elements in pass-band filters, *Proceedings of XXXI IC-SPETO*, Gliwice-Wisła, 28-30 May 2008, pp. 63–64
 50. **Izydorczyk J., Chojcan J.†**, Sensitivity Invariant Sums of High-Order, *Proceedings of IEEE International Conference on Electronics, Circuits, and Systems*, Malta, 31 August - 3 September 2008, pp. 234-237
 51. **Izydorczyk J., Chojcan J.†**, Some Invariant Sums of Higher-Order Sensitivities, *Int. J. Circ. Theor. Appl.* (2008), DOI: 10.1002/cta.514 (www.interscience.wiley.com)
 52. **Izydorczyk J., Cionaka L.**, Signed Power-of-Two Term Allocation Scheme for the Design of FIR Filters, *Proceedings of IEEE Symposium on Industrial Electronics ISIE08*, Cambridge, UK, 30 June-2 July 2008, pp. 1982–1985
 53. **Izydorczyk J., Chojcan J.†**, Tuning of Coupled Resonator LC Filter Aided by SPICE Sensitivity Analysis, *Proceedings of 2008 IEEE Region 8 International Conference on Computational Technologies in Electrical and Electronics Engineering*, Novosibirsk, Russia (IEEEExplore), 21-25 July 2008, pp. 331–336

54. **Izydorczyk J.**, Notes on Lossy Transmission Lines, IEEE Antennas and Propagation Magazine, Vol. 50, No. 5, pp. 170–175
55. **Izydorczyk W.**, Adamowicz B., **Izydorczyk J.**, Papis E., Kamińska E., Piotrowska A., Mazurkiewicz J., Kwaśny W., Mazur J., Bodzenta J., Jakubik W., Klimasek A., Żywicki J., Studies of thin SnO₂ film structure and sensing properties in atmosphere containing oxygen, 2nd National Conference on Nanotechnology, Book of Abstracts, Cracow, 25-28 June 2008
56. **Izydorczyk W.**, **Waczyński K.**, **Uljanow J.**, Crystalline structure research of SnO₂ thin layer and their sensor properties in the oxide containing atmosphere, 32nd International IMAPS-IEEE CPMT Poland Conference, Book of Abstracts, 21-24 September 2008, Warsaw-Pułtusk, p. 45 (CD proceedings)
57. **Jantos P.**, **Grzechca D.**, **Golonek T.**, **Rutkowski J.**, Global Parametric Faults in Analogue Integrated Circuits: Two Approaches to Classification with the Use of Differential Evolution, The 2nd European Computing Conference, ECC'08, Sponsored by WSEAS, New Aspects on Computing Research, WSEAS Press, Malta, Vol. 1, pp. 281-286
58. **Jantos P.**, **Grzechca D.**, **Golonek T.**, **Rutkowski J.**, Global parametric faults in analogue integrated circuits testing, Elektronika, No. 11, 2008, pp. 122-125
59. **Jantos P.**, **Grzechca D.**, **Golonek T.**, **Rutkowski J.**, Heuristic method to test frequencies optimization for analogue circuit diagnosis, Bulletin of the Polish Academy of Sciences, Vol. 56, No. 1, January 2008, pp. 29-38
60. **Jantos P.**, **Grzechca D.**, **Golonek T.**, **Rutkowski J.**, The Influence of Global Parametric Faults on Analogue Electronic Circuits Time Domain Response Features, 11th IEEE Workshop on Design and Diagnostics of Electronic Systems, DDECS 2008, 16-18 April 2008, Bratislava, Slovakia, pp. 299-303
61. **Jantos P.**, **Rutkowski J.**, Evolutionary Methods to Analogue Electronic Circuits Yield Optimisation, Bulletin of the Polish Academy of Sciences - Technical Sciences, Vol. 56, Issue 1, March 2008, pp. 9-16
62. **Jeżewski M.**, **Czabański R.**, Horoba K., Wrobel J., Jeżewski J., Prediction of Newborn Sex with Neural Networks Approach to Fetal

- Cardiotocograms Classification, IEEE Conference on Information Technologies in Biomedicine, Kamień Śląski 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 299-306
63. **Jeżewski M., Czabański R.,** Horoba K., Wróbel J., **Łęski J.,** Jeżewski J., Influence of gestational age on neural networks interpretation of fetal monitoring signals, *Journal of Medical Informatics and Technologies*, 2008, Vol. 12, pp. 137-142
 64. **Jeżewski M.,** Wróbel J., Horoba K., Jeżewski J., **Czabański R., Łęski J.,** Influence of input data modification on performance of neural networks in prediction of fetal outcome, *IEEE Transactions on Information Technology in BioMedicine*, 2008 (submitted)
 65. **Kania D., Czerwiński R.,** State assignment for self-correcting sequential circuits, *Elektronika* No. 5, 2008, pp. 107-111
 66. **Kania D.,** Grabiec W., Decomposition of a multi-output function based on utilization of XOR gates, *Pomiary Automatyka Kontrola*, Vol. 54, No. 8, 2008, pp. 502-504
 67. **Kania D.,** Kajstura K., Kurytnik I., Logic synthesis on PAL-based devices using decomposition, *Transaction of the Universities of Kosice*, No. 2, 2008, pp. 52-57
 68. **Kania D., Kulisz J.,** An application of the Incompatibility and Complement Graph to asynchronous FSM coding, *Pomiary Automatyka Kontrola*, Vol. 54, No. 8, 2008, pp. 486-488
 69. **Kania D., Milik A.,** Opara A., Decompositional based logic synthesis methods dedicated for CPLDs, *Elektronika*, No. 10, 2008, pp. 93-99
 70. **Karwowski A., Noga A.,** On the interpolation of the frequency variations of the MoM-PO impedance matrix over a wide bandwidth, *Microwave and Optical Technology Letters*, Vol. 50, March 2008, pp. 738-741
 71. **Kawa J., Piętka E.,** Automated Fuzzy-Connectedness-Based Segmentation in Extraction of Multiple Sclerosis Lesions, IEEE Conference on "Information Technologies in Biomedicine", Kamień Śląski, 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 149-156
 72. **Kawa J., Piętka E., Badura P.,** Konopka M., Kieltyka A., A Computer-aided Diagnosis Workstation for Automated Follow-up of

- Patients with Multiple Sclerosis, Proc. 94th Scientific Assembly and Annual Meeting of the Radiological Society of North America, RSNA, Chicago, 2008
73. **Kidoń Z., Fiołka J.**, A comparison of methods used for stabilogram data analysis, *Elektronika*, No. 11, 2008, pp. 213-216
 74. **Kidoń Z., Kania D., Fiołka J.**, Pethe-Kania K., Stabilographic stand for diagnosis of patients after a hip replacement surgery, *Elektronika*, No. 11, 2008, pp. 242-244
 75. **Kidoń Z.**, Pethe-Kania K., **Kania D.**, Stabilography platform used for progress estimation in rehabilitation of patients after a hip replacement surgery, *Pomiary Automatyka Kontrola, PAK* Vol. 54, No. 2, 2008, pp. 71-75
 76. Kiełtyka A., **Kawa J.**, Konopka M., Dziubinska-Basiak M., Computer aided extraction and measurement of demyelination plaques in magnetic resonance studies, Proc. of 33rd Annual Meeting of European Society of Neuroradiology 2008
 77. **Kłosowski P.**, Distance Education at Silesian University of Technology, Proceedings of The 6th International Conference on Education and Information Systems, Technologies and Applications: EISTA2008 in the context of The 2nd International Multi-Conference on Society, Cybernetics and Informatics: IMSCI2008, Orlando, Florida, USA, 2008, pp. 138- 143
 78. **Kłosowski P., Pułka A.**, Polish Semantic Speech Recognition Expert System Supporting Electronic Design System, Proceedings of The International Conference on Human System Interaction: HIS2008, Cracow, Poland, 2008, pp. 480-484
 79. **Komorowski D., Tkacz E.**, The Basic Statistical Methods Applied to Microarrays Genes Expression Analysis” Proceedings of the 5th International Conference on Information Technology and Applications in Biomedicine (ITAB 2008), Shenzhen, China, 30-31 May 2008, CD
 80. **Komorowski D., Pietraszek S., Tkacz E.**, Preliminary examination of the methods applied to artefacts elimination during EGG examination, Engineering and Physical Sciences in Medicine and the Australian Biomedical Engineering Conference EPSM 2008, 16-20 November 2008, New Zealand, pp. 408-409

