

EDITORIAL

Dear reader,

You have at your desk the issue no. 2/2016 of the journal AUTOMATIKA, which contains 25 original scientific papers in the fields of signal processing, computer science, power electronics, control systems, robotics and communications.

In the first paper, **Negotiation in Internet of Things**, Krešimir Mišura and Mario Žagar analyze the problem of negotiations between the application owner and device owners on conditions under which will the data be made available to applications. This problem is prominent since in the Internet of things, as a market, the number of connected devices is growing very rapidly and as the number of sensors increases, it will become much more practical to reuse existing sensors for new applications than to deploy new ones. The analyzed system was tested on simulated environments and showed that it can mediate between devices and applications with reasonable performance. Evren Isen and Ahmet Faruk Bakan in their paper entitled **Development of 10 kW Three-Phase Grid Connected Inverter** present modeling, simulation and experimental study of a 10kW three-phase grid connected inverter. In the paper the mathematical model of the system is derived and characteristic curves are obtained for various switching frequencies, dc-link voltages and filter inductance values used for parameter selection of three-phase grid connected inverter design. In the experimental study the inverter is controlled with Space Vector Pulse Width Modulation technique in d-q reference frame with grid current total harmonic distortion value and efficiency of 3.59% and 97.6%, respectively. The following paper, **Efficiency Evaluation of a MOSFET bridge rectifier for Powering LEDs using Piezo-electric Energy Harvesting Systems** by Arul A. C. Asis and Samuel E. Rajan, presents a full bridge AC/DC MOSFET converter for piezoelectric energy harvesting in LED application, supported by experiments. In the following paper, **A New Method for Fundamental Signal Extraction Based on Wavelet Transform** by Javad Modarresi and Eskandar Gholipour, a method for fundamental signal extraction by discrete wavelet transform with allowed frequency interference is presented. The fifth paper entitled **Experimental Verification and Comparative Study of Various MPPT Algorithms** by Yuval Beck and Nadav Sober presents theoretical, as well as experimental comparison results, in several aspects regarding four Maximum Power Point Tracking (MPPT) methods based on the basic two MPPT algorithms (Perturb and Observe, Incremental Conductance), implemented on a single DC/DC converter, under the same experimental conditions. The experimental results are provided and supported by theoretical analysis and show that gradient based methods have better convergence time as well as ripple values in comparison to fixed step methods. The paper entitled **Comparison of Modulation Techniques of a Grid Side Converter in a Wind Energy Conversion System** by Mustafa Cem Ozkilig et al. investigates the grid side converter of a low power on-grid WECS. Two Pulse Width Modulation techniques – Space Vector Pulse Width Modulation and Discontinuous Pulse Width Modulation are applied to compare switching losses of semiconductors and THD of the system. The seventh paper entitled **Passivity-Based Direct power control of Shunt Active Filter under Distorted Grid Voltage Conditions** by Salem Saidi et al. investigates the design of a new control method that combines DPC control and passivity theory to ensure quasi-sinusoidal grid currents, under various conditions of the source voltages. Obtained simulation results show satisfactory dynamic response and improvement of network behavior in the presence of an imbalance. Jakub Bernat et al. in their paper **Finite time linear quadratic based optimal control of BLDC motor**

