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Photonics and Web Engineering: WILGA 2009

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The paper is a digest of work presented during a cyclic Ph.D. student symposium on Photonics and Web Engineering WILGA 2009. Symposium is organized by ISE PW in cooperation with professional organizations IEEE, SPIE, PSP and KEiT PAN. There are presented mainly Ph.D. and M.Sc. theses as well as achievements of young researchers. These papers, presented in such a big number, more than 250 in some years, are in certain sense a good digest of the condition of academic research capabilities in this branch of science and technology. The undertaken research subjects for Ph.D. theses in electronics is determined by the interest and research capacity (financial, laboratory and intellectual) of the young researchers and their tutors. Basically, the condition of academic electronics research depends on financing coming from applications areas. During Wilga 2009 there were organized, and thus the paper debates, the following topical sessions concerning applications of advanced electronics and photonics systems: merging of electronic systems and photonics, Internet engineering, distributed measurement systems, security in information technology, astronomy and space technology, HEP experiments, environment protection, image processing and biometry. The paper contains also more general remarks concerning the workshops organized by and for the Ph.D. students in advanced photonics and electronics systems.

Keywords: photonics, optoelectronics, Internet engineering, web engineering, advanced electronics systems, WILGA Symposium, IEEE, SPIE, Photonics Society of Poland

1. INTRODUCTION

Institute of Electronic Systems of Warsaw University of Technology (ISE PW) [1] has been organizing, for over a decade, an interdisciplinary Ph.D. student Symposium, which is known in this country and internationally as WILGA [2]. WILGA is organized two times a year since 1998, in January and May editions. The place is a small village

near Warsaw on the Vistula river. There is a holiday resort owned by WUT. The Symposium has gathered together more than 3500 Ph.D. and M.Sc. students. There were published more than 1500 research papers in more than 10 volumes of Proceedings of SPIE [3] in the USA and several volumes of special issues of professional journals including Electronics Monthly [4], Electronics and Telecommunications Quarterly by PAN [5], Measurement Systems and Technology by IOP. The WILGA Symposium is attended by representatives of nearly all technical universities in this country (from faculties of electronics, information technology, electrical engineering, mechatronics, technical physics) and Ph.D. students from physics faculties of universities. Each year the WILGA Symposium is attended by young researchers from abroad.

During the last decade, the WILGA Symposium on Photonics Applications has established a meaningful position on the domestic market of academic meetings. It is a pretext for young scientists for comparisons of research work conditions in different parts of the country and abroad. In WILGA there are conditions to undertake a more general discussion on the condition of particular disciplines or technical research and perspectives of their further development. These perspectives are determined by financial conditions, application requirements, and a focused interest to develop a new technology. WILGA is a sensitive mirror showing the status of a certain segment of the 'young science' on the international background. This WILGA barometer shows quite precisely a lot of positive and negative processes in this domain. There is observed a period of strong reconstruction in the area of technical sciences in this country and internationally. The most gifted young people do not choose technical sciences as a subject and aim for their professional career.

A number of research branches, and especially technical sciences, are developing in an interdisciplinary way. This interdisciplinary path concerns also, and particularly, a number of realized Ph.D. theses at electronics, photonics and their applications, as well as related disciplines. Particular neighboring disciplines start to overlap, giving rise and/or opening new research areas. One of such relatively new research areas, combining a number of subjects like solid state physics, optics, mechanics and mechatronics, electronics, material engineering, chemistry, and other ones, are 'microsystems'. A research product, as well as more and more frequently an application product of this branch are objects of a general name including (integrated micro-electro-opto mechanical systems) [6] like MEMS, MOEMS, SOC, LOC, etc. Another example of such an interdisciplinary branch, which now is a separate field of research and industry is photonics. A similar example is mechatronics. Many, nearly all, of these products of these fields can not work without a complex multi-level programming. This programming is, on one hand, strictly combined with cooperating hardware, determining directly their functionality, while on the other hand, it is connected to the global communication network, which is in most cases the Internet.