81. **Komorowski D., Tkacz E.**, Typical Statistical Methods Applied to Microarrays Genes Expression Analysis, Proc. IX International Conference SYMBIOSIS 2008, Kamień Śląski, 11-13 June 2008, pp. 56-37
82. **Konopacki J.**, Computational complexity comparison of the algorithms for linear-phase FIR and IIR filters realization, Elektronika, No. 11, 2008, pp. 181-183
83. Kopeć M., **Garbolino T., Gucwa K., Hławiczka A.**, On Application of Polynomial Algebra for Identification of Dynamic Faults in Interconnects, Electronics and Telecommunications Quarterly, 2008, 54, No. 1, pp. 29-41
84. Kopeć M., **Garbolino T., Gucwa K., Hławiczka A.**, Identification of dynamic faults in interconnects by the use of polynomial algebra, Digest of Papers of IEEE European Test Symposium - ETS'08, Verbania, Italy, 25-29 May 2008
85. **Kostka P.**, Nawrat Z., Integrating data, models and reasoning in adaptive patient data tele-monitoring. XXXV Congress of ESAO (European Society for Artificial Organs), 3-6 September 2008, Geneva, Switzerland
86. **Kostka P.S., Tkacz E.J.**, Feature extraction for improving the support vector machine biomedical data classifier performance, Proc. IX International Conference Symbiosis 2008, Kamień Śląski, 11-13 June 2008, pp. 41-44
87. **Kotas M.**, Combined Application of Independent Component Analysis and Projective Filtering to Fetal ECG Extraction, Biocybernetics and Biomedical Engineering, Vol. 28, 2008, No. 1, pp. 75-93
88. **Kotas M.**, Jeżewski J., Kupka T., Horoba K., Detection of low amplitude fetal QRS complexes, in Proc. of 30th IEEE/EMBS Conference, 20-24 August 2008, Canada, pp. 4764-4767
89. **Kotas M.**, Jeżewski J., Matonia A. Kupka T., Separation of abdominal fetal electrocardiograms in twin pregnancy, Journal of Medical Informatics and Technologies, Vol. 12, 2008, pp. 83-90
90. **Kotas M.**, Projective versus Linear Filtering for Repolarization Duration Measurement, IEEE Conference on Information Technologies in Biomedicine, Kamień Śląski, 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 251-258

91. **Kotas M.**, Robust Projective Filtering of Time Warped ECG Beats, Computer Methods and Programs in Biomedicine, Vol. 92 (2008), No. 10, pp. 161-172
92. **Kotas M.**, Combined Application of Independent Component Analysis and Projective Filtering to Fetal ECG Extraction, Biocybernetics and Biomedical Engineering, Vol.28 (2008), No. 1, pp. 77-95
93. **Kotas M.**, Projective filtering of time warped ECG beats, Computers in Biology and Medicine, Vol. 38 (2008), No. 1, pp. 127-37
94. **Kowalik P., Pruszowski Z.**, Impulse stabilisation of Ni-P resistive layers, Elektronika, No. 11, 2008, pp. 66-67
95. **Kowalik P., Pruszowski Z.**, Modelling R and TCR of resistors with Ni-P resistive layers, Elektronika, No. 11, 2008, pp. 68-70
96. **Kristof A.**, Push-pull LF power amplifier based on the LM317/LM337, Elektronika No. 11, 2008, pp. 125-129
97. **Kucharczyk M.**, Internet System for Assessment of Classes, ed. P. Gaj, B. Pochopiń, S. Kozielski, Contemporary aspects of computer networks, Vol. 1, Chapter 41, WKiŁ, Warsaw 2008, pp. 423-432
98. **Kukielka A., Izydorczyk J.**, Sensitivity Analysis of Overall Transfer Functions of Active Affined Two-Ports, Proceedings of ICSES 2008 International Conference on Signals and Electronic Systems, Cracow, 14-17 September 2008, pp. 289–292
99. **Kyziół P., Grzechca D., Golonek T., Rutkowski J.**, The Use of Variable Load for RF Circuit Testing, Int. Conference on Signals and Electronic Systems, ICSES 2008, Cracow, 14-17 September 2008, Poland, pp. 557-560
100. **Kyziół P., Grzechca D., Jantos P., Rutkowski J.**, Impedance Matching Concepts in RF Systems Based on TRF7960 Example, The Seventh International PhD Students' Workshop Control & Information Technology, IWCIT'08, Gliwice, 18-19 September 2008, pp. 72-77
101. **Kyziół P., Grzechca D., Jantos P., Rutkowski J.**, Impedance matching concepts in RFID systems based on TRF7960 example, Elektronika, No. 11, 2008, pp. 155-158
102. **Łaskarzewski Z., Mocha J.**, Communication mechanisms with universal testing equipment, Elektronika, No. 11, 2008, pp. 210-212

103. **Lasota S.**, Parameter Decision Diagram in the Structural Synthesis of Analog Networks, International Conference on Signals and Electronic Systems (ICSES 2008), Cracow, 14-17 September 2008, pp. 301-304
104. **Lasota S.**, Parameter Decision Diagrams in the Symbolic Analysis and the Structural Synthesis Part I: Notation and Analysis Toolbox, 10th International Workshop on Symbolic and Numerical Methods, Modelling and Application to Circuit Design (SM²ACD'08), Erfurt, Germany, 7-8 October 2008, pp. 149-157
105. **Lasota S.**, Parameter Decision Diagrams in the Symbolic Analysis and the Structural Synthesis Part II: PDD Construction and Basic Manipulations, 10th International Workshop on Symbolic and Numerical Methods, Modelling and Application to Circuit Design (SM²ACD'08), Erfurt, Germany, 7-8 October 2008, pp. 172-179
106. **Lasota S.**, Parameter Decision Diagrams in the Symbolic Analysis and the Structural Synthesis Part II: Application in the Analysis and the Structural Synthesis – an Overview, 10th International Workshop on Symbolic and Numerical Methods, Modelling and Application to Circuit Design (SM²ACD'08), Erfurt, Germany, 7-8 October 2008, pp. 180-187
107. **Małota Z.**, **Przybylski R.**, **Nawrat Z.**, **Kostka P.**, **Kukulski T.**, The comparison of two methods of left ventricular reconstructions in patients with congestive heart failure by means of computer simulations. XXXV Congress of ESAO (European Society for Artificial Organs), 3-6 September 2008, Geneva, Switzerland
108. **Mika B.T.**, **Tkacz E.J.**, Independent Component Analysis & Running Spectrum Analysis of Electrogastrographic Signal with the Water Load Test, Proc. IX International Conference Symbiosis 2008, Kamień Śląski, 11-13 June 2008, pp. 35-37
109. **Milik A.**, **Mocha J.**, Self Reconfigurable Digital System, *Pomiary Automatyka Kontrola*, Vol. 54, No. 8, 2008, pp. 483-485
110. **Milik A.**, **Pułka A.**, Complex Mathematical Models Simulation on Mixed HDL-Simulink Platform, Proceedings of the HSI'08 Human Systems Interaction Conference, Cracow, 26-28 May 2008, pp. 380-385
111. **Mocha J.**, **Łaskarzewski Z.**, Hardware part of universal testing station, *Elektronika*, No. 11, 2008, pp. 184-186

