

JOURNAL OF TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

Preface

This issue of the *Journal on Telecommunications and Information Technology* contains nine articles. We have five papers related to biometry, three papers related to certain environmental issues in communication and measurement systems, and the last paper deals with communication systems.

Let us first discuss the biometrics papers. The first one, namely *Supervised Kernel Principal Component Analysis by Most Expressive Feature Reordering* by Krzysztof Ślot *et al.* reaches in fact far beyond biometrics, as it analyses a general feature selection problem in kernel methods. The paper discusses feature space derivation through feature selection. The selection is based on kernel Principal Component Analysis (kPCA) of the input data. Several selection criteria are introduced and compared against the reference approach being the combination of kPCA and the most expressive feature reordering based on the Fisher linear discriminant criterion. It has been shown that one can improve classification performance by introduction of appropriate modifications to the feature selection procedure. The proposed method is an important alternative to the commonly used feature selection approaches in kernel-induced feature spaces.

The paper of Ewa Kartasińska and Anna Brągoszewska on *Analysis of Polymorphic DNA Sequences in the Identification of Individuals and its Possible Use in Biometric Systems* presents the latest developments in DNA analysis and future trends in DNA forensic practice, and discusses ways and possibilities for DNA analysis to be applied in biometric recognition. Genetic tests that allow to establish a DNA profile constitute an effective and reliable method of individual identification, yet they are not performed in real time. A noninvasive device capable of quick and automatic generation and comparison of DNA profiles is yet to be invented. Development of Lab-on-a-Chip technology explored possibilities to produce miniature devices aimed also for genetic purposes. The idea of the Lab-on-a-Chip is already used in diagnostic procedures and in analytical chemistry and may be the future of the DNA biometric.

In their paper on *Biometric Systems Based on Palm Vein Patterns*, Dorota Smorawa and Mariusz Kubanek discuss a complete biometric recognition system based on hand vascular pattern. They first present the way to obtain the hand blood vessels image and to improve its contrast. The proposed feature extraction methodology uses two-dimensional Gaussian

density and curvature analysis. The image is finally coded as a set of feature vectors. Out of the two proposed verification methods, the one based on Hidden Markov Models performs better. Verification using the generally available CASIA hand blood vessels database shows that the Hidden Markov Models approach compares favorably too many earlier results obtained by another authors.

The last two biometric papers are related to social and legal issues. In the paper on *Polish Personal Identity Card as a Tool for Identity Theft*, Mirosław Owoc express his personal concern about the changes resulting from an introduction of the new personal ID card in Poland. The new document contains less information about the owner, i.e. height, eye color, and signature are missing, and may thus significantly increase the risk of identity theft. The issues raised by the author may start a discussion on the identity card security issue.

Magdalena Tomaszewska-Michalak in *The Practical Implementation of Biometric Technology – Legal Aspects* discusses the legal and social problems that may occur while implementing a biometric system. Author's research lead to general rules, which should be followed by legislators to introduce a well-functioning and user-friendly biometric system. It is necessary to launch the legal frames relevant to the aim of the particular biometric system. A proper system should be thus an effect of cooperation between engineers and lawyers with a background in privacy rights.

The next three articles deal with various environment-related problems. In the paper on *Wind Farms Influence on Radiocommunication Systems Operating in the VHF and UHF Bands* Krzysztof Bronk *et al.* discuss various ways the wind farms may affect radiocommunication systems. The authors experimentally confirmed that the ITU-R BT.1893 model could be applied to both UHF and VHF bands. They showed that the interference with wind turbines is stronger in UHF band, and the reflected signal is periodic so the areas of very strong interference are adjacent to the areas of low interference.

Another issue is discussed by Krzysztof Maniak in *Measuring Electromagnetic Emissions from Active Landslides*. Electromagnetic emission measurement from active landslides and other geophysical complex structures is a new useful method of slope stability assessment that can provide continuous monitoring of landslide conditions. The paper describes the mechanism of electromagnetic emission generation in active landslides and proposes an original system for measuring both continuous and pulsed magnetic emission of landslides. The proposed measurement system can be also used for examination of the structural inhomogeneity of rock strata subjected to considerable stresses. The results of examinations of active and inactive landslide in Poland are also presented.

The paper of Ratna Kalos Zakiah Sahbudin *et al.* on *SAC-OCDMA over Hybrid FTTx Free Space Optical Communication Networks* investigates weather influence on this class of communication systems. Spectral Amplitude Coding Optical Code Division Multiple Access (SAC-OCDMA) is a promising multiplexing technique for hybrid Fiber-to-the-x (FTTx) access networks. FTTx and Free Space Optical (FSO) are the last mile technologies that deliver secure and high-speed communication. Authors results determine the range for the proposed SAC-OCDMA FTTx-FSO for drizzle, light rain, medium rain and heavy rain, useful to locate the FSO transceivers.

In *Improvement of LTE Downlink Channel Estimation Performance by Using an Adaptive Pilot Pattern* by My Abdelkader Youssefi and Jamal El Abbadi, the authors propose an adaptive pilot pattern to improve channel estimation performance for Long Term Evolution (LTE) downlink system with high mobility. The adaptive pilot pattern is to replace the fixed pilot positions predefined in time and frequency to use optimally pilot tones over time varying channels. It is shown that only seven bits of additional wide-band feedback per frame and per user are required to support optimally adaptive pilot patterns. Simulation results show that the proposed method allows high performance in terms of throughput and channel estimation error.

I would like to thank all the authors and the reviewers for their effort to make this issue interesting and of high quality.

Andrzej Pacut
Guest Editor
Institute of Control and Computation Engineering
Warsaw University of Technology
E-mail: pacut@ia.pw.edu.pl