EDITORIAL

Dear reader,

You have at your desk the issue no. 1/2016 of the journal AUTOMATIKA, which contains 25 original scientific papers in the fields of signal processing, computer science, power electronics, microelectronics, control systems, mobile robotics and communications.

*In the first paper, **Effect of transformer symmetry on intrabody communication channel measurements using grounded instruments**, Željka Lučev Vasić et al. measure intrabody communication system amplitude and phase transmission characteristics using three types of galvanic decouplers: non-symmetric RF transformers, balun transformers with center tap grounded and balun transformers with center tap floating. The authors showed that the change in the measured amplitude for different signal and ground electrode arrangements, while measuring with non-symmetric transformers, is influenced by the transformer symmetry to the ground, and not the capacitive intrabody communication transmission characteristics. The second paper entitled **Study of Network Reconfiguration in Distribution Systems Using an Adaptive Modified Firefly Algorithm** by Reza Sedaghati et al. suggests a new method based on the probabilistic load flow and adaptive modified firefly algorithm in order to evaluate the optimal management of the distribution feeder reconfiguration operation problems. Described case study involves few wind turbines in the system, whereas performance satisfaction of the proposed method is examined on the IEEE 32-bus standard test system. Xinzhou Xu et al. present in their paper entitled **Locally Discriminant Diffusion Projection and Its Application in Speech Emotion Recognition** generalized single-graph-diffusion embedding framework on the basis of graph embedding framework. Then, by designing the embedding graph of the framework, an algorithm, namely locally discriminant diffusion projection, is proposed for speech emotion recognition. The authors validate the proposed algorithm on two speech emotion databases and show that the proposed methods outperform some other state-of-the-art dimensionality reduction methods which are based on graph embedding or discriminant analysis. The following paper entitled **Accurate stereo matching using pixel normalized cross correlation in time domain** by Marko Lelas and Tomislav Pribanić presents a novel method for stereo matching which is based on combination of active and passive stereo 3D reconstruction approaches. A laser line is used to scan the reconstructed scene and a stereo camera pair is used for the image acquisition. This method is not computationally intensive and can be used for turning the smartphone into the practical 3D scanner as presented in this work. The fifth paper entitled **BeFriend: A Context-Aware Ad-hoc Social Networking Platform** by Vanja Smailović and Vedran Podobnik describes the BeFriend, a contextaware ad-hoc social networking platform based on Facebook and Google+ social graphs. The proof-of-concept BeFriend platform presented in this paper is available in the form of BeFriend application for users possessing Android-based smartphones. The following paper entitled **Partitioned Common Spatial Pattern Method for single trial EEG Signal classification in Brain-Computer Interface System** by Hongyu Sun et al. considers the application of a novel partitioned common spatial pattern to find the most relevant spatial frequency distribution with motor imagery. The experimental results on 4 subjects showed that the proposed method significantly outperforms approaches based on conventional common spatial pattern and common spatio-spectral pattern. Irena Galić et al. show in their paper entitled **Image compression with B-tree coding algorithm enhanced by data modelling with Burrows-Wheeler transformation** that the partial differential based compression*

framework, edge enhancing diffusion compression on high compression ratios can come close to or even be better than present compression standard JPEG2000, thus presenting a novel method for image compression. They enhance diffusion compression by changing its data coding with an entropy coder accompanied with Burrows-Wheeler transformation and context mixing. They also examine the effectiveness of the partial differential equations in image compression and evaluate it by comparing to cosine and wavelet transform based compression methods. In the following paper, **Sliding Mode Control of a Grid-Connected Distributed Generation Unit under Unbalanced Voltage Conditions** *by Mohammad Mahdi Rezaei and Jafar Soltani a sliding mode based controller for grid-connected distributed generator units, under unbalanced grid voltage condition is proposed. The proposed nonlinear control scheme directly cancels out the negative-sequence components of distributed generator output current under unbalanced voltage condition; and directly regulates the positive-sequence active and reactive power injected by distributed generator units to main-grid. The control method proposed in this paper is shown to be robust and stable under system parameter uncertainties. The ninth paper entitled* **An Efficient Methodology Proposed For Deciding About the Number of Battery Modules In Hybrid Electric Vehicles** *by Kazem Varesi et al. considers vehicles with higher degree of hybridization. Higher deegree of hybridization results in lower emissions and higher level of fuel economy. Compared to the existing approaches for the same decision problem, the approach presented in this paper achieves better performance of the vehicle with high degree of hybridization. In the following paper,* **An Efficient ANN-Based MPPT Optimal Controller of a DC/DC Boost Converter for Photovoltaic Systems** *by Makhloufi et al. a simulation study of the maximum power point tracking for a photovoltaic system using an artificial neural network is presented.The system simulation is elaborated by combining the models established of solar PV module and a DC/DC Boost converter and it is studied using various irradiance shading conditions. Paper entitled* **The application of fuzzy inference systems in overload elimination and correction** *by Ivica Petrović et al. considers analysis of the safety and stability of a power supply network. In the modern market need for power system to function near stability margin is increased, whereas commonly applied control has property of slow convergence or inadequate accuracy. In this paper authors present a fuzzy controller for the power system operation that employs vulnerability indices of the system components to cope with the line overloads. The following paper entitled* **Realization of Single Phase to Three Phase Matrix Converter using SVPWM Algorithm** *by Vengadeshwaran Velu et al. presents a novel attempt in implementing the space vector pulse width modulation based matrix converter system for direct single phase to three phase conversion. They use IGBT based bi-directional switches that produce convincing three phase output signals from a single phase voltage source. In the following paper,* **Design of Control and Switching Frequency Optimization of DC/DC Power Converter for Super-capacitor**, *Tomas Haubert et al. conduct analysis supported by experiments of the optimal PWM frequency choice for DC/DC converter in hybrid car drive super-capacitor energy storage application. N. Gunavardhini and M. Chandrasekaran in their paper entitled* **Power Quality Conditioners for Railway Traction - a Review** *present a review on power quality conditioners suitable for railway traction based on the configuration, components involved and on the technical and economic considerations. Paper entitled* **Performance of a Photovoltaic Pumping System Driven by a Single Phase Induction Motor Connected to a Photovoltaic Generator** *by Chams-Eddine Feraga and Abdallah Bouldjedri analyze the performances of a single phase induction motor connected to a photovoltaic generator through an inverter. Firstly, the mathematical model of the suggested structure is developed. Secondly, the concept of the indirect rotor-field-oriented control techniques is used to pilot the working of the single phase induction motor coupled with the centrifugal pump. In the end, in simulations the effectiveness and feasibility of the proposed approach*