112. **Musiół J., Więclawek A.,** Mazurek U., Fuzzy Support Vector Machine for Genes Expression Data Analysis, in: Piętka E., Kawa J. (Eds.) Information Technologies in Biomedicine, Advances in Soft Computing, Springer-Verlag, Berlin, 2008, pp. 387-394
113. **Musiół J., Więclawek W.,** Mazurek U., Fuzzy Support Vector Machine for Genes Expression Data Speaker Verification, The Seventh International PhD Students' Workshop Control & Information Technology IWCIT'08, Gliwice, 18-19 September 2008, pp. 124-129
114. Nawrat Z., **Kostka P.,** Dybka W. Rohr K., Małota Z., Man-machine interface optimization. Steering console of Polish cardiac surgery robot Robin Heart, XXXV Congress of ESAO (European Society for Artificial Organs), 3-6 September 2008, Geneva, Switzerland
115. Nawrat Z., **Kostka P.,** Dybka W., Rohr K., Innovative semi-automatic laparoscopic tool: Robin Heart Uni Tool. PAR Pomiar Automatyka Robotyka. No. 2, 2008, pp. 718-728
116. **Noga A.,** Improvement of efficiency of the hybrid MM-PO method for wide-band analysis of the radiating structures, Telecommunication Review and Telecommunication News, No. 4, 2008, pp. 259-262
117. **Noga A., Karwowski A.,** Analysis of Electrically Large Problems Using The Hybrid MM-PO Method, 17th International Conference on Microwaves, Radar and Wireless Communications, MIKON 2008, pp. 201-204
118. **Noga A., Karwowski A.,** Estimation of the computer resources required by the hybrid MM-PO method, Telecommunication Review and Telecommunication News No. 4, 2008, pp. 625-628
119. **Noga A. Karwowski A.,** Fast hybrid MM-PO method for wide-band analysis of electrically large radiating structures, 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, EMC 2008, Wroclaw, June, 2008, pp. 145-150
120. Opara A., **Kania D.,** Decomposition of multi-output function based on pseudo-MTBDD, Pomiar Automatyka Kontrola, Vol. 54, No. 8, 2008, pp. 496-498
121. **Pander T.,** An Application of Robust Kernel-based Filtering of Biomedical Signals, IEEE Conference on Information Technologies in Biomedicine, Kamień Śląski, 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 259-266

122. **Pander T., Czabański R., Przybyła T.**, An Eye Blinking Detection Method On The Base Of EOG Signal, Biosignal 2008, International EUROSIP Conference, CD
123. **Pander T., Przybyła T., Czabański R.**, An application of detection function for eye blinking detection: The International Conference on Human System Interaction (HSI-2008), Cracow, 25-27 May 2008, pp. 287-291
124. **Pander T., Przybyła T., Czabański R.**, An Approach to the EOG Signal Segmentation Based on Fuzzy Reasoning, The International Conference on Human System Interaction (HSI-2008), Cracow, 25-27 Ma, 2008, pp. 710-713
125. **Pawlak A., Fraś P., Penkala P.**, Web services-based collaborative system for distributed engineering, PRO-VE'08 9th IFIP Working Conference on Virtual Enterprises, Poznan, Poland, 8 - 10 September 2008, in Pervasive Collaborative Networks, Edited by Luis M. Camarinha-Matos and Willy Picard, Springer, pp. 463-472
126. **Pawlak A., Fraś P., Penkala P.**, Integration of Distributed Design Tools Based on Web Services, Work in Progress Session in conjunction with 6th EUROMICRO International Conference on Parallel, Distributed and Network-based Processing, PDP 2008 Toulouse, France, 13-15 February 2008
127. **Piętka E., Kawa J.**, Web oriented CAD architecture, International Journal Computer Assisted Radiology and Surgery, (suppl.)2008, S161-S162
128. **Pietraszek S., Komorowski D.**, A New Method of Reconstruction Signals Connected With Human Respiratory Activity During EGG Examination, Proceedings of IX International Conference SYMBIOSIS 2008, Kamień Śląski, 11-13 June 2008, pp. 13-15
129. **Pośpiech-Kurkowska S.**, Processing of Missing Data In A Fuzzy System, IEEE Conference on "Information Technologies in Biomedicine", Kamień Śląski, 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 453-460
130. **Pruszowski Z., Kowalik P.**, Thermoelectric force in Ni-P resistive layers, Elektronika No. 1, 2008, pp. 70-71

131. **Przybyła T.**, Bootstrap method and its application in machine learning, VIII Scientific Seminar on Selected Problems of Electrotechnics and Electronics, PTETIS 2008
132. **Przybyła T.**, The Fuzzy Meridian And Its Application to Fuzzy Clustering, The Eighth International Conference on Artificial Intelligence and Soft Computing 2008, Computational Intelligence: Methods and Applications, Editors: Leszek Rutkowski, Ryszard Tadeusiewicz, Lotfi A. Zadeh, Jacek Żurada, 2008, pp. 112-121
133. **Przybyła T., Pander T., Czabański R., Henzel N.**, An Approach to Estimation of the Angular Eye-ball Speed Based on the EOG Signal, IEEE Conference on "Information Technologies in Biomedicine", Kamień Śląski, 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 283-291
134. **Pucher K.**, Implementation of control systems operated in networks with impeded data flow and unpredictable time of frame transfer, XII Poznań Telecommunication Workshop, Poznań, 11 December 2008
135. **Pucher K., Polok D.**, Adaptation of the VME Bus for the Need to Implement the ISA Bus Used by the DIMM-PC Module, Electronica si Telecomunicatii, ETc 2008, Timisoara, 25-26 Septembrie, 2008, Scientific Bulletin of the „Politehnica” University of Timisoara, Romania. Transaction on Electronics And Communications. Tomul 53(67), Fascicola 1, 2008, ISSN 1583-3380, pp. 166-171
136. **Pucher K., Polok D.**, Application of the DMM-PC module for mapping the ISA bus onto the VME bus hardware, XII Poznań Telecommunication Workshop, Poznań, 11 December 2008
137. **Pułka A., Milik A.**, A New Hardware Algorithm for Searching Genome Patterns, Proceedings of IEEE International Conference on Signals and Electronic Systems ICSES 2008, Cracow, 15-17 September 2008, pp. 177-180
138. **Pułka A., Kłosowski P.**, Polish Semantic Speech Recognition Expert System Supporting Electronic Design System, Proceedings of the HSI'08 Human Systems Interaction Conference, Cracow, 26-28 May 2008, pp. 479-484
139. **Pułka A., Milik A.**, VEST - An Intelligent Tool for Timing SoCs Verification Using UML Timing Diagrams, Proceedings of the FDL'08 Conference, Stuttgart, Germany, 23-25 September 2008, pp. 118-123

140. Roj D., Fuchs T., **Przybyła T., Jeżewski M.**, Matonia A., Gacek A., The Influence of Window Size of Autocorrelation Function on Fetal Heart Rate Variability Measurement Using The Doppler Ultrasound Signal, *Journal of Medical Informatics and Technologies*, 2008, Vol. 12, pp. 111-116
141. Roj D., Wróbel J., **Przybyła T., Jeżewski M.**, Kupka T., Matonia A., Jeżewski J., The Influence of Window Size of Autocorrelation Function on Fetal Heart Rate Variability Measurement Using The Doppler Ultrasound Signal, *Conference Young Biomedical Engineers And Researchers 2008*, pp. 100-104
142. Roj D., Wróbel J., **Przybyła T., Jeżewski M.**, Kupka T., Matonia A., Jeżewski J., Fetal Heart Rate variability analysis using the Doppler ultrasound technique – the significance of window size of autocorrelation function, *Clinician and Technology Journal*, Vol. 38(2), 2008, 100-104
143. **Rudnicki T.**, Motor Vehicles With Electric Motor, *Notes on Exploitation Problems of Electrical Machines and Driver No. 80*, 2008, May 2008, *Rytro*, pp. 245-250
144. **Rudzki M.**, A Workflow for an Automated 3D Segmentation of Human Intrathoracic Airway Trees, *X International PhD Workshop OWD 2008, Conference Archives PTETiS Vol.25*, 2008, pp. 63-68
145. **Rutkowski J., Grzechca D.**, Use of Artificial Intelligence Techniques to fault diagnosis in analog systems, *The 2nd European Computing Conference, ECC'08, Sponsored by WSEAS, New Aspects on Computing Research, WSEAS Press, Malta 2008*, pp. 267-274
146. **Rutkowski J., Moscinska K., Grzechca D.**, Students' attitude to formative web-based assessment, *Proc. IASTED International Conference on Web Based Education (WBE), Innsbruck 2008*, pp. 139-144
147. **Rutkowski J., Moscinska K., Kłosowski P.**, Blended education at large Technical University located in highly urbanized metropolitan region, *e-Proc. 6th International Conference On Education and Information Systems, Technologies and Applications (EISTA), Orlando, 2008*
148. **Rutkowski J., Mościnska K., Kłosowski P.**, Five Years Of Faculty Distant Education Platform – How It Changed Education Process,