An important branch of technology is, recently a subject to intense development, integration of mechanical, optical and electronic hardware and programming. A basic theoretical as well as practical question here is which functionalities to place in the

electronic hardware and which in the software. A developmental tendency in this domain is to position in the hardware, apart from the operating system, only the following basic resources needed for the hardware to operate: calculation power, memory and logics. The whole parameterized and configurable and, thus, flexible and scalable functionality is placed in the multilevel software in a few basic kinds of specialized microprocessors: GPP – general purpose, DSP – digital signal processing (floating points calculations), FPGA – behavioral modeling in VHDL, fixed point calculations, but also DSP, and basically logics. Such an electronic node of a system, of the aggregated processing power, fit to the application needs, is connected into a network by means of broadband wireless and/or optical fiber links. The node has (apart from TCP/IP) universal, industrial I/O ports, analog and digital.

The development of design of complex functional systems, serviced by advanced electronics, is observed in several fundamental directions. Two of these were observed in WILGA 2009 works. These concerned probably two separated poles of these application processes of the modern electronics. On one hand, a big number of very narrowly specialized, and economically tailored devices is designed, optimized for usage of confined resources. This is clearly observed in cheap gadgets which do not need any versatility but optimally fulfill the imposed tasks. On the other hand, the research interest concerns big systems of extended calculation potential. During a developmental stage of a large system, due to a fast decrease of unit costs of the resources, the design of advanced electronic systems are frequently quite redundant. The nontrivial task of optimization of usage of large calculation power pays only back in the case of serial applications, which is only rarely a case in academic research.

Below, there are presented some chosen subject groups moved in WILGA 2009 works. There were also discussed some more general development problems concerning electronic and photonic systems in the following aspects: hardware and software balance and integration, design and applications, further development in the nearest future.

2. ELECTRONICS AND INFORMATION TECHNOLOGIES

The increase in calculation resources and the increase in reliability is done, in certain sense, without any excess costs from the point of view of the system designer. The rule for hardware cost reduction, with the introduction of a new generation of microprocessors, is valid not only for GPP chips but also for DSP and FPGA ones. This rule includes also the unit costs of broadband communications between chips and PCBs. This opens a way to use in academic projects the components of much greater resources at nearly the same overall costs. Availability of increased resources allows for reaching more ambitious projects, possible for realization not only in virtual environments. Other considered design aspects of electronic systems during WILGA 2009 were: system ruggedness, resistance to adverse working environments, including ionizing radiation, temperature shocks (cosmic conditions), EMI and EM compatibility

in mixed analog and digital circuits, design and realization of advanced multilayer PCBs, etc.

Another important aspect in the development of electronic systems, which found a reflection in the works of WILGA 2009, is relatively new (or renewed after a shorter or longer absence) area of applications including: telemetric networks of large extent, intelligent sensory wireless networks – including self-configurability, specialist satellite communications, radar technology, SDR and RFID, biomedical engineering, automobile and airborne technologies, and in particular homeland security. In nearly all technologically advanced societies, the universities are actively involved in the research on the security systems. It concerns particularly the research on electronics security solutions. We all hope that the situation in this country will change in favor of academic research teams. The first steps have recently been done on the level of Ministry of Research and Higher Education [7]. This organization has announced recently two series of grants in the area of national security. It will soon be reflected in realization of Ph.D. work. The first work of this kind was presented in WILGA 2009 by WUT and MUT students. One of the works, presented during a session on measurement data categorization, presented by students from Italy concerned a safe thermal method of detection of landmines.

3. PHOTONICS, OPTICAL FIBER AND LASER TECHNOLOGIES

Photonics [8] is one of the most dynamically developing branches of technical sciences. Optical fiber technology is now a solid foundation of strictly standardized, optical, telecommunications, broadband, transport networks. This area is hardly available for a number of academic laboratories in this country. There is a research carried out and development work in many technical niches around optical fiber specialist telecommunications. An optical fiber network, with links stabilized thermally and mechanically, is a good medium for time distribution systems, reference phase and frequency. Such systems are a step towards the direction of building a technical infrastructure for optical clocks or optical reference rules. The aim is to build an optical clock system with accuracy surpassing the atom clocks. An optical fiber ultra-stable link for connection between two or more atom clocks is build by a team from AGH University in Kraków (dr P.Krehlik).

Active and sensory optical fibers and photonic materials are under development in several academic research centers in this country including: Białystok Uni. of Technology [9], UMCS Lublin [10], ITME Warsaw [11], AGH Kraków and WUT. The possibility and interest in research in this area is caused by several factors, and among them: availability of instrumentation – nontelecom optical fibers manufactured by several technological groups, relatively low price of such fibers, mastering of building of optical circuits from such instrumentation fibers, and first of all a large variety of such optical fibers. Broad range of possibilities of instrumentation fiber construction

has not yet exhausted all ideas, despite a very broad literature in this domain, reaching thousands in numbers.