*are discussed. In the following paper, **Large-scale surveillance system: detection and tracking of suspicious motion patterns in crowded traffic scenes**, by Amar El Maadi and Mohand S. Djouadi, a method for pattern recognition in crowded scenes is presented by using density-based technique to cluster motion vectors, followed by active camera scheduling strategy in large traffic surveillance systems. Abdullah Bajelan and Adel Akbarimajd in their paper entitled **A New Mechanism for Passive Dynamic Object Manipulation along a Curved Path** develop a dynamic passive object manipulation mechanism to achieve manipulation in more than one dimension and to simultaneously change position and orientation of the object. The object is composed of two wheels with different radiuses and an axle connecting the wheels to each other, and moves passively along a circular path on the platform with inclined surface. The authors also derive the equations of motion and perform the dynamics analysis. The following paper, **Optical flow based odometry for mobile robots supported by multiple sensors and sensor fusion**, by Ferenc Tajti et al. introduces an optical flow based odometry solution for indoor mobile robots. The paper presents the theoretical background, the implementation and the experimental results as well. The authors state that the universal optical flow module can be implemented in any kind of indoor mobile robot to measure the position and the orientation of the robot during the motion, even in the case of a 3 DoF holonomic drive like kiwi drive. The paper entitled **Tuning of Pulse-Width Pulse-Frequency Modulator using PSO: An Engineering Approach to Spacecraft Attitude Controller Design**, by Alireza Khosravi and Pouria Sarhadi, presents a technique for fine tuning of spacecraft autopilots based on pulse-width pulse-frequency modulators. The paper shows how particle swarm optimization can be invoked to set both controller and pulse-width pulse-frequency modulator parameters. Several spacecraft autopilots have been designed to show effectiveness of the proposed method. Pooja Mohindru et al. in their paper entitled **Spectral Analysis of Generalized Triangular and Welch Window Functions using Fractional Fourier Transform** present a closed-form expression for the fractional Fourier transform of generalized triangular and Welch window functions. The analysis of generalized triangular and Welch window functions in fractional Fourier domain establishes a direct relationship between their fractional Fourier transforms and fractional angle. Based on the mathematical model obtained, it is observed that adjustable spectral parameters of these functions can be obtained by modifying the fractional angle. The following paper, **Analysis and Application of FLL based on the Processing of the Input and Output Periods**, by Djurdje Perišić et al. describes development, analysis, implementation and application of one recursive frequency locked loop based on the measurement and processing of the periods of the input and output signals. sing mathematical analyses and the simulations of the frequency locked loop it is shown that, for the corresponding system parameters, it possesses the power noise rejection ability. The frequency locked loop can also be used for different predicting and tracking applications, for frequency measurements of the input signal in noisy environments and some other applications. The paper entitled **Design of low-power voltage/current references and supply voltage for 9-bit fully differential ADC**, by Niko Bako et al., presents the design of a low-power voltage reference, bias current and the supply voltage for a 9-bit fully differential ADC. The references, power supply circuits and the ADC are integrated in one circuit, i.e. chip, implemented in the UMC $0.18\,\mu$m CMOS process and occupies $800 \times 700\,\mu$m^2. The presented results are based on measurements. In the following paper, **Weight Clustering Based TDMA-MAC Scheme in VANET**, by Jianli Xie and Cuiran Li weight clustering based TDMA-MAC scheme for VANET is presented considering the constrains of radio signal transmitting power in green communication. Therein the vehicles energy consumption in VANET is chosen as an important factor for cluster-head election, and entropy weight is calculated, which can reflect the subjective intention. Simulation results reveal the values of access probability for which the network throughput and energy consumption under*

*the weight clustering based MAC scheme yields the better performance compared to the region-based clustering MAC policy The following paper, **Outage probability of correlated SIR-based SSC diversity systems over composite K_G fading/shadowing channels**, by Stefan R. Panić et al. observes effects of multipath fading and shadowing over the propagation channel with fading modeled by Generalized-K (K_G) distribution. In the last paper, **Towards automatic cross-lingual acoustic modelling applied to HMM-based speech synthesis for under-resourced languages**, by Tadej Justin et al., a method for cross-lingual phoneme mapping between an under-resourced and a well-resourced language is proposed and further used for development of a speech-synthesis system for the under-resourced language.*

Prof. Ivan Petrović, Ph.D., Editor-In-Chief
University of Zagreb
Faculty of Electrical Engineering and Computing
Unska 3, HR-10000 Zagreb, Croatia
E-mail: ivan.petrovic@fer.hr