- Proceedings of 11th IASTED International Conference Computers and Advanced Technology in Education CATE, Hersonissos, Crete, 2008, pp. 94-99
149. **Rymarski Z.**, Design method of a 3-phase VSI for UPS systems, International Conference on Signals and Electronic System ICSES 2008, Cracow, 14-17 September 2008, Conference Proceedings, pp. 293-296
 150. **Rymarski Z.**, Designing the single-phase low power inverter with the nonlinear load, *Elektronika*, No. 11, 2008, pp. 48-51
 151. **Sakowski W.**, Mirek Ł., Rak F., Embedded software development using an interpretive instruction set simulator, Proceedings of IP based Electronic System Conference, 3-4 December 2008, Grenoble, France
 152. **Spinczyk D., Piętka E.**, E-atlas with advanced image analysis functions, *Int. J. Computer Assisted Radiology and Surgery*, (suppl.) 2008, pp. 167-168
 153. **Spinczyk D., Brzoza P.**, Multimedia System for Accessible Distant Education, in: Piętka E., Kawa J. (Eds.) *Information Technologies in Biomedicine, Advances in Soft Computing*, Springer-Verlag, Berlin, 2008, pp. 513-517
 154. **Stachańczyk D.**, The XML use for the SoC circuits design, *Elektronika*, No. 11, 2008, pp. 129-133
 155. **Straszecka E.**, Matching knowledge and evidence in a model of medical diagnosis, in: *Advances in Soft Computing 47, Information Technologies in Biomedicine*, E. Pietka, J. Kawa eds., 2008 Springer-Verlag Berlin Heidelberg, pp. 429-436
 156. **Straszecka E.**, Combining basic probability assignments for fuzzy focal elements, in: *Lecture Notes in Artificial Intelligence 5097, Artificial Intelligence and Soft Computing – ICAISC 2008*, 9th Int. Conf., Zakopane, Poland 22-26 June 2008, L. Rutkowski, R. Tadeusiewicz, L.A. Zadeh, J. M. Zurada (Eds.), pp. 341-350
 157. **Sulek W.**, Hardware decoder implementation for AA-LDPC codes, *Telecommunication Review and Telecommunication News*, No. 8/9, 2008, pp. 1229-1240
 158. **Sulek W., Kania D.**, Code construction algorithm for architecture aware LDPC codes with low-error-floor, *IEEE Region 8 International*

- Conference on Computational Technologies in Electrical and Electronics Engineering, SIBIRCON 2008, Novosibirsk, Russia, 21-25 July 2008, pp. 1-6
159. **Surma M., Karwowski A.**, Efficient MoM-based techniques for broadband analysis of scattering and radiating objects, 19th International Wrocław Symposium and Exhibition on Electromagnetic Compatibility, EMC 2008, Wrocław, June, 2008, pp. 157-160
 160. **Taborek K., Pogoda Z.**, Regular load of processors in multiprocessor system, *Elektronika*, No. 11, 2008, pp. 190-192
 161. **Tkacz E., Kostka P., Komorowski D.**, An Application of Both Principal Dynamic Modes (PDM) and Statistics for Rehabilitation Estimation Related to the Patients after Ischemic Brain Stroke, Proceedings of the 30th Annual International IEEE EMBS Conference, 20-24 August 2008, Vancouver, British Columbia, Canada, CD
 162. **Tkacz E., Kostka P., Komorowski D., Gintrowski A.**, An Application of Principal Dynamic Modes for HRV Signals Spectrum Decomposition Related to the Patients After Ischemic Brain Stroke, Proceedings (IEEE Xplore database) of the 5th International Conference on Information Technology and Applications in Biomedicine (ITAB 2008), Shenzhen, China, 30-31 May 2008, CD
 163. **Topa T., Karwowski A.**, Computationally efficient hybrid MoM-FDTD technique for electromagnetic analysis, 19th International Wrocław Symposium and Exhibition on Electromagnetic Compatibility, EMC 2008, Wrocław, June 2008, pp. 151-156
 164. **Topa T., Karwowski A.**, Efficient Wideband Analysis of Electromagnetic Problems Using the AWE Adaptive Technique with the Hybrid MoM-FDTD Method, 17th International Conference on Microwaves, Radar and Wireless Communications, MIKON 2008, Wrocław, 19-21 May 2008, pp. 105-108
 165. **Topa T., Karwowski A.**, Improvement of the efficiency of the hybrid MoM-FDTD method by forming the excitation sources on the Huygen's surface, *Telecommunication Review and Telecommunication News*, No. 4, 2008, pp. 617-620
 166. **Waczyński K., Filipowski W., Panek P., Drabczyk K., Olechowska A.**, Atomic force microscope investigation of silicon surface form for solar cells, *Elektronika*, No. 1, 2008, pp. 83-86

167. **Więclawek W., Piętka E.**, Fuzzy Clustering in Segmentation of Abdominal Structures Based on CT Studies, IEEE Conference on Information Technologies in Biomedicine, Kamień Śląski, 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 93-104
168. **Wójcik D., Karwowski A.**, Prediction of exposure condition in vicinity of cellular telephony base station antennas, 19th International Wrocław Symposium and Exhibition on Electromagnetic Compatibility, EMC 2008, Wrocław, June, 2008, pp. 161-164
169. **Wróbel E., Waczyński K., Filipowski W.**, Elaborating of preparation of spin-on silicon glasses, which are enabling to obtain of high concentration of donor dopant in diffusion layer, 7th National Electronics Conference, Darłówko Wschodnie, 2-4 June 2008
170. **Wróbel E., Waczyński K., Filipowski W.**, Formation of diffusion layer with using slowly doped dopants, Elektronika, No. 11, 2008, pp. 70-72
171. **Wróbel E., Waczyński K., Filipowski W.**, Investigation on high doped phosphorus sources in silicon solar cells technology, Elektronika, No. 1, 2008, pp. 16-17
172. **Wyrwoł B.**, Error Masking in Hierarchical Fuzzy Inference System Using Defuzzification Operators, Elektronika, No. 11, 2008, pp. 237-239
173. **Wyrwoł B.**, Linguistic decomposition technique based on partitioning the knowledge base of the fuzzy inference system, Bulletin of the Polish Academy Of Sciences, Technical Sciences, 2008, Vol. 56, No. 1, pp. 71-76
174. **Wyrwoł B.**, Linguistic Decomposition the Knowledge Base of the Fuzzy Inference System with Elimination of the Inconsistent Rules, Elektronika, No. 11, 2008, pp. 234-236
175. **Wyrwoł B., Polok D.**, Hardware Implementation of the Linguistic Decomposition Technique in the FPGA-FIS System, Scientific bulletin of the Politehnica University of Timisoara, Transactions on Electronics and Communications, 2008, Vol. 53 (67), Fascicola 1, pp. 161-166
176. **Zarychta P.**, Zarychta-Bargieła A., Automatic Registration of MRI Brain, IEEE Conference on "Information Technologies in Biomedicine", Kamień Śląski, 16-18 June 2008, Springer-Verlag Berlin Heidelberg, pp. 165-172

