PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 7502

, "Front Matter: Volume 7502," Proc. SPIE 7502, Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2009, 750201 (6 August 2009); doi: 10.1117/12.843290

SPIE.

Event: Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2009, 2009, Wilga, Poland

PROCEEDINGS OF SPIE

Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2009

**Ryszard S. Romaniuk
Krzysztof S. Kulpa**
Editors

**25–31 May 2009
Wilga, Poland**

Organized by
Institute of Electronic Systems, Faculty of Electronics and Information Technologies, Warsaw
University of Technology (Poland)

Sponsored by
Photonics Society of Poland • SPIE Europe • Committee of Electronics and
Telecommunications of Polish Academy of Sciences • IEEE Poland Section
EuCARD – European Coordination of Accelerator Research and Development

Published by
SPIE

Volume 7502

Proceedings of SPIE, 0277-786X, v. 7502

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2009*, edited by Ryszard S. Romaniuk, Krzysztof S. Kulpa, Proceedings of SPIE Vol. 7502 (SPIE, Bellingham, WA, 2009) Article CID Number.

ISSN 0277-786X

ISBN 9780819478139

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2009, Society of Photo-Optical Instrumentation Engineers

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/09/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE
Digital Library

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

xiii	<i>Symposium Committees</i>
xix	<i>Conference Committee</i>
xxiii	<i>Introduction</i>

SESSION 1 IMAGE PROCESSING, OPTICAL BIOMETRY

7502 02	Photonics and web engineering in Poland, WILGA 2009 (Invited Paper) [7502-01] R. S. Romaniuk, Warsaw Univ. of Technology (Poland)
7502 03	Filter-less gray patterns detection in 3D modeling by structured light (Invited Paper) [7502-02] W. Skarbek, A. Nowakowski, Warsaw Univ. of Technology (Poland)
7502 04	Using GPU for face detection [7502-03] J. Naruniec, Warsaw Univ. of Technology (Poland)
7502 05	Teaching image processing and pattern recognition with the Intel OpenCV library [7502-04] A. Kozłowski, A. Królak, Technical Univ. of Lodz (Poland)
7502 06	Steering angle prediction using neural networks and look-up table for different drivers [7502-05] A. Vidugirienė, A. Demčenko, M. Tamošiūnaitė, Vytautas Magnus Univ. (Lithuania)
7502 07	The H.264/MPEG4 advanced video coding [7502-06] A. Gromek, Warsaw Univ. of Technology (Poland)
7502 08	FPGA implementation of image enhancement techniques [7502-07] K. Kumar, A. Jain, A. K. Srivastava, Jaypee Institute of Information Technology Univ. (India)
7502 09	Applying of HDR algorithm as a method of SAR image quality improvement [7502-08] M. Smolarczyk, Przemysłowy Instytut Telekomunikacji S.A. (Poland)
7502 0A	Constant rate control algorithm for Wyner-Ziv video codec [7502-09] M. Jakubowski, Warsaw Univ. of Technology (Poland)
7502 0B	Using color for face verification [7502-10] M. Leszczyński, Warsaw Univ. of Technology (Poland)
7502 0C	Hands segmentation algorithms for colour and graylevel images [7502-11] M. Jędryka, W. Skarbek, Warsaw Univ. of Technology (Poland)