One of the most interesting presented solutions using instrumentation fibers concerned optical capillaries. It was a number of applications to build an integrated photonic and chemical laboratory on optical capillary. The work was presented by dr M.Borecki from IMiO WUT [12]. Among other measurements the following were presented: quality factors of milk, veterinary measurements in cows, food industry - quality of edible oils and alcohols, petrochemical industry – differentiation between and quality of petrol.

Laser technology is traditionally developed on the academic level in MUT, WUT, WrUT and a number of other centers. The research teams from MUT (and from IFPiLM) participate in a number of European programs concerning creation of large European research laser infrastructures like: HIPER [13] or ELI [14]. Several domestic laboratories is building tailored demonstrators of the relevant laser technologies. The role of these costly laboratory projects is to train experts, on the doctoral level as well as development and application research.

4. COMMUNICATIONS AND LOCAL NETWORKS

A number of academic laboratories is doing research in the field of passive, transparent optical networks PONs and in the area of cost effective solutions with multimode optical fibers. A multimode optical fiber transmission with modal groups multiplexing was a subject of a recent Ph.D. thesis in the Institute of Telecommunications of WYT (prof.J.Siuzdak). The effective multiplexing factor was two or three on a distance of several hundred m.

Optical fiber CATV systems are very cost effective. They provide proper bandwidth, even with multimode fibers, and thus transmission quality, and relevant transmission distance between numerous video signal sources and the video central distribution station. A development work is carried out in the direction of using different analog and digital modulation methods and optimization of application solutions for various technical work conditions. There were presented results from the Institute of Telecom of WUT on multichannel system using a multimode fiber working in the first transmission window 0f 850nm. A video FM signal was transmitted outside the baseband of the fiber.

5. INTERNET ENGINEERING

The global network is a magnificent platform for development of a variety of different access systems: networking, measurement, telemetric, safety, multimedia, etc. A strong observed development tendency is a cooperation between many systems on the platform of Internet like: distributed measurement networks, public measurement

result information, GPS location, GIS data, urban traffic monitoring, and many more. The Internet engineering embraces hardware layer and mainly software layers. The latter consists of many sub-layers in agreement with the standard OSI model.

Self-configuring, distributed measurement networks, integrated with the internet and using GPS, GIS and other systems are predicted in the near future for versatile natural environment monitoring. A lot of miniature measurement sensors has to communicate with the network backbone via wireless communications using SDR standard but also via RFID technology. There are imposed very rigid requirements concerning the power supply and power usage confinements. There are used low voltage electrets batteries with zero current supply or micro nuclear ones with high current supply.

The Internet engineering, in popular understanding, embraces mainly the user layer. In reality, these are the following components: data, network, transmission, software and firmware, deposits and data bases, services, security. These components possess complex internal structure like: data kinds and structure, transmission and acquisition of data, data transmission and distribution network, network topology and reliability, diversification of access networks for users, hardware and its configuration, TCP/IP v6 services, measurement data transmission protocols, software and OSI layers, contents and management, offered services, kinds and configuration of services, applications connected with services, programming environments, multimedia, etc. The Internet engineering embraces such problems like: availability, best effort or QoS, mobility, interactivity, standardization, identification, anonymity, confidentiality, identity confirmation, integrity, security, continuous development, and e-technologies like e-science, e-work, e-banking, e-taxes, e-trade, e-business, e-voting, e-polls, e-fun, e-society.

WILGA 2009 Symposium featured a number of topical session devoted to different aspects of Internet engineering and to the systems which are built on the basis of the global network like specialist access networks and measurement networks (prof.W.Winiecki – Institute of Radioelectronics WUT [15] and prof. T.Adamski – Institute of Electronic Systems WUT).