177. **Zawadzki P.**, The security of the VPN protocols), in Contemporary aspects of computer networks, (Eds.) P. Gaj, B. Pochopień, S. Kozielski, Vol. 1, WKiŁ, Warsaw, 2008, pp. 319-328
178. **Zawadzki P.**, The VoIP security – theory and practice, in Contemporary aspects of computer networks, (Eds.) P. Gaj, B. Pochopień, S. Kozielski, WKiŁ, Warsaw, 2008, Vol. II, pp. 165-170
179. **Zawadzki P.**, The VoIP Communication Security Protocols, Studia Informatica, Gliwice, 2008, Vol. 29, No. 4B (81), pp. 28-35

BOOKS AND CHAPTERS IN BOOKS

1. **Łęski J.**, Neuro-fazy systems (in Polish), WNT Warsaw, 2008, 689 pages
2. Nawrat Z., **Kostka P.**, Medical Robotics, I-Tech Education and Publishing, Vienna, Austria, January 2008, pp. 265-291

PUBLICATIONS EDITED BY STAFF MEMBERS OF THE INSTITUTE OF ELECTRONICS

1. **Tkacz E., Komorowski D., Kostka P., Budzianowski Z.**, (Eds), Proceedings of the 9th International Conference Symbiosis 2008, Kamień Śląski, Poland, 11-13 June 2008
2. **Piętka E., Kawa J.** (Eds.), Proceedings of the International Conference on Information Technology in Biomedicine, Kamień Śląski, Poland, 16-18 June 2008, Advances in Soft Computing, Springer-Verlag, Berlin Heidelberg, 2008
3. **Filus Z., Noga A.**, (Eds.), Proceedings of the Seventh International PhD Students' Workshop Control & Information Technology – IWCIT'08, Gliwice, Poland, 18-19 September 2008

PUBLICATIONS OF THE INSTITUTE OF ELECTRONICS

- Filus Z., Hryniewicz E., Annual Review 2007 – Institute of Electronics, Gliwice, March 2008, 69 pages

ABSTRACTS OF SELECTED RESEARCH PROJECTS

DIVISION OF ELECTRONICS FUNDAMENTALS

Prof. A. Karwowski, A. Noga (PhD), *Generating Wide-Band Data from MoM-PO by Z Matrix Interpolation*

Evaluation of performance behaviour of electrically large radiating/scattering structures in the frequency domain over a broad frequency band is essential in many electromagnetic engineering problems. For structures composed of arbitrarily arranged conducting bodies, including thin wires and conducting sheets, this can be accomplished via the full-wave frequency-domain integral equation technique discretized by the method of moments (MoM). Unfortunately, the well-known major limitation of this method has always been the computer resources, i.e., the computer CPU time and storage needed to perform computations. The problem becomes severe in broadband analysis, since the MoM-generated matrix equation for the structure must be solved repeatedly at many frequencies. Computational efficiency of the MoM-based technique oriented on wide-band analyses can be improved by supporting MoM by a high-frequency Physical-Optics (PO) approximation, i.e., employing the MoM-PO hybrid approach.

Within this research, we have proposed and carefully examined a possibility of generating wide-band data from MoM-PO by interpolation of the structure impedance matrix Z . The impedance matrix interpolation methodology proved its efficiency in the context of the conventional MoM but not in the context of MoM-PO hybrid, and thus needed to be examined in the latter. Numerical examples show that the proposed overall approach offers spectacular savings in the CPU time and memory consumption required for wideband simulations.

S. Lasota (PhD), *Parametric Decision Diagrams in the Symbolic Analysis and the Structural Synthesis of Electronic Circuits*

The symbolic analysis is one of the basic methods of the computer-aided analysis that is very useful in the structural synthesis of analog circuits as well. The main disadvantage of these methods is that the number of terms in a result increases rapidly in the exponential (combinatorial) way. This is a reason why search for lossy and lossless methods that allow compression of results has

been performed. In 1997 C.-J. Shi and X. D. Tan in the paper “Symbolic analysis of large analog circuits with determinant decision diagrams” (in Proc. IEEE/ACM Int. Conf. Computer Aided Design, San Jose, CA, Nov. 1997, pp. 366–373) proposed the structure of results in the form similar to Zero-suppressed Binary Decision Diagram instead of the classical sum of products (SoP). This structure was called the Determinant Decision Diagram (DDD). However, the DDDs have some disadvantages. The first step to construct a DDD is to create the Modified Nodal Admittance Matrix (MNA), and then the DDD itself. The determination of cofactors is very simple, but only for the first order ones. The determination of higher order (also summative) cofactors needs extra effort. The values associated with vertices can be sums of parameters of components and the same parameter can be associated with more than one vertex. This complicates determination of large- and small-scale sensitivities. The original DDD is not a cancellation-free one. To get the cancellation-free form, some extra post-processing of results is needed. The last two disadvantages cause complication in the lossy simplification of results (e.g. simplification before (and after) generation). The author presents a similar structure of results called the Parameter Decision Diagram (PDD) that is always cancellation-free, each vertex is associated with only one parameter and it can be created directly from the net-list (i.e. the list of names of parameters with numbers of nodes to which the component is connected). The results of research have been presented in four papers.

In the nearest future the author is planning software implementation of this method and work on the optimisation of PDDs.

Z. Rymarski (PhD), *The analysis of output voltage distortion minimization in a 3-phase VSI for a non-linear rectifier with RC load*

A simple but effective design method for a 3-phase VSI power stage and a discrete control loop was developed. The parameters of the VSI control loop were tested for the steady-state nominal resistive load, the transient response after a step change of the resistive load and the THD of the output voltage for a typical non-linear load – a rectifier with RC load (sometimes the crest factor is defined). A complex design method for the 3-phase inverter, i.e. for its power stage and its discrete control loop, was developed. It was oriented on a microprocessor-based control. The presented method of discrete controller design was based on the necessary double feedback loop architecture with the inner instantaneous loop responsible for the transient response after the step change of the load (however, it works improperly for a non-linear load, even

increasing some types of distortions of the output line-to-line voltages) and the outer loop with a repetitive controller that uses in its control function values from the previous fundamental period and dumps the harmonics of the fundamental frequency. Characteristics of the inner CDM/PID controller in frequency domain enable the simplification of the compensator in the repetitive controller. In the single phase VSI this gives a good quality, robustness control. The transformation of the 3-phase a-b-c system to a 2-phase stationary orthogonal α - β frame using the Clark transform simplifies the control system (2 decoupled control loops in the 3-phase system) and enables solutions dedicated for the single phase VSI to be used. A 3-phase inverter with a 6-switch bridge architecture was chosen. The rectifier with RC load causes 4 types of distortions. The limits of the distortions cancellation depend on the values of the filter components, the load parameters and the fundamental frequency. The distortions cannot be radically reduced by any type of control loop if the calculated requirements are not met. The filter design and equations of the control loop are in the form ready to be implemented in the microprocessor controlled 3-phase inverter design.

DIVISION OF DIGITAL AND MICROPROCESSOR SYSTEMS

Prof. A. Hławiczka, T. Garbolino (PhD), K. Gucwa (PhD), *Testing faults in interconnects in a System-on-a-Chip*

In today's System-on-a-Chip devices, which are manufactured in deep sub-micron technologies and work with gigahertz frequencies, testing of dynamic faults in interconnects (delay and crosstalk faults, power supply and ground bouncing) plays a more and more crucial role. It requires that test stimuli are applied and test responses are captured at-speed in a test-per-clock manner.

The research group involved in this project has developed a new method that is an effective instrument for investigating sources of dynamic faults in interconnects. In the proposed approach an erroneous bit sequence coming from the faulty net is reconstructed on the basis of a set of signatures. This facilitates precise identification of dynamic faults. The discussed method is applicable to interconnects between ICs mounted on the PCBs as well as interconnect networks connecting IP cores in SoCs. Moreover, it is easily scalable to any number of nets in the interconnect network and can be used with any type of test sequence and test pattern generator. There are several variants of hardware implementation of the method. This supports finding a trade-off between the overhead area and the testing time.