SESSION 2 OPTICAL ASTRONOMY AND SPACE TECHNOLOGY

- 7502 0D **General overview of the "Pi of the Sky" system (Invited Paper)** [7502-12]
K. Malek, Ctr. for Theoretical Physics (Poland); T. Batsch, The Andrzej Soltan Institute for Nuclear Studies (Poland); M. Cwiok, W. Dominik, Univ. of Warsaw (Poland); G. Kaspruwicz, Warsaw Univ. of Technology (Poland); A. Majcher, A. Majczyna, The Andrzej Soltan Institute for Nuclear Studies (Poland); L. Mankiewicz, Ctr. for Theoretical Physics (Poland); K. Nawrocki, The Andrzej Soltan Institute for Nuclear Studies (Poland); R. Pietrzak, Space Research Ctr. (Poland); L. W. Piotrowski, Univ. of Warsaw (Poland); M. Ptasinska, M. Siudek, Warsaw Univ. of Technology (Poland); M. Sokolowski, J. Uzycki, The Andrzej Soltan Institute for Nuclear Studies (Poland); P. Wawer, R. Wawrzaszek, Space Research Ctr. (Poland); G. Wrochna, The Andrzej Soltan Institute for Nuclear Studies (Poland); M. Zaremba, Warsaw Univ. of Technology (Poland); A. F. Zarnecki, Univ. of Warsaw (Poland)
- 7502 0E **Laboratory measurements of the "Pi of the Sky" optical system** [7502-13]
L. W. Piotrowski, A. F. Zarnecki, Univ. of Warsaw (Poland); G. Stępnia, Warsaw Univ. of Technology (Poland)
- 7502 0F **Detection of short optical transients of astrophysical origin in real time** [7502-14]
M. Sokolowski, The Andrzej Soltan Institute for Nuclear Studies (Poland); K. Małek, Ctr. for Theoretical Physics (Poland); L. W. Piotrowski, Univ. of Warsaw (Poland); G. Wrochna, The Andrzej Soltan Institute for Nuclear Studies (Poland)
- 7502 0G **Gamma-ray bursts and GRB080319B** [7502-15]
A. Majcher, T. Batsch, The Andrzej Soltan Institute for Nuclear Studies (Poland); M. Cwiok, W. Dominik, Univ. of Warsaw (Poland); G. Kaspruwicz, Warsaw Univ. of Technology (Poland); A. Majczyna, The Andrzej Soltan Institute for Nuclear Studies (Poland); K. Malek, L. Mankiewicz, Ctr. for Theoretical Physics (Poland); K. Nawrocki, The Andrzej Soltan Institute for Nuclear Studies (Poland); R. Pietrzak, Space Research Ctr. (Poland); L. W. Piotrowski, Univ. of Warsaw (Poland); M. Ptasinska, M. Siudek, Warsaw Univ. of Technology (Poland); M. Sokolowski, The Andrzej Soltan Institute for Nuclear Studies (Poland); J. Uzycki, The Andrzej Soltan Institute for Nuclear Studies (Poland); P. Wawer, R. Wawrzaszek, Space Research Ctr. (Poland); G. Wrochna, The Andrzej Soltan Institute for Nuclear Studies (Poland); M. Zaremba, Warsaw Univ. of Technology (Poland); A. F. Zarnecki, Univ. of Warsaw (Poland)
- 7502 0H **Variable stars classification based on photometric data from the "Pi of the Sky" project** [7502-16]
A. Majczyna, The Andrzej Soltan Institute for Nuclear Studies (Poland); M. Należyty, Univ. of Warsaw Astronomical Observatory (Poland); M. Siudek, Warsaw Univ. of Technology (Poland); K. Małek, Ctr. for Theoretical Physics (Poland); A. Barnacka, Copernicus Astronomical Ctr. (Poland); L. Mankiewicz, Ctr. for Theoretical Physics (Poland); A. F. Zarnecki, Univ. of Warsaw (Poland)
- 7502 0I **Integrated system for monitoring and control of the "Pi of the Sky" experiment** [7502-17]
K. Nawrocki, The Andrzej Soltan Institute for Nuclear Studies (Poland); M. Ptasinska, M. Zaremba, Warsaw Univ. of Technology (Poland)
- 7502 0J **Possible use of the 'Pi of the Sky' system in a space situational awareness program** [7502-18]
R. Wawrzaszek, P. Wawer, Space Research Ctr. (Poland); M. Sokolowski, K. Nawrocki, The Andrzej Soltan Institute for Nuclear Studies (Poland); R. Pietrzak, Space Research Ctr. (Poland); K. Malek, Ctr. for Theoretical Physics (Poland); M. Zaremba, Warsaw Univ. of Technology (Poland); L. W. Piotrowski, Univ. of Warsaw (Poland)

- 7502 OK **Study of amplitude fluctuation spectrum of geostationary satellite signals at different atmospheric conditions** [7502-19]
I. M. Mytsenko, D. D. Khalameyda, Institute of Radiophysics and Electronics (Ukraine)
- 7502 OL **The communication subsystem of Masat-1, the first Hungarian satellite** [7502-20]
L. Dudás, L. Varga, R. Seller, Budapest Univ. of Technology and Economics (Hungary)
- 7502 OM **Space platform for student CubeSat pico-satellite** [7502-21]
M. Stolarski, M. Dobrowolski, R. Graczyk, K. Kurek, Warsaw Univ. of Technology (Poland)
- 7502 ON **PW-Sat on-board flight computer, hardware and software design** [7502-22]
M. Mosdorf, M. Kurowski, L. Mosdorf, A. Cichocki, Mosdorf, M. Kocoń, Warsaw Univ. of Technology (Poland)
- 7502 OO **Processing of sliding spotlight mode data with consideration of orbit geometry (Invited Paper)** [7502-23]
A. Ossowska, R. Speck, German Aerospace Ctr. DLR (Germany)
- 7502 OP **Radiation results of the SEE test of Xilinx XC3S400 FPGA instances** [7502-24]
S. Korolczuk, Warsaw Univ. of Technology (Poland); D. Rybka, Warsaw Univ. of Technology (Poland) and The Andrzej Soltan Institute for Nuclear Studies (Poland); T. Szczęśniak, R. Marcinkowski, Ł. Świdorski, The Andrzej Soltan Institute for Nuclear Studies (Poland)

SESSION 3 RADAR TECHNOLOGY

- 7502 OQ **Passive bistatic radar analysis** [7502-25]
D. W. O'Hagan, H. Kuschel, J. Schiller, FGAN – Research Establishment for Applied Science (Germany)
- 7502 OR **Low-flying target position finding with a seismic system (Invited Paper)** [7502-26]
J. Cechak, P. Hubacek, J. Vesely, Univ. of Defence (Czech Republic)
- 7502 OS **Low-flying target detection: a surface seismic waves application** [7502-27]
J. Cechak, P. Bojda, Univ. of Defence (Czech Republic)
- 7502 OT **Bistatic passive radar simulator with spatial filtering subsystem** [7502-28]
R. Hossa, B. Szlachetko, A. Lewandowski, M. Górski, Wrocław Univ. of Technology (Poland)
- 7502 OU **Beamforming strategy of ULA and UCA sensor configuration in multistatic passive radar** [7502-29]
R. Hossa, Wrocław Univ. of Technology (Poland)
- 7502 OV **Fixed WiMAX (IEEE 802.16d) base station signal analysis for passive radar applications** [7502-30]
M. Malanowski, K. Kulpa, Warsaw Univ. of Technology (Poland); M. Dryjański, S. Pietrzyk, Innovative Solutions (Poland)
- 7502 OW **Preliminary results of noise radar experiments** [7502-31]
M. Malanowski, C. Contartese, Ł. Maślikowski, M. Bączyk, K. Kulpa, Warsaw Univ. of Technology (Poland)