6. SECURITY IN INFORMATION TECHNOLOGY

The main subject of research in the area of the IT security in academic groups is a formal analysis of the problem including specialist securities and cryptology. The researched theoretical and practical problems in this area are the following: updating the applications on the administrator level, configuration of security in operational systems and browsers, distinguishing of work between admin and user, observation of the most endangered ports: 9669, 52522, 59989, 36802, 48811, 21400,40821, 1990, 41174, 12288, hacking, phishing, cryptology, cryptography and cryptanalysis in the Internet, confidentiality, identification, authorization, authentication, integrity, proof with zero knowledge, cryptology attacks, sharing of secrets, coded books, coding and codes, stream and block codes, secure protocols, secure algorithms, RC4, MD5, SHA-1, DES, RSA, DSA, IDEA, PGP, elliptic curves, modulo arithmetic, keys, PKI, digital

signature, symmetric and asymmetric cryptography, quantum cryptography, coding as armor, DRM, security infrastructure, secure logging OAuth, security in wireless networks, WEP, dependence of security on platform system, distribution of quantum key, web security, weak sides of web sites, classification of threats – STRIDE model [16], design of a safe web application, firewall configuration, security tests, security audit of web, warning services of ISP, security organizations and certificates CISA, ISACA [17], ISSAA [18], IEEE CIST [19], Internet research for security.

There is realized a number of M.Sc. and Ph.D theses in ISE WUT in the area of cryptology and web application security. Some of the works are realized in cooperation with the Institute of Informatics of WUT [20] and with NASK [21].

7. ASTRONOMY, ASTROPARTICLE PHYSICS, SPACE TECHNOLOGIES

The students at WUT interested in cosmic technologies are organized in a few research circles. One of these organizations is Students Club of Cosmic Engineering [22]. There is an effective cooperation of these groups with CBK PAN [23] and MEiL WUT Faculty [24]. These groups participate in realization of extended international programs to build mini students satellites. A few of such satellites were launched to the Earth's orbit. There was performed a number of practical experiments concerning the flight trajectory, dropping of parcels from the orbit, optical observations, measurements, etc. All of these experiments required solid resources in the form of advanced electronic measurement and control systems. These systems had to fulfill all strict technical requirements to survive the cosmic conditions of work.

The Mars Society announces each year the University Rover Challenge [25]. This year's competitions of Mars robots took place at the end of May at Utah desert. One of the rovers, called Skarabeusz (The Scarab), was from the WUT prepared by the students in cooperation with PIAP. The rover consists of a versatile car and a gripper. An obstacle race consists of a difficult terrain path, taking probes of soil for analysis and helping a 'wounded astronaut'. Apart from mechanics, the key role in robot operation has an electronic control and automation system. The development work on this rover was presented by G.Kasprowicz, a Ph.D. student of ISE WUT.

A group of M.Sc. and Ph.D. students from WUT, WU and PAN takes part in the realization of an international project of wide angle optical observations of the whole sky. The name of the project is 'Pi-of-the-Sky' [26]. The aim of the project is to detect optical flashes accompanying the GRB effects [27]. During the project realization, it has turned out that the optical and electronic apparatus is very suitable for many other measurements like cataloguing of changing stars, observations of satellite paths, discovering of meteorites, cataloguing of space debris, etc. The experiment has telescopes localized in a few places around the globe, among them in the European Southern Observatory ESO in Chile [28]. In March 2008, the Pi-of-the-Sky experiment observed one of the largest GRBs originating from the distance around 7 bln light years. The observation results were published in Nature. A number of M.Sc. and Ph.D. students

from ISE WUT are participating in the design and construction of ultra-low-noise and cooled CCD cameras with programming. The WILGA 2009 Symposium featured two 'cosmic technology' sessions (prof.L.Mankiewicz, doc.G.Wrochna, prof.F.Zarnecki). There were presented around 20 papers in these subjects.

Ph.D.Students from ISE WUT cooperate with the MPS Institute [29]. They participated in design, construction, testing and fabrication of an on-board, cosmic-grade version of a near infrared spectroscope SIR. This instrument was launched in an Indian space mission Chandrayaan-1 [30]. The satellite now circles around the Moon on a polar orbit. It makes precise spectral and geodesic measurements and mapping of the lunar surface. In this topical region a Ph.D. thesis of P.Sitek is under preparation.

Other region of cooperation with the MPS Institute concerns the matrix detectors for IR spectral region designed for cosmic conditions. These detectors, working in the spectral range of 0,8 – 2,5μm, are designed for Pamela project which will be realized during one of the planned low-orbit LEO [31] missions in a few years time.