A method of the fault detection, identification and localization by means of a ring LFSR has been also proposed. The properties of a ring LFSR have been investigated. The method of designing a ring LFSR BIST has been worked out as well. Practical applicability of a ring LFSR for localization of faults in 8, 16, 24 and 32-bit buses in System-on-a-Chip and FPGA devices has been examined too. Moreover, the research resulted in some important observations regarding the types of characteristic polynomials that need to be used in ring LFSRs.

Prof. E. Hryniewicz, M. Chmiel (PhD), A. Milik (PhD), *A Fast Operating Bit-Byte PLC*

The authors considered two different approaches to the optimisation of operation speed of Programmable Logic Controllers. The first approach optimises the architecture of the CPU and the program execution by the use of the classical two-processor bit-byte architecture with concurrent execution of bit and byte computational tasks. The examination of information exchange between the processors of the bit-byte CPU of a PLC leads to the modified two-processor CPU hardware solution which significantly increases the speed of program execution. The most interesting result is the possibility of fully parallel work of both processors without waiting one for the other. Such a mode of CPU operation becomes possible thanks to the realisation that for a considered processor the other processor can be treated in the same way as a controlled object. The second approach is based on hardware implementation of the control algorithm on a reconfigurable platform (FPGA). In this solution high performance is achieved by a fully concurrent hardware execution of the control program. Dedicated implementation tools, which were also developed by the group, enable typical PLC programming for the hardware target platform.

Prof. D. Kania, R. Czerwiński (PhD), J. Kulisz (PhD), *Sequential logic synthesis for programmable devices*

Technological progress drives necessity of constant improvement of logic synthesis algorithms. A characteristic feature of most contemporary CPLD circuits is their structure, which consists of PAL-like building blocks, containing a limited (and small, e. g. 3, 4, 5) number of product terms.

The research work concerns several problems. The first is the application of a novel concept of graph, namely the Incompatibility and Complement Graph is

being developed. A specific feature of this graph is that it contains two kinds of edges: connecting mutually incompatible nodes and connecting mutually complementing nodes. The graph can be useful in a certain class of optimisation problems, in which compatibility of bit patterns in both the true and the complemented form has to be analysed. An example of such a problem is the covering analysis in asynchronous FSM coding. The method consists of several steps. In one of the steps a Boolean matrix is built, describing partitions of the relevant state set, which are required to provide the coding which is free from critical races. In the subsequent step the Boolean matrix has to be reduced. During this step, compatibility of the matrix rows, both in the true and the complemented form, has to be analysed. The appropriate algorithms for the graph building and colouring have been developed.

Additionally, a new approach to the state assignment, which provides self-correcting circuits, is proposed. This method is presented on the basis of simple modification of the 1-hot method. The results of experiments prove that the proposed state assignment leads to a significant reduction of chip area in comparison with the classical 1-hot method.

The research work concerns also the problem of Finite State Machine description in Hardware Description Languages and effective usage of vendor-independent synthesis tools, including academic software, in the synthesis dedicated for Complex Programmable Logic Devices. We propose an alternative method of porting a design from a vendor-independent synthesis tool to a vendor system, for completing the implementation stage. The method utilises a special style of VHDL modelling, so the description is universal and comprehensible to a human. The efficiency of the method was verified by experiments carried out with the use of academic software and leading commercial tools.

DIVISION OF CIRCUIT AND SIGNAL THEORY

A. Pułka (PhD), *Heuristic techniques for handling incomplete and imprecise information – application to modelling and verification of electronic circuits*

The research has been divided into two sub-tasks: the prototype implementation of the export for electronic system design and development of a new mechanism modelling the common-sense reasoning in the absence of complete information and imprecise information. A module of non-monotonic reasoning responsible for high-level abstract models has been presented as a

part of the first task. This module, which is the crucial part of the entire design flow, aids the process of recognition and understanding of voice commands given to the system by a designer. The main drawback of the presented solution is a limited dictionary of possible commands, however, the system is open and it could be extended in the future. The results of the work have been published on the international conference IEEE Human Systems Interaction. The second task concerns a novel, original approach to the problem of common-sense reasoning in the case of vagueness. It combines logic programming based on backtracking, closed word assumption, negation as a failure and cumulative default logic as well as imprecise reasoning based on fuzzy logic extended to the form of prof. Zadeh's generalized theory of uncertainty. The proposed mechanism called FDL (acronym for Fuzzy Default Logic) has been defined and implemented in PROLOG. The results have been prepared in a form of technical report for further publication and compared to other approaches based on disjunctive logic programming and answer set programming.

A. Pułka (PhD), A.Milik (PhD), *Application of a modern programmable hardware platform to large genome database pattern matching*

The research concerns application of modern electronic circuits to microbiology, computational biology and medicine. The main part of the project was development of an effective searching algorithm which is able to find the best alignment between short query sequences (consisting of 25-30 symbols) and a long genome chain. The dynamic programming algorithms are well suited for this purpose, and particularly the Smith-Waterman approach. It allows obtaining the value of penalty describing the difference between the current sequence and the reference (searched) sequence. The software algorithm was analysed towards its hardware implementation. The algorithm has been split into the control path and the data path. The detailed analysis of the algorithm allowed finding independent arguments and operations and further hardware optimisation. Then the algorithm, which has a block structure, was implemented in HDL (Verilog). Thanks to a detailed analysis the original Smith-Waterman based approach could be executed within a single clock cycle. Further optimisations led to the minimization of the ranges of variables and shared resources which have a strong impact on the hardware resources utilization. In order to obtain better performance, the multi-query processing and multiplexing of processed data were used within the FPGA structure. As a final result we obtained a circuit for pattern alignment search implemented in the Virtex 2 FPGA device family in a form of parallel

pipelining architecture and computational efficiency of about 6 Gsymbol/s. These researches will be continued in the next years to refine the architecture as well as the evaluations and abilities of the hardware implementations.

Prof. J. Rutkowski, D. Grzechca (PhD), T. Golonek (PhD), Ł. Chruszczyk (MSc), P. Jantos (MSc), P. Kyzioł (MSc), *Application of soft computing methods for diagnosis and design of analog electronic circuits*

This research project has been focused on the application of computing methods for diagnosis, testing and design of analog electronic circuits. Recently, the following new methods, making use of artificial intelligence, have been developed for the optimisation of the above tasks.

1. *The application of evolutionary computations to the optimisation of the testing stimulus shape.* The proposed testing excitation is a PWL waveform that generates responses of the tested circuit with an appropriate relationship between current values of its specifications and the value of the observed parameter. The energy of the error signal between nominal and actually obtained responses is designated for the analyzed parameter. The fitness function applied to the evolutionary system allows to optimize the separation level of the identified circuit states and to improve linearity for the relationship between the energy level and the circuit state.
2. *The estimation of the FPAA specification with the use of an artificial neural network (NN).* Simple and fast operation of the NN makes an on-line application possible, even if the method belongs to the SAT technique, which is more time consuming. The NN maps the output space (response features) into the input one (specification parameters). The output layer of the NN indicates the input specification. Moreover, multiple parametric faults in the FPAA have been taken into consideration (global parametric faults). This method is resistant to fluctuation of the measurements.
3. *The wavelet – genetic based method for fault diagnosis of integrated analog electronic circuits.* Its purpose has been an improvement of detection and location of single catastrophic (hard) and parametric (soft) faults with the use of small signal sensitivity in the time and frequency domains. The methods focused on development of optimal shape of the aperiodic excitation signal in the time domain. The optimisation process has been run by the Genetic Algorithm, while the Wavelet Transform

ensured additional improvement of obtained results. The chosen algorithms have been developed in Matlab environment and tested in the DSP Analog Devices board and reconfigurable analog arrays (FPAA). Results in this field are very promising and tend to prove that highly mixed algorithms result in high diagnosis efficiency. Hardware implementation of the most time consuming procedures leads to a short testing time.