- 7502 0X **Synthetic range profiling in ground penetrating radar** [7502-32]
P. Kaczmarek, M. Łapiński, D. Silko, Military Univ. of Technology (Poland)
- 7502 0Y **Geometrical arrangement of multilateration surveillance system components by means of Cramer-Rao lower bound analysis** [7502-33]
I. Konchenko, F. Yanovsky, National Aviation Univ. (Ukraine)
- 7502 0Z **Non-iterative autofocus algorithm for GMTI sigma-delta STAP processing** [7502-34]
P. Samczyński, Przemysłowy Instytut Telekomunikacji S.A. (Poland) and Warsaw Univ. of Technology (Poland); G. Pietrzyk, Przemysłowy Instytut Telekomunikacji S.A. (Poland); K. Kulpa, Warsaw Univ. of Technology (Poland)
- 7502 10 **Determination of the soil structure and moisture under the area of "Kirilov" church of the National Sanctuary "Sophia of Kiev" by georadar sensing** [7502-35]
E. Kozan, A. Sugak, V. Sugak, Usikov Institute of Radiophysics and Mathematics (Ukraine)
- 7502 11 **Mean velocity of raindrops at orthogonal polarizations of radar sounding waveform** [7502-36]
D. Glushko, F. J. Yanovsky, National Aviation Univ. (Ukraine)
- 7502 12 **Fuzzy detection and classification of dangerous weather phenomena using dual-polarimetric radar measurements** [7502-37]
V. Tho Dang, F. J. Yanovsky, National Aviation Univ. (Ukraine)
- 7502 13 **Simulation of wind shear detection by radar system** [7502-38]
J. Pristavka, National Aviation Univ. (Ukraine)
- 7502 14 **Application of the GNU Radio platform in the multistatic radar** [7502-39]
B. Szlachetko, A. Lewandowski, Wrocław Univ. of Technology (Poland)
- 7502 15 **Phase errors due to distortions in synthetic aperture antenna pattern of noise waveform d-InSAR** [7502-40]
P. Vyplavin, Institute of Radiophysics and Electronics (Ukraine)

SESSION 4 NAVIGATION AND TARGET TRACKING

- 7502 16 **Dead reckoning navigation: supplementing pedestrian GPS with an accelerometer-based pedometer and an electronic compass** [7502-41]
P. Barański, M. Bujacz, P. Strumillo, Technical Univ. of Łódź (Poland)
- 7502 17 **Sensor set stabilization system for miniature UAV** [7502-42]
W. Komorniczak, T. Górski, A. Kawalec, J. Pietrasinski, Military Univ. of Technology (Poland)
- 7502 18 **Digital navigation system for miniature quadcopter UAV** [7502-43]
W. Komorniczak, T. Górski, M. Maciejewski, A. Wrońska, C. Zych, WB Electronics Sp. Z.o.o. (Poland)
- 7502 19 **An adaptive target tracking algorithm for fluctuating signals** [7502-44]
D. Janczak, Y. P. Grishin, A. Nikolajew, Białystok Technical Univ. (Poland)

- 7502 1A **Radar waveform diversity for tracking (Invited Paper)** [7502-45]
Y. Grishin, Bialystok Technical Univ. (Poland)
- 7502 1B **An algorithm for 3D target localization from passive radar measurements (Invited Paper)** [7502-46]
M. Malanowski, Warsaw Univ. of Technology (Poland)

SESSION 5 SIGNAL FILTERS AND DSP

- 7502 1C **Speech compression using zeros-ones-position method (Invited Paper)** [7502-47]
A.-R. Al-Qawasmi, Philadelphia Univ. (Jordan); A. Al-Lawama, Mutah Univ. (Jordan);
N. Al-Khatib, Philadelphia Univ. (Jordan)
- 7502 1D **Robust adaptive detection with angular rejection (Invited Paper)** [7502-48]
S. De Nicola, A. De Maio, Univ. degli Studi di Napoli Federico II (Italy); A. Farina, SELEX Sistemi Integrati S.p.A. (Italy)
- 7502 1E **Computation of continuous wavelet transform of discrete signals with adapted mother functions** [7502-49]
A. Popov, M. Zhukov, National Technical Univ. of Ukraine Kyiv Polytechnic Institute (Ukraine)
- 7502 1F **An algorithm for parametric modelling of a series of time intervals** [7502-50]
K. Kudrynski, P. Strumiłło, Technical Univ. of Lodz (Poland)
- 7502 1G **Gain deficit effect in the fractional delay filter design by the window method** [7502-51]
M. Sac, M. Blok, Gdansk Univ. of Technology (Poland)
- 7502 1H **An approach to description of fuzzy filters (Invited Paper)** [7502-52]
B. S. Butkiewicz, Warsaw Univ. of Technology (Poland)
- 7502 1I **Time-frequency analysis using NVIDIA compute unified device architecture (CUDA)** [7502-53]
J. Kulpa, Warsaw Univ. of Technology (Poland)
- 7502 1J **Low-order modelling of head related transfer functions based on spectral smoothing and principal component analysis** [7502-54]
M. Pec, P. Strumiłło, Technical Univ. of Lodz (Poland)
- 7502 1K **Nonlinear filtration of the spoken language signals** [7502-55]
L. V. Kolchenko, R. B. Sinitsyn, National Aviation Univ. (Ukraine)
- 7502 1L **Walsh-Hadamard transform and its application in linearity testing of Boolean functions** [7502-56]
M. Woś, Warsaw Univ. of Technology (Poland)
- 7502 1M **Nonlinear dynamics approach to speech detection in noisy signals** [7502-57]
Ł. J. Bronakowski, Technical Univ. of Lodz (Poland)
- 7502 1N **Project of universal DSP platform: cluster of floating point DSP processors** [7502-58]
Ł. Dymanowski, K. Lewandowski, M. Linczuk, Warsaw Univ. of Technology (Poland)