8. ENVIRONMENT PROTECTION, MEASUREMENTS OF SURFACE WATER

There is realized a number of research projects in the ISE WUT concerning measurements of the quality factors of surface water. The projects are performed within European FP6 initiative. The research projects SEWING [32] (coordinated by ISE WUT, prof.A.Filipkowski) and WARMER [33] brought very valuable practical results. Part of these results are discussed in Electronics Monthly No 8/2009. A number of papers on SEWING and WARMER projects were published in Proc.SPIE. A practical working technology demonstrator for water measurements is under final tests. The system is an advanced measurement network with data fusion and processing. The system measures typical water parameters endangered with pollution, like alkaline salts and heavy metal ions. The projects results are traditionally demonstrated during WILGA Symposium (prof.L.Opalski, prof.J.Ogrodzki). The priority of these projects is to build cost effective automatic networking systems for warning against water pollution. Sewing and Warmer projects attracted a number of gifted M.Sc. and Ph.D. students in ISE WUT.

9. KNOWLEDGE DISCOVERY FROM MEDICAL DATA BASES AND AUTOMATIC DATA CATEGORIZATION

Large bases of data of various nature are expected to contain so called undiscovered knowledge. There are however several technical conditions on such data bases. The data has to be reliable, sound and good. These may be technological data concerning the production of electronic or photonic components, data about weather changes in the particular geographical region, water quality data, and biomedical data. Research on complex mechanisms of correlation in seemingly uncorrelated data with the usage of

advanced statistical and analytical tools like SVM and knowledge discovery from data mines leads in medicine to completely new conclusions.

The basic tasks for the future in this research on knowledge discovery is systematic building of spacious, credible technical as well as medical databases. Not all available data bases now fulfill these criteria, despite seemingly highly ordered data form and high quality. A large hope for further development of this research direction particularly in medicine is building large data bases. Now, there is observed, a considerable development of data classification methods using multiparameter data sets. Proper data classification, sorting and correlation methods are basic tools in this field of data processing.

WILGA 2009 Symposium featured two big, well attended sessions on this subject (prof.J.Mulawka, dr S.Jankowski). The majority of papers presented during these sessions were delivered by two persons each: an M.D. and an engineer. M.D. person presented a medical problem, while an engineer presented a technical solution using data mining methods and obtained numerical results, Finally, these results were commented by an M.D. The medical problems were presented by the representatives of the following institutions: CZD and UM in Warsaw, CZMP in Łódź and Lublin Medical University.

10. IMAGE PROCESSING

One of the topical sessions in WILGA 2009 was devoted to the image processing in general theoretical, practical and computational aspects. Some aspects concerned the biometry -recognition and/or detection of a face, a palm of hand, an eye etc. A group of Ph.D. students for the Institute of Radioelectronics of WUT, under the guidance of prof W.Skarbek [15] presented a series of papers from these subjects creating a homogeneous picture of the development of this discipline of science and technology.

A research on automatic determination of pollen level is carried out in the ISE WUT. A three year grant was realized in this subject. A tutorial was presented by dr Z.Wawrzyniak with the project results. A measurement system was designed and constructed, consisting of the following parts: a device gathering the pollen grains in a standardized way, device for pollen microscopic image acquisition, multilevel software for image processing and pollen classification. The software classified pollen and calculated the number of pollen grains in each category. A decision was calculated for the pollen levels. The system was shown to be also practical for measurements and classification of other defined air pollutants.

11. RADAR TECHNOLOGY AND DIGITAL SIGNAL PROCESSING

WILGA Symposium is traditionally a multi-conference event. Every two years Wilga has a partner conference on Radar Technology and Digital Signal Processing

organized by prof K.Kulpa of ISE WUT. Every other two years the Radar Symposium is organized as a large international event under the name Radar Week. The radar conference was traditionally organized in Wilga in other neighboring resort. This year the Radar Symposium was organized in Jachranka, a resort near Warsaw on the Zegrzynski Lake. The proceedings of Wilga and Jachranka conferences are published in a common volume of Proc.SPIE.

12. EXPERIMENTS AND PROJECTS: LHC, CMS, E-XFEL, POLFEL, ILC

Young researchers from the ISE WUT take part in a few large international research experiments in the area of synchrotron radiation, high intensity high power lasers, high energy physics, photon physics, elementary particle physics, accelerator science and technology, nuclear technology, cosmic technology, etc. The M.Sc. and Ph.D. students of ISE WUT spend frequently fellowships in DESY [34] in Hamburg (at the machines FLASH [35] and E-XFEL [36]) in CERN [37] in Geneva (at the experiments LHC [38] and CMS [39]) in Fermilab [40] in Chicago (at the experiment ILC [41], in PSI [42] in Willingen. They participated in building Spanish national synchrotron ALBA [43] by CELLS consortium.