4. *The application of relations and superrelations between features of analog integrated circuits.* Basic features are extracted and classified with the use of an evolutionary algorithm – Differential Evolution. The character of integrated technology influences the profile of occurring faults in analog integrated circuits. The most common ones are multiple and proportional parametric faults - global parametric faults. An influence of global parametric faults on analogue integrated circuits in the time domain, response basic features, such as maxima and minima, first order derivative maxima and minima has been analyzed. The use of relations and superrelations should increase testability and diagnosability of the global parametric faults on the production line of analog and mixed electronic circuits.
5. *The Swarm Intelligence algorithms for the optimisation of continuous and combinatorial problems in the area of testing and diagnosis of analog electronic circuits.* The Particle Swarm Optimisation algorithm is used to optimize continuous problems and the Ant Colony Optimisation is used for combinatorial problems. This approach tries to build a complete testing strategy for analog electronic circuits. The continuous optimisation part of this procedure is time consuming, so currently new techniques of hardware implementation, using a parallel computing architecture developed by NVIDIA, are investigated. This method is primarily designed for testing and diagnosis of radio frequency (RF) circuits. Catastrophic and parametric faults have been considered.

DIVISION OF TELECOMMUNICATION

A. Dustor (PhD), *Application of kernel classifiers to speaker modelling*

Speaker recognition is the process of automatically recognizing who is speaking by the analysis of speaker-specific information included in spoken utterances. This process can be divided into identification and verification. While the task of speaker identification is to determine the identity of an

unknown person from a sample of his or her voice, the aim of speaker verification is to decide whether a speaker is whom he claims to be. Although there are some possible applications of speaker identification, it is the speaker verification, which is in the centre of research. The main applications of verification are secure access to services via telephone, home banking and verification in WWW applications. Speaker recognition systems can also be divided into text dependent and text independent. In the text dependent mode the speaker has to provide the same utterance during training and testing of the system. In the text independent mode there are no such constraints. Better results are achieved for the text dependent verification.

Since speaker verification is based on the similarity calculation between test utterance and reference models, it is obvious that the problem of good model construction is very important. The models usually applied to speaker recognition are divided into generative and discriminative. The generative models are probability density estimators that attempt to capture all of the underlying fluctuations and variations of the speaker's voice. These models include Gaussian mixture models (GMM) and a broad family of the nearest neighbour classifiers based on vector quantization (VQ) techniques such as k-means or the LBG algorithm. The discriminative models are optimized to minimize the error on a set of training samples. From this category, the support vector machines (SVM) found application to speaker recognition. Since the discriminative approach should theoretically yield better performance than the generative one, it is very interesting to test the performance of other discriminative classifiers in speaker recognition. Especially interesting is the application of classifiers leading to the lowest errors on a standard data sets used in pattern recognition like the kernel Ho-Kashyap classifier KHK.

The kernel classifier techniques implement the idea of mapping the input vectors into a high dimensional (even infinite) feature space through some nonlinear mapping. In this space a linear separating hyperplane is constructed. The KHK classifier is a kernel extension of the classical Ho-Kashyap procedure. This method uses an approximation to the absolute loss function, resulting in robustness to outliers and a better approximation to the misclassification error.

J. Izydorczyk (PhD), *Some Invariant Sums of Higher-Order Sensitivities*

The aim of this research project is to extend the notion of invariant sensitivity sum, widely known for electrical networks, from the first-order sensitivities to

high-order sensitivities. The basis for all considerations is an invariant sensitivity sum given for a general class of networks by M. N. S. Swamy with the help of the Tellegen Theorem. Because of the fact that it is possible to compute recurrently high-order sensitivities from the first-order sensitivities, it is also possible to extend invariant sensitivity sums from the case of the first-order sensitivity to a high-order sensitivity. This is the basis of the methodology used in this research. The results are high-order invariant sums of sensitivities formulated for a linear lumped circuit consisting of one-port and two-ports only. One-ports are linear resistances, capacitances, inductances, voltage, and current sources. Two-ports are four types of linear controlled sources. A proper selection of parameters describing the circuit allows one to omit a complicated form of invariant sums and reduce them to a particularly simple form. It is shown that the invariant sums actually found for linear lumped networks are generalizations of sums given earlier by the author for the first-order sensitivities of branch voltages and branch currents in a linear lumped network. Invariant sums of higher-order for linear networks are given explicitly to the fourth order only. It is believed that generalizations of them save the simple form to any arbitrary high order.

P. Kłosowski (PhD), *Distance Education at the Silesian University of Technology*

The Distance Learning Platform used by the Silesian University of Technology is based on the modular object-oriented dynamic learning environment. It represents the LMS (Learning Management Systems) technology, a software package designed to help educators create quality online courses. Currently, over 520 online courses are available, created for students of twelve University's faculties. The total number of users exceeds 12,000. The Distance Learning Platform works as a typically asynchronous e-learning service, but in the future more synchronous e-learning services will be added. It has a great potential to create a successful e-learning experience by providing a plethora of excellent tools that can be used to enhance conventional classroom instruction, in hybrid courses, or any distance learning arrangements.

The Distance Learning Platform used at the Silesian University of Technology is continually developed. New interesting features are added as new modules to the source code. These new modules implement the up-to-date technology that appears in web-based e-learning and Internet services. An example of that is the Web 2.0 technology.

Web 2.0 refers to a perceived second-generation of web-based communities and hosted services — such as social networking sites — that facilitate collaboration and sharing between users. While interested parties continue to debate the definition of the Web 2.0 application, a Web 2.0 web-site may exhibit some basic characteristics. These might include:

- "Network as a platform" — delivering (and allowing users to use) applications entirely through a browser (web operating system),
- users owning the data on the site and exercising control over that data,
- an architecture of participation and democracy that encourages users to add value to the application as they use it. This stands in sharp contrast to hierarchical access control in applications, in which systems categorize users into roles with varying levels of functionality,
- a rich, interactive, user-friendly interface based on Ajax (Asynchronous JavaScript and XML) or similar frameworks,
- Some social-networking aspects.

Most of elements of the Web 2.0 technology listed above are currently implemented into the Distance Learning Platform.

DIVISION OF BIOMEDICAL ELECTRONICS

R. Czabański (PhD), M. Jeżewski (MSc), K. Choroba (PhD), J. Wróbel (PhD), J. Jeżewski (PhD), *The Prediction of The Low Fetal Birth Weight Based on Quantitative Description of Cardiotocographic Signals*

Cardiotocography (CTG) is a routine method of fetal condition assessment used in modern obstetrics. It is a biophysical method based on simultaneous recording and analysis of activity of the fetal heart, fetal movement and maternal uterine contraction. The fetal condition is identified on the basis of printed CTG record evaluation. At a present, CTG has become a standard clinical technique for identifying a well-being of fetuses. However, a visual analysis of graphical patterns describing the FHR variability is relatively difficult. Therefore, computerized fetal monitoring systems are used to provide the quantitative description of the CTG signal. Nevertheless, the interpretation is still made by clinicians and remains highly subjective and dependent on the human expert's capability and experience. Consequently, effective methods, aiming to support the diagnosis, are still the topic of many research studies.

The CTG examination evaluates the actual (at the time of monitoring session) fetal state, but the diagnosis verification is possible only after the delivery.

There is no reference information about the fetal health condition during pregnancy. This information will be obtained only after the delivery, and the fetal outcome is retrospectively assigned to the fetal state. Such a prediction of fetal outcome during pregnancy is possible, because in perinatology it is assumed that the fetal state cannot change rapidly. One of the most important features defining the state of fetal outcome is the weight of the newborn. Babies categorized as low birth weight are at a particular risk of health problems, disability, or even death.