- 7502 1O **Structural optimization of least-squares support vector classifier based on virtual leave-one-out residuals.** [7502-59]
S. Jankowski, Z. Szymański, Warsaw Univ. of Technology (Poland)

SESSION 6 SIGNAL MODULATION, TRANSMISSION AND DETECTION

- 7502 1P **Optimum pulse shaping application of Walsh-functions used in MSK** [7502-60]
I. N. Abu-Isbeih, Philadelphia Univ. (Jordan); M. Maqusi, Texas Tech Univ. (United States)
- 7502 1Q **Transmission over UWB channels with OFDM system using LDPC coding** [7502-61]
G. Dziwoki, M. Kucharczyk, W. Sułek, Silesian Univ. of Technology (Poland)
- 7502 1R **Educational model of the OFDM modulator and demodulator** [7502-62]
Ł. Ćwikowski, Telecommunications Research Institute S.A. (Poland); M. Blok, Gdansk Univ. of Technology (Poland)
- 7502 1S **An effective CFO estimation method for OFDM transmission** [7502-63]
M. Purchla-Malanowska, Warsaw Univ. of Technology (Poland)
- 7502 1T **Comparison of hybrid adaptive blind equalizers for QAM signals** [7502-64]
A. Labed, EMP (Algeria); A. Belouchrani, ENP (Algeria); A. Aissa-El-Bey, T. Chonavel, Institut TELECOM (France) and Univ. Européenne de Bretagne (France)
- 7502 1U **Wireless system for explosion detection in underground structures** [7502-65]
M. Chikhradze, N. Bochorishvili, I. Akhvlediani, D. Kukhalashvili, I. Kalichava, E. Mataradze, G. Tsulukidze Mining Institute (Georgia)
- 7502 1V **FM transmission of video signals beyond of the baseband of a 1-km 62.5 μ m multimode fibre at the 850 nm wavelength** [7502-66]
M. Kowalczyk, Warsaw Univ. of Technology (Poland)
- 7502 1W **Detection of Markovian signals on the background of Markovian interferences: prior uncertainty case** [7502-67]
I. G. Prokopenko, I. P. Omelchuk, J. D. Chirka, F. J. Yanovsky, National Aviation Univ. (Ukraine)
- 7502 1X **Reflected signal depolarization estimate with single transceiving antenna** [7502-68]
Yu. Averyanova, A. Averyanov, F. Yanovsky, National Aviation Univ. (Ukraine)
- 7502 1Y **Ultrabroadband photonic Internet: data mining approach to security aspects** [7502-69]
A. Kalicki, Warsaw Univ. of Technology (Poland)

SESSION 7 LASERS, MATERIALS, OPTICAL FIBERS AND OPTOELECTRONICS

- 7502 1Z **Development of free electron laser and accelerator technology in Poland (CARE and EuCARD projects)** [7502-70]
R. S. Romaniuk, Warsaw Univ. of Technology (Poland)

- 7502 20 **Institute of electronic systems in CARE and EuCARD projects accelerator and FEL research, development and applications in Europe** [7502-71]
R. S. Romaniuk, Warsaw Univ. of Technology (Poland)
- 7502 21 **Multichannel acquisition system with photomultiplier detectors** [7502-72]
M. Bohdanowicz, G. Kaspruwicz, Warsaw Univ. of Technology (Poland)
- 7502 22 **Nd³⁺/Yb³⁺ energy transfer in oxyfluoride silicate glass** [7502-73]
J. Źmojda, D. Dorosz, M. Kochanowicz, Białystok Univ. of Technology (Poland)
- 7502 23 **Raman and SEM studies of nanocrystalline Pd-carbonaceous films** [7502-74]
E. Czerwosz, E. Kowalska, Tele & Radio Research Institute (Poland); R. Belka, J. Kęczkowska, M. Suchańska, Kielce Univ. of Technology (Poland); H. Wronka, J. Radomska, Tele & Radio Research Institute (Poland); M. Płaza, Kielce Univ. of Technology (Poland); U. Schmidt, WITec Wissenschaftliche Instrumente und Technologie GmbH (Germany)
- 7502 24 **FEM modelling of nanoindentation experiment for nanostructural Me-carbon film (Me = Pd, Ni)** [7502-75]
J. Rymarczyk, E. Czerwosz, Tele & Radio Research Institute (Poland) and The Jan Kochanowski Univ. (Poland); A. Richter, Univ. of Applied Sciences (Germany)
- 7502 25 **Coherent beam combining of active multicore optical fiber** [7502-76]
M. Kochanowicz, D. Dorosz, J. Źmojda, Białystok Technical Univ. (Poland)