The young researchers from ISE WUT participate in DESY in building FLASH and E-XFEL lasers. They take part in the design, construction and tests as well as in the commissioning of electronic and photonic systems for the control of superconducting linear accelerator. This accelerator is a power supply in a form of an electron beam for the FEL laser. A construction of an E-XFEL clone is planned in Poland, in a smaller scale, under the name of POLFEL. The young experts from WUT are potentially a natural crew of the future POLFEL team.

The Ph.D.students from ISE WUT take part in CERN in realization of a few large experiments:CMS, LHC Interlock, Proton Synchrotron upgrade, etc. In thie area there are realized a few M.Sc and Ph.D theses. A few Ph.D.students stay in CERN as permanent residents.

In the frames of FP6 CARE and FP7 EuCARD [44] projects the Ph.D and M.Sc students from ISE WUT carry out research on electronic and photonic systems for accelerator technology, since several years.

13. PROFESSIONAL ORGANIZATIONS: IEEE-SPIE-PSP- KEIT PAN-SEP

The professional societies play a very important role in the academic life of students. A majority of serious professional organizations of national and international extent have students chapters. WILGA Symposium was bound from the very beginning with IEEE and SPIE and their Poland Sections. Now this role for SPIE Poland Chapter plays the Photonics Society of Poland – PSP [49], a continuator of this organization. PSP and SPIE sponsors the best student paper/presentation competition during WILGA.

The international professional organizations assure the possibility of the best possible publication place for WILGA Proceedings. The publications are in the data bases like: SPIE Digital Library [spiedl.org], AIP – America Institute of Physics, IEEE eXplore, PSP Photonics Letters [50]. WILGA publishes its works in Proc.SPIE. Electronics Monthly by SEP, and ETQ by KEiT PAN.

14. WILGA 2009

The XXIVth WILGA 2009 Symposium was organized on 25-31 May in the WILGA resort owned by Warsaw University of Technology on Vistula river near Warsaw. The Symposium lasted traditionally the whole week from Monday till Sunday. A tendency for the various research teams to come to WILGA for only a short visit deepened from a year before. The teams are either from a region of representing a particular topic. Each day WILGA saw a little different set of participants, which can be seen on attached photographs from particular topical sessions. During WILGA 2009 there were presented around 200 presentations from many academic centers in this country: Warsaw, Gdańsk, Toruń, Kraków, Rzeszów, Białystok, Lublin, Łódź.

The organizers of WILGA Symposium are Ph.D. and M.Sc. students of ISE WUT. A very effective chairman of WILGA 2009 Organizing Committee was dr Maciek Linczuk. During certain years, the students form ISE WUT are supported in organization efforts by their colleagues, members of student chapters IEEE [45] and SPIE [46] at WUT and from other universities [47]. The symposium is under the patronage of the Alma Mater and domestic professional organizations: SEP, PAN, PSP. The symposium is supported in Europe, Middle East and in Africa by the SAC IEEE of Region 8 [48]. The effects of this support are frequently observed as WILGA is attended by very nice exotic guests from distant and neighboring countries alike.

SPIE best student presentation award. Traditionally, during the WILGA Symposium there is a student paper contest sponsored by SPIE. Last year, during WILGA 2008 the competition was judged by the eminent and high representatives of SPIE headquarters in Bellingham WA, USA. The participating persons were prof.B.Culshaw from Univ. Strathclyde and dr Emery Moore from Elmonics. The winners of SPIE WILGA 2009 student paper contest are M.Sc. students (Ph.D. students were not taken into account):

- First place – Łukasz Koniusz for the presentation 'Integration of astronomical telescope and weather station with 'Pi-of-the-sky' experiments astronomical system';
- Second place – Agnieszka Zagoździńska for the presentation 'Parametrization of the componants described in VHDL';
- Third place – Łukasz Dymanowski and Kamil Lewandowski for the presentation 'Universal platform for high speed digital signal processing';
- Fourth place – Paweł Drabik for the presentation 'Component Internal Interface framework';

- Fifth place – ex aequo Stefan Korolczuk for the presentation 'Radiation results of the SEE test of Xilinx XC3S400 FPGA instances'; and Michał Bohdanowicz for presentation 'Multichannel acquisition system with photomultipliers detectors'.