The work describes an application of the Artificial Neural Network Based on Logical Interpretation of fuzzy if-then Rules (ANBLIR) to the evaluation of the risk of low birth weight using a set of parameters quantitatively describing the CTG traces. To establish values of the neuro-fuzzy system parameters for birth weight assessment we applied a preprocessed database obtained from an archive of computerized fetal surveillance system MONAKO. We investigated three different learning algorithms of ANBLIR based on the integration of steepest descent method, the least squares algorithm and deterministic annealing learning as well as different training data set structures in order to achieve the best CTG classification accuracy. The obtained results confirm that the neuro-fuzzy based CTG classification methods are efficient for the prediction of the fetal outcome.

M. Kotas (PhD), *Robust projective filtering of time warped ECG beats*

The electrocardiographic (ECG) signal, representing the electrical activity of the heart, is often contaminated by noise. Therefore, since the beginnings of the noninvasive cardiology, development of the effective methods of the electrocardiographic noise suppression has stimulated the progress in the field. Great possibilities emerged when digital filters with a linear phase response, allowing for suppression of ECG noise with limited distortions of the desired component, were introduced. This type of filters is particularly effective when applied to the baseline wander and power-line interference suppression. To enable the analysis of the signals contaminated by the wide-band electromyographic (EMG) noise, the synchronized averaging was introduced. Assuming the constant morphology of the ECG beats, the method performs a linear time-alignment of the respective cycles and a construction of an average one. As a result, the noise is suppressed and the repetitive desired component is enhanced. The assumption of constant morphology of the averaged signal was released in the work applying the technique of dynamic time warping to the nonlinear alignment of the echocardiographic left ventricular volume

cycles. Averaging the aligned cycles allowed reducing the wide-band noise and the periodical artefact related to heart movements synchronous with respiration. As a result, the method caused reduction of inter-beat variability of the processed signal and improved its quantification.

In many applications, it is advantageous to suppress noise without suppressing the variability of the desired signal morphology. In such cases, it is necessary to construct a space of possible shapes instead of constructing an average template. This task can be accomplished by application of the principal component analysis. However, the intrinsically linear principal component analysis models complicated possibly non-linear relationships among different parts of an ECG beat with a limited success. A great progress was achieved when the method of the non-linear state-space projections (NSSP) was applied to ECG processing. Non-linear state-space projections allowed to suppress noise whose power spectrum overlaps the spectrum of the desired component. NSSP was compared to several sophisticated methods of ECG noise suppression and achieved the highest increase of the signal-to-noise ratio in EMG noise environment. The limited number of the method's applications was caused by its extremely high computational costs. The modified version of this method, called as projective filtering of time-aligned beats (PFTAB), allowed overcoming this problem to some extent. The method was successfully applied to ECG enhancement prior to the measurements of the repolarization duration. The next version, called as projective filtering of time warped ECG beats (PFTWEB), achieved significantly higher performance. Still, its applicability was limited to the cases of a not particularly high level of noise. The goal of the referred study was to combine the dynamic time warping with the robust principal component analysis to develop a new version (more immune to noise) of the projective filtering. The filter usefulness was illustrated with its application to ECG enhancement prior to the analysis of the ventricular repolarization duration (the QT or RT interval). In this application the developed filter proved to be superior to the other known methods of ECG filtering.

T. Przybyła (PhD), *Towards the Adaptive Fuzzy Meridian*

Clustering aims at assigning a set of objects to clusters in such a way that objects within the same cluster have a high degree of similarity, while objects belonging to different clusters are dissimilar. Clustering methods can be divided into hierarchical and nonhierarchical (partitioning) methods.

In many cases real data are corrupted by noise and outliers. Hence, the clustering methods should be robust for noise and outliers. In real applications, the data are corrupted by noise and assumed models such the Gaussian distribution are never exact. The Gaussian model is inadequate in an impulsive environment. Impulsive signals are more accurately modelled by distributions whose density functions have heavier tails than the Gaussian distribution. An example of the heavy-tailed distribution can be the meridian distribution. The location parameter of the meridian distribution is called the sample meridian. The sample meridian can be generalized to the weighted meridian by assigning nonnegative weights to the input samples. The weights associated with the data points may be interpreted as the membership degrees. Hence, in such an interpretation of the weights, the weighted meridian becomes the fuzzy meridian. The value of the fuzzy meridian depends on the data samples and the assigned membership grades. Moreover, the value of the fuzzy meridian depends on the medianity parameter.

Our work is concentrated on the problem of an estimation of the medianity parameter using the data samples, which results in the adaptive fuzzy meridian. The adaptive fuzzy meridian can be used as the cluster prototype in a clustering method.

DIVISION OF MICROELECTRONICS AND BIOTECHNOLOGY

W. Izydorczyk (PhD), K. Waczyński (PhD), J. Uljanow (PhD), *Examination of SnO₂ thin layer crystalline structures and their sensing properties in the atmosphere containing oxygen*

The experimental studies of correlation between electric properties of thin SnO₂ layers versus their stoichiometry and microstructure were performed. The aim of the research was to find which factor (layer structure, chemical composition, working temperature, gas concentration) has a dominant effect on optimum work of SnO₂ thin layer based sensors in the oxygen atmosphere. Resistive layers of SnO₂, about 1µm thick, were made on an alundum substrate using the Rheotaxial Growth and Thermal Oxidation (RGTO) technique. The low-angle X-Ray diffraction research proved crystalline structure of the layer by identifying reflexes from surfaces (110), (101), (200), (211), (112) and (321) of the SnO₂ phase. The surface morphology of the obtained SnO₂ thin layers and the chemical composition of chosen microregions were characterized by means of the Scanning Electron Microscope, equipped with scattered X-Ray detectors. The chemical composition of the layer was

additionally characterized using the Auger Electron Spectroscopy. The produced layers are sensitive to oxygen contained in the gas mixture (consisting of oxygen and nitrogen at different partial pressures). The state of the layer during oxygen concentration changes (from 4% to 75%), was registered when the samples were heated and cooled (between 25°C and 540°C). Then, the conductance of the layer as a function of $1/T$ was analysed. Later on, on the basis of conductance curves the potential barrier versus temperature was determined and related to the literature data. For comparison, similar studies were performed for a commercial SnO₂ thick film (TGS 812) gas sensor. The measurements showed that state of the layer was depending on working temperature and oxygen pressure.

P. Kowalik (PhD), Z. Prusowski (PhD), *Modelling R and TCR of resistors with Ni-P resistive layers*

The aim of this project was to create a tool, comfortable and simple in use, which would enable determination of Ni-P layer parameters, such as resistance and TCR, on the basis of the parameters of chemical metallization process. The result of the work is a program, in which data can be easily input and the user can observe changes in parameters of produced layers with small surface resistance, which is between $0,5\Omega/ \pm 2,5\Omega/$, and all range of modification of TCR received for the tested metallizing bath, adequate to the given range of resistance.

The experimental data incorporated into the program were grouped and connected in three basic functions of the program, in which, depending on the provided input dimensions, the remaining parameters of the chemical process of nickel plating are calculated. The input data are first of all: surface resistance, TCR of the obtained layer and, in some cases, pH or temperature of the solution. Depending on the needs one of available functions can be used:

- optimisation from the point of view of nominal resistance
- optimisation whose aim is to obtain layers with small TCR ratio
- choice of duration and parameters of the process to find the centre of tolerance of the nominal resistance of the layer and TCR of the resistive layer.

The first from the available functions is a subprogram that enables calculation of parameters of the chemical metallization process, in which the main determinant of optimisation is the nominal resistance of the received layer; the TCR is not considered here. The program enables, by smooth modification of

pH and T, calculation of the time of metallization and the thickness of the received layer.

The second function is “Optimisation of the process with respect to TCR of the metallic layer”. In this subprogram the inputs are the lower and the upper TCR limit of the layer. For the provided parameters the program calculates various versions of parameters T and pH of the bath and calculates surface resistance and TCR for them.

The last function of the program is a combination of the previous two, used to optimise the process of metallization of resistive layers with respect to both the resistance and TCR of resistors. The necessary input data to run this function are: the acceptable range of TCR and the nominal resistance of the resistive layer. As a result of calculations the program determines some parameters of the metallizing bath (pH and duration) that guarantee the assumed parameters R and TCR.