SESSION 8 SENSORS, REMOTE SENSING AND MEASUREMENT NETWORKS

- 7502 26 **Data acquisition system for ion-selective potentiometric sensors (Invited Paper)** [7502-77]
A. Filipkowski, J. Ogrodzki, L. J. Opalski, R. Rybaniec, P. Z. Wieczorek, Warsaw Univ. of Technology (Poland)
- 7502 27 **Chemical sensors for water monitoring: diversity of approaches to behavioral modeling** [7502-78]
J. Ogrodzki, Warsaw Univ. of Technology (Poland)
- 7502 28 **Universal measurement system with web interface** [7502-79]
M. M. Lipiński, G. Kaspruwicz, Warsaw Univ. of Technology (Poland)
- 7502 29 **Application of double frequency radar for the remote sensing of solid aerosols** [7502-80]
A. Linkova, Institute of Radiophysics and Electronics (Ukraine)
- 7502 2A **Cryptographic random number generators for low-power distributed measurement system** [7502-81]
P. Czernik, J. Olszyna, Warsaw Univ. of Technology (Poland)
- 7502 2B **Random signal sodar for meteorology** [7502-82]
Z. M. Bokai, R. B. Sinitsyn, National Aviation Univ. (Ukraine)
- 7502 2C **Maintaining complex and distributed measurement systems with component internal interface framework** [7502-83]
P. Drabik, K. T. Pozniak, Warsaw Univ. of Technology (Poland)

- 7502 2D **Project and realization of fast A/D and D/A conversion channel using FPGA to analyze and process signals** [7502-84]
T. Janicki, K. T. Pozniak, Warsaw Univ. of Technology (Poland)
- 7502 2E **Detecting data anomalies methods in distributed systems** [7502-85]
L. Mosiej, Warsaw Univ. of Technology (Poland)
- 7502 2F **Thermal systems for landmine detection** [7502-86]
M. D'Angelo, L. Del Vecchio, S. Esposito, M. Balsi, Univ. degli Studi di Roma La Sapienza (Italy); S. Jankowski, Warsaw Univ. of Technology (Poland)
- 7502 2G **Application of differential evolution algorithm for automatic constructing and adapting radial basis function neural networks** [7502-87]
D. Rymso, S. Jankowski, Warsaw Univ. of Technology (Poland)

SESSION 9 DATABASES GENETICS AND BIOMEDICAL APPLICATIONS

- 7502 2H **Knowledge discovery in ophthalmology: analysis of wet form of age-related macular degeneration treatment outcomes (Invited Paper)** [7502-88]
M. Ulińska, Warsaw Medical Univ. (Poland); E. Tataj, J. J. Mulawka, Warsaw Univ. of Technology (Poland); J. Szaflik, Warsaw Medical Univ. (Poland)
- 7502 2I **Discomfort glare measurement** [7502-89]
U. J. Blaszcak, Białystok Technical Univ. (Poland)
- 7502 2J **Statistical relationship discovery in SNP data using Bayesian networks** [7502-90]
P. Szlendak, R. M. Nowak, Warsaw Univ. of Technology (Poland)
- 7502 2K **Data mining approach to the evaluation of diagnostic tests in Wilson disease (Invited Paper)** [7502-92]
M. M. Plutecki, Warsaw University of Technology (Poland); M. Dądański, P. Socha, The Children Memorial Health Institute (Poland); J. J. Mulawka, Warsaw Univ. of Technology (Poland)
- 7502 2L **Application of Weka environment to determine factors that stand behind non-alcoholic fatty liver disease (NAFLD)** [7502-93]
M. M. Plutecki, Warsaw Univ. of Technology (Poland); A. Wierzbicka, P. Socha, The Children Memorial Health Institute (Poland); J. J. Mulawka, Warsaw Univ. of Technology (Poland)
- 7502 2M **Detection of blood vessels in human brain: 3D magnetic resonance images with the use of mathematical morphology and region growing algorithms** [7502-94]
A. Sankowski, A. Materka, Technical Univ. of Łódź (Poland)
- 7502 2N **Method and system for measuring of selected optical parameters of the biological tissue subjected to biostimulation treatment** [7502-95]
L. Gryko, Białystok Univ. of Technology (Poland); A. Zajac, Białystok Univ. of Technology (Poland) and Military Univ. of Technology (Poland)
- 7502 2O **Cell broadband engine architecture as a DSP platform** [7502-96]
K. Szumski, M. Malanowski, Warsaw Univ. of Technology (Poland)

- 7502 2P **Epileptic database exploration via the R environment** [7502-97]
D. Dunin-Wąsowicz, The Children's Memorial Health Institute (Poland); P. Zieliński, Warsaw Univ. of Technology (Poland)
- 7502 2Q **Detecting a proper patient with a help of medical data retrieval** [7502-98]
T. Małacka-Massalska, R. Maciejewski, Medical Univ. of Lublin (Poland); P. Wąsiewicz, The Warsaw Univ. of Technology (Poland); W. Zaluska, A. Książek, Medical Univ. of Lublin (Poland)
- 7502 2R **Data mining analysis of factors influencing children's blood pressure in a nation-wide health survey** [7502-99]
P. Wąsiewicz, Warsaw Univ. of Technology (Poland); Z. Kułaga, M. Litwin, Children's Memorial Health Institute (Poland)
- 7502 2S **Proper medical diagnosis and treatment with computer aided system** [7502-100]
T. Pedowski, Medical Univ. of Lublin (Poland); P. Wasiewicz, Warsaw Univ. of Technology (Poland); R. Maciejewski, Medical Univ. of Lublin (Poland) and Institute of Biomedical Informatics (Poland); G. Wallner, Medical Univ. of Lublin (Poland)
- 7502 2T **Application of differential evolution for optimization of least-square support vector machine classifier of signal-averaged electrocardiograms** [7502-101]
S. Kryś, S. Jankowski, E. Piatkowska-Janko, Warsaw Univ. of Technology (Poland)