Three first places are accompanied with monetary awards, an annual access to SPIE digital library (confined number of downloads), free one-year-membership in SPIE and in PSP. All winners obtain diplomas signed by the SPIE President 2008 dtr Kevin Harding and congratulation letter from the President of PSP prof. T.R.Woliński. A very skilful secretary of the WILGA 2009 Award Committee was dr Ryszard Kossowski of ISE WUT.

15. WILGA 2010

Symposium WILGA 2010 will be organized in two editions – January 29-31.01 and May 24-30.05, traditionally during the whole last week of May. Information about

WILGA 2009 Topical sessions and supervisors (l to r). 1 – Program WARMER – Water management in Europe; prof.A.Filipkowski, prof.L.Opalski, prof.J.Ogrodzki; 2 – Image Processing and Biometry; prof.W.Skarbek; 3 – Cosmic Technologies and Astronomical Program Pi-of-the-Sky; prof.L.Mankiewicz, prof.G.Wrochna, prof.F.Zarnecki; 4 – Security of Internet Measurement Systems; prof.W.Winiecki, prof.T.Adamski; 5 – Photonics – Optical Fiber Engineering; prof.J.Dorosz, dr.M.Borecki, doc.K.Jędrzejewski; 6 – Knowledge discovery in medical databases; prof.J.Mulawka; 7 – LHC, CMS, FLASH, E-XFEL, Electronics for HEP; prof.J.Krolikowski, dr K.Poźniak. Brak sesji nt Data Classifiers; dr S.Jankowski; sesji Internet Engneering; prof.R.Romaniuk; sesji Communications; prof.A.Płatonow

WILGA is available on the web page http://wilga.ise.pw.edu.pl. There are organized numerable Ph.D. student conferences in this country, for researchers in technical sciences. WILGA Symposium has its own unique and valuable character worked diligently during many years of hard and positive academic work. The organizers of WILGA Symposium, who are successive generations of M.Sc. and Ph.D students of the ISE WUT, supported by IEEE and SPIE student members, warmly invite their colleagues, young researchers, together with their tutors and mentors to participate in WILGA 2010 in May.

SPIE Best Student Presentation Award Ceremony. Students with Photonics Society of Poland Officers, Faculty of Physics, WUT, 26.06.2009

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20. Instytut Informatyki PW [http://www.ii.pw.edu.pl];
21. NASK [http://www.nask.pl]
22. Studenckie Koło Inżynierii Kosmicznej Politechniki Warszawskiej [http://skik.pw.edu.pl/]
23. CBK PAN [http://www2.cbk.waw.pl/];
24. MEiL PW [http://www.meil.pw.edu.pl/]
25. The Mars Society; University Rover Challenge [http://www.marssociety.org/portal/c/urc/frontPage];
26. Pi od the Sky [http://grb.fuw.edu.pl/]
27. GRB [http://pl.wikipedia.org/wiki/GRB_080319B]
28. ESO [http://www.eso.org/]
29. Max Planck Institute for Solar System Research [http://www.mps.mpg.de/en/]
30. Chandrayyan-1 satellite [http://en.wikipedia.org/wiki/Chandrayaan]
31. Low-Earth orbit [http://en.wikipedia.org/wiki/Low_Earth_orbit]
32. SEWING Project. System for European Water Monitoring [http://www.sewing.mixdes.org/]
33. Project WARMER, Water Risk Management in Europe [http://www.projectwarmer.eu]
34. DESY Hamburg [http://wwwdesy.de];
35. FLASH Laser [http://flash.desy.de]
36. E-XFEL [http://xfel.desy.de/]
37. CERN Geneva [http://public.web.cern.ch]
38. LHC [http://lhc.fuw.edu.pl/]
39. CMS [http://cms.web.cern.ch/cms]
40. FERMILAB [http://www.fnal.gov]
41. ILC [http://www.linearcollider.org/
42. PSI [http://www.psi.ch/]
43. ALBA CELLS [http://www.cells.es/]
44. FP7 Project EuCARD [https://eucard.web.cern.ch/EuCARD/index.html]
45. IEEE PL [http://ieee.pl/]
46. SPIE PL [http://www.spie.pl/]
47. SPIE and OSA Politechnika Wrocławska [http://www.spie.if.pwr.wroc.pl/links.htm]
48. IEEE R8 [http://www.ewh.ieee.org/reg/8/cms/]
49. Photonics Society of Poland [http://photonics.pl]
50. Photonics Letters of Poland [http://photonics.pl/PLP]