Author Index

WILGA 2009 Symposium Committees

WILGA 2009 Symposium Chairs

Ryszard S. Romaniuk, Warsaw University of Technology (Poland)

Krzysztof S. Kulpa, Warsaw University of Technology (Poland)

WILGA Symposium Steering Committee

Andrzej W. Domański, Warsaw University of Technology (Poland)

Leszek Jaroszewicz, Military University of Technology (Poland)

Jerzy Klamka, Elektronika, Association of Polish Electrical Engineers (Poland)

Ryszard S. Romaniuk, Warsaw University of Technology (Poland)

Jan Dorosz, Białystok University of Technology (Poland)

Jerzy Szabat, Warsaw University of Technology (Poland)

Tomasz R. Woliński, Warsaw University of Technology (Poland)

Wiesław L. Woliński, Warsaw University of Technology (Poland)

Grzegorz Wrochna, The Andrzej Sołtan Institute for Nuclear Studies, Świerk (Poland)

WILGA 2009 Symposium Committee

Tomasz Adamski, Warsaw University of Technology (Poland)

Michał Borecki, Warsaw University of Technology (Poland)

Jan Dorosz, Białystok University of Technology (Poland)

Stanisław Jankowski, Warsaw University of Technology (Poland)

Kazimierz Jędrzejewski, Warsaw University of Technology (Poland)

Ryszard Kossowski, Warsaw University of Technology (Poland)

Jan Królikowski, Warsaw University (Poland)

Maciej Linczuk, Warsaw University of Technology (Poland)

Lech Mankiewicz, Polish Academy of Sciences (Poland)

Jan J. Mulawka, Warsaw University of Technology (Poland)

Jan Ogrodzki, Warsaw University of Technology (Poland)

Leszek J. Opalski, Warsaw University of Technology (Poland)

Anatoli Piatonow, Warsaw University of Technology (Poland)

Krzysztof T. Poźniak, Warsaw University of Technology (Poland)

Michał Ramotowski, Warsaw University of Technology (Poland)

Ryszard S. Romaniuk, Warsaw University of Technology (Poland)

Władysław Skarbek, Warsaw University of Technology (Poland)

Wiesław Winiecki, Warsaw University of Technology (Poland)

Filip A. Żarnecki, University of Warsaw (Poland)

Jachranka 2009 Symposium Committee

Witold Czarnecki, Military University of Technology (Poland)
Andrzej Jakubiak, Warsaw University of Technology (Poland)
Ignacy Kaliszewski, Industrial Institute of Telecommunications (Poland)
Adam Kawalec, Military University of Technology (Poland)
Krzysztof S. Kulpa, Warsaw University of Technology (Poland)
Konstantin Lukin, Institute of Radiophysics & Electronics, NASU (Ukraine)
Jacek Misiurewicz, Warsaw University of Technology (Poland)
Maj Mordzonek, Industrial Institute of Telecommunications (Poland)
Jerzy Pietrański, Military University of Technology (Poland)
Piotr Samczyński, Warsaw University of Technology (Poland) and Industrial Institute of Telecommunications (Poland)
Edward Sedek, Industrial Institute of Telecommunications (Poland)
Joachim Schiller, FGAN – Research Establishment of Applied Science (Germany)
Mirosław Swiercz, Białystok University of Technology (Poland)
Andrzej Wilk, Industrial Institute of Telecommunications (Poland)
Felix Yanovsky, National Aviation University (Ukraine)

WILGA 2009 Symposium Session Chairs

- 1 Distributed Measurement Systems
Tomasz Adamski, Warsaw University of Technology (Poland)
Wiesław Winiecki, Warsaw University of Technology (Poland)
- 2 Apparatus for Optical and Gamma Ray Astrophysical Observations
Filip A. Żarnecki, Warsaw University (Poland)
Lech Mankiewicz, Polish Academy of Sciences (Poland)
- 3 Optical Fiber Bragg Gratings
Kazimierz Jędrzejewski, Warsaw University of Technology (Poland)
- 4 Optical Fiber Technology
Jan Dorosz, Białystok University of Technology (Poland)
- 5 Distributed Measurement Systems
Tomasz Adamski, Warsaw University of Technology (Poland)
Wiesław Winiecki, Warsaw University of Technology (Poland)
- 6 WARMER
Andrzej Filipkowski, Warsaw University of Technology (Poland)
- 7 Optoelectronics
Michał Borecki, Warsaw University of Technology (Poland)

- 8 Image Processing
Władysław Skarbek, Warsaw University of Technology (Poland)
- 9 Optical Communications
Przemysław Krehlik, AGH University, Kraków (Poland)
- 10 Laser Technology
Ryszard S. Romaniuk, Warsaw University of Technology (Poland)
- 11 Knowledge Discovery in Large Databases
Jan J. Mulawka, Warsaw University of Technology (Poland)
- 12 Data Categorization
Stanisław Jankowski, Warsaw University of Technology (Poland)
- 13 Photonics and Electronics for HEP Experiments
Krzysztof T. Poźniak, Warsaw University of Technology (Poland)
Maciej Linczuk, Warsaw University of Technology (Poland)
- 14 LHC and CMS
Jan Królikowski, Warsaw University (Poland)
- 15 Photonics and Web Engineering I
Maciej Linczuk, Warsaw University of Technology (Poland)
- 16 Photonics and Web Engineering II
Ryszard S. Romaniuk, Warsaw University of Technology (Poland)
- 17 WILGA 2009 SPIE Best Student Paper Awards
Ryszard Kossowski, Warsaw University of Technology (Poland)

Jachranka 2009 Symposium Session Chairs

- 1 Civilian Applications of Airborne SAR Systems
Krzysztof S. Kulpa, Warsaw University of Technology (Poland)
Maj Mordzonek, Przemyslowy Instytut Telekomunikacji S.A. (Poland)
- 2 Passive Radars
Joachim Schiller, FGAN - Research Establishment of Applied Science (Germany)
Jerzy Goca, Przemyslowy Instytut Telekomunikacji S.A. (Poland)

- 3 Signal Processing
Anna Dzvonkovskaya, University of Hamburg (Germany)
Wojciech Komorniczak, Military University of Technology, Warsaw
(Poland)

- 4 DSP in Radars, Posters
Mikheil Chikhradze, G.Tsulukidze Mining Institute (Georgia)
Piotr Samczyński, Warsaw University of Technology (Poland)

- 5 Radar I
Felix J. Yanovsky, National Aviation University (Ukraine)
Jacek Misiurewicz, Warsaw University of Technology (Poland)

- 6 Image Processing / Signal Processing II
Abdel-Rahman Al-Qawasmi, Philadelphia University (Jordan)
Robert Hossa, Wrocław University of Technology (Poland)

- 7 Radar II
Yulia Averyanova, National Aviation University (Ukraine)
Mateusz Malanowski, Warsaw University of Technology (Poland)

- 8 Medical Signal Processing
Pavlo Vyplavin, Institute of Radiophysics & Electronics, NASU (Ukraine)
Bohdan Butkiewicz, Warsaw University of Technology (Poland)

- 9 SAR / Noise Radars
Daniel O'Hagan, FGAN – Research Establishment of Applied Science
(Germany)
Jerzy Pietrański, Military University of Technology (Poland)

- 10 Radar Phenomenology / Radar Polarimetry
Jaroslav Cechak, University of Defence (Czech Republic)
Zbigniew Czekala, RADWAR S.A. (Poland)

- 11 Navigation Technology
Natalie Kasperovych, National Aviation University (Ukraine)
Maciej Smolarczyk, Przemyslowy Instytut Telekomunikacji S.A. (Poland)

- 12 Radio Frequency Technology / Telecommunications
Ibrahim N. Abu-Isbeih, Philadelphia University (Jordan)
Krzysztof Kurek, Warsaw University of Technology (Poland)

- 13 Security / Ground Penetration
Konstantin Lukin, Institute of Radiophysics & Electronics, NASU (Ukraine)
Adam Kawalec, Military University of Technology (Poland)

- 14 Communications / Space Technology
 Alicja Ossowska, German Aerospace Center DLR (Germany),
 Tomasz Górski, Military University of Technology (Poland)
- 15 Lectures on Radar Technology
 Krzysztof S. Kulpa, Warsaw University of Technology (Poland)
- 16 SPS 2009 Best Student Paper Awards and Best Poster Presentation
 Awards
 Jerzy Pietrasiński, Military University of Technology (Poland)

WILGA 2009 Conference Committee

WILGA 2009 Conference Chairs

Ryszard S. Romaniuk, Warsaw University of Technology (Poland)
Krzysztof S. Kulpa, Warsaw University of Technology (Poland)

WILGA 2009 Conference Program Committee

Tomasz Adamski, Warsaw University of Technology (Poland)
Michał Borecki, Warsaw University of Technology (Poland)
Jan Dorosz, Białystok University of Technology (Poland)
Stanisław Jankowski, Warsaw University of Technology (Poland)
Jan Krolkowski, University of Warsaw (Poland)
Lech Mankiewicz, Center for Theoretical Physics (Poland)
Jan J. Mulawka, Warsaw University of Technology (Poland)
Jan Ogrodzki, Warsaw University of Technology (Poland)
Leszek J. Opalski, Warsaw University of Technology (Poland)
Krzysztof T. Pozniak, Warsaw University of Technology (Poland)
Władysław Skarbek, Warsaw University of Technology (Poland)
Jerzy Szabat, Warsaw University of Technology (Poland)
Wiesław Winiecki, Warsaw University of Technology (Poland)
Aleksander F. Zarnecki, University of Warsaw (Poland)
Anatoli Platonow, Institute of Electronic Systems, Warsaw University of Technology (Poland)
Ryszard Kossowski, Institute of Electronic Systems, Warsaw University of Technology (Poland)
Michael Ramotowski, Institute of Electronic Systems, Warsaw University of Technology (Poland)
Witold Czarnecki, Warsaw University of Technology (Poland)
Andrzej Jakubiak, Warsaw University of Technology (Poland)
Ignacy Kaliszewski, Przemysłowy Instytut Telekomunikacji S.A. (Poland)
Adam Kawalec, Military University of Technology (Poland)
Konstantin Lukin, Institute of Radiophysics & Electronics, NASU (Ukraine)
Jacek Misiurewicz, Warsaw University of Technology (Poland)
Maj Mordzonek, Przemysłowy Instytut Telekomunikacji S.A. (Poland)
Jerzy Pietrasinski, Military University of Technology (Poland)
Edward Sedek, Przemysłowy Instytut Telekomunikacji S.A. (Poland)
Joachim Schiller, FGAN – Research Establishment of Applied Science (Germany)
Mirosław Swiercz, Białystok University of Technology (Poland)
Andrzej Wilk, Przemysłowy Instytut Telekomunikacji S.A. (Poland)
Felix J. Yanovsky, National Aviation University (Ukraine)

Krzysztof Zaremba, Institute of Radioelectronics, Warsaw University of Technology (Poland)
Antoni Grzanka, Institute of Electronic Systems, Warsaw University of Technology (Poland)
Leszek Jaroszewicz, Military University of Technology (Poland)
Tomasz Wolinski, Institute of Physics, Warsaw University of Technology (Poland)
Andrzej Domanski, Institute of Physics, Warsaw University of Technology (Poland)
Grzegorz Wrochna, The Andrzej Soltan Institute for Nuclear Studies (Poland)
Andrzej Filipkowski, Institute of Electronic Systems, Warsaw University of Technology (Poland)
Jaroslav Arabas, Institute of Electronic Systems, Warsaw University of Technology (Poland)
Ignacy Kaliszewski, Przemyslowy Instytut Telekomunikacji S.A. (Poland)
Andrzej Wilk, Przemyslowy Instytut Telekomunikacji S.A. (Poland)

WILGA 2009 Conference Session Chairs

- 1 Image Processing, Optical Biometry
Władysław Skarbek, Warsaw University of Technology (Poland)
- 2 Optical Astronomy and Space Technology
Filip Zarnecki, Warsaw University (Poland)
Lech Mankiewicz, Polish Academy of Sciences
- 3 Radar Technology
Krzysztof S. Kulpa, Warsaw University of Technology (Poland)
- 4 Navigation and Target Tracking
Maj Mordzonek, Industrial Institute of Telecommunications, Warsaw (Poland)
- 5 Signal Filters and DSP
Felix J. Yanovsky, National Aviation University, Kiev (Ukraine)
- 6 Signal Modulation, Transmission and Detection
Jacek Misiurewicz, Warsaw University of Technology (Poland)
- 7 Lasers, Materials, Optical Fibers and Optoelectronics
Ryszard S. Romaniuk, Warsaw University of Technology (Poland)

- 8 Sensors, Remote Sensing and Measurement Networks
 Tomasz Adamski, Warsaw University of Technology (Poland)
 Wieslaw Winiecki, Warsaw University of Technology (Poland)
- 9 Databases Genetics and Biomedical Applications
 Jan J. Mulawka, Warsaw University of Technology (Poland)

Introduction

The **SPIE-IEEE-PSP WILGA** symposium is part of international Forum of Young Science. It is annually organized under the eminent patronage of two international engineering institutions, SPIE [www.spie.org], IEEE [www.ieee.org], and their Polish Counterparts: Photonics Society of Poland [www.photonics.pl], the successor of the Polish Chapter of SPIE [www.spie.pl], and IEEE Poland Section [www.ieee.pl]. The patrons of the symposium are: the Polish Academy of Science (The Committee on Electronics and Telecommunication) [keit.pan.pl], Association of Polish Electrical Engineers (SEP) [www.sep.com.pl], and Warsaw University of Technology [www.pw.edu.pl].

The official language of the Symposium was English and the peer-reviewed papers are being published in the world renowned Proceedings of SPIE. The symposium was designed mainly for Ph.D., M.Sc., and B.Sc. students (from physics, electronics and mechatronics) and their tutors/mentors. WILGA displayed a number of primary topics, the first being Photonics and Web Engineering. Generally, WILGA embraces advanced photonic and electronic systems in the following ways: theory, modeling, algorithms, simulations, design, hardware, software, hardware-software interaction, measurements, testing, commissioning, and exploitation.

The topical sessions are organized by leading experts and usually begin with current tutorials and are filled with contributed papers by students and young researchers. One of the most important session tracks in WILGA is the photonics applications and systems for superconductive accelerator technology (and free electron laser) and high energy physics experiments. We warmly invite students, young researchers, and their tutors to participate in WILGA conferences.

WILGA 2009 was held on 25-31 May at a resort owned by the Warsaw University of Technology. There were 200 presentations delivered covering a broad range of photonics applications and web engineering topics.

The Jachranka 2009 VI Signal Processing Symposium (SPS-2009) was held on 28-30 May 2009 at the GUS Holiday Camp in Jachranka Village near Warsaw. The main goal of the symposium was to create a forum for students and scientists to present their latest research results, new trends in science and technology, and exchange ideas during the technical and evening sessions.

The Jachranka meeting was part of the 24th SPIE-IEEE Symposium on Advanced Photonics, Electronics Systems, and Web Engineering. The SPS-2009 conference was organized by the Institute of Electronic Systems and Warsaw University of Technology together with the Przemyslowy Instytut Telekomunikacji S.A., Military University of Technology, RADWAR S.A, Space Research Center of Polish Academy of Sciences, Foundation for Development of Radiocommunication and Multimedia Technologies, IEEE Signal Processing Society Poland Chapter, and IEEE AEES Poland Chapter.

In 2003 Dr. K. Kulpa chaired and organized the first Digital Signal Processing and Radar Signal Processing Sessions of the 12th IEEE-SPIE Symposium on Advanced Photonics and Electronics. In 2005 and 2007 students from The Radiolocation and Digital Signal Processing Students' Research Group, along with Dr. Kulpa, decided to organize the second and third edition of the Signal Processing Symposium, which was a part IEEE-SPIE Symposium on Photonics, Electronics, and Web Engineering. SPS-2005 and SPS 2007 gathered more than 100 participants and have been considered very successful events, a fact that has led the Radar Group of ISE to organize for the fourth time to create the Signal Processing Symposium, SPS-2009.

Ryszard S. Romaniuk
Krzysztof S. Kulpa