employing distributed parameters modeling employ mathematical model of the Brushless Direct-Current motor with distributed parameters and finite time linear quadratic controller to minimise the phase current control error and energy delivered to the drive. Authors suggest appropriate weighting of the objectives in the cost function in order to get satisfactory behaviour of the control system. The paper entitled **Optimized Torque Control via Backstepping Using Genetic Algorithm of Induction Motor** by Souad Chaouchet et al. proposes a novel hybrid control of induction motor, based on the combination of the direct torque control DTC and the backstepping one, optimized by Genetic Algorithm. Genetic algorithm is used to find the best parameters for backstepping control. Experimental results are presented in order to prove the efficiency of the control technique. In the following paper, **Application of Open-Circuit IGBT Faults Diagnostic Method in DTC-SVM Induction Motor Drive**, by Piotr Sobański and Teresa Orłowska-Kowalska, a simple diagnostic method of a single IGBT open-circuit fault is presented. It is dedicated for three-phase two-level voltage-inverter-fed vector controlled induction motor drive systems. The main achievement of the research, whose results have been presented in this paper, is an experimental validation of the analyzed IGBT faults diagnosis technique in the drive with the Direct Torque Control algorithm. The eleventh paper, **Multiphase Wind Energy Conversion Systems Based on Matrix Converter**, by Abdelkader Djahbar et al. a new variable speed wind energy conversion systems which is based on a six-phase asymmetrical squirrel cage induction generator (SCIG) and a matrix converter as power electronic interface between six-phase SCIG and electrical network is presented. Numerical simulations are carried out to show the effectiveness of the proposed WECS topology. The following paper entitled **Adhesion Force Detection Method Based on the Kalman Filter for Slip Control Purpose** by Petr Pichlík and Jiří Zděnek presents a method for adhesion force detection for slip control between locomotive wheels and rails. The adhesion force is estimated by the Kalman filter using the locomotive model and measured locomotive velocity. The Kalman filter is implemented in Matlab and also applied on measured data. The following paper, **Single Inverter Fed Speed Sensorless Vector Control of Parallel Connected Two Motor Drive**, by Gunabalan and Subbiaha presents a speed sensorless vector control method of the torque for cost-effective parallel-connected dual induction motor fed by a single inverter. The simulation and experimental results of studies are demonstrated for various running conditions to prove the effectiveness of the proposed method. The paper entitled **Speed Optimization Control for Wheeled Robot Navigation with Obstacle Avoidance Based on Viability Theory** by Lei Liu et al. explores a method that involves robot dynamic model, environmental constraints and navigation control which can raise the efficiency of the robot navigation. The authors assert that simulation shows that viability theory can precisely describe the link between robotic dynamics and the obstacle, and thus can help the robot to achieve radical high speed navigation in an unknown environment. Xiangshun Li in his paper **Control for Formation of Multi-Agent Systems with Time-varying Delays and Uncertainties based on LMI** analyzes robust stability of vehicles formation system with structural uncertainties and time-varying delays. Stability and robust stability criteria of vehicles formations system are obtained in terms of linear inequality matrix and free-weighting matrix method. In the end numerical examples are given to illustrate the effectiveness of the results. The following paper, **Running Agent-based-models Simulations Synchronized with Reality to Control Transport Systems** by Ismael F. Chaile-Alfaro and Lluís Ribas-Xirgo, presents a multi-agent controller design for internal transportation system by introducing synchronizers of simulation and reality events. In the following paper, **Intelligent Control Method of a 6-DOF parallel robot Used for Rehabilitation Treatment in lower limbs** by Amini Azar et al. an algorithm and an improved rule are presented for controlling a rehabilitation system of lower limbs which is implemented on a 6-Degree Of Freedom Stewart parallel robot. The results of simulations are presented by defining

a physiotherapy standard mode on a desired trajectory and a comparative discussion between this strategy and common methods is devised. The paper entitled **Improved Path Planning Algorithm on the rugged road** by Dianhua Zhang et al. discusses the problem of path planning. The paper shows a 2.5-dimensional terrain grid which can reduce the amount of computation. By applying the fuzzy logic theory, the terrain trafficability of the rugged road can be evaluated based on different gradient, roughness, elevation difference; the trafficability factor can be achieved and applied to the heuristic function. In **Unbounded regulators with variable gains for a direct-drive robot manipulator** Miguel A. Limón-Díaz et al. address the position-control problem with variable gains for robot manipulators. Authors present a new regulator based on a hyperbolic-sine structure with tuning rules for control gains. It is demonstrated that the equilibrium point of the closed-loop system is globally and asymptotically stable according to Lyapunov theory. The following paper entitled **Influence of the LTE System using Cognitive Radio Technology on the DVB-T2 System using Diversity Technique** by Ladislav Polak et al. explores possible influences of the LTE, using cognitive radio technology, on the area which is covered by DVB-T2 services. Obtained results show there are the same requirements on the Forward Error Correction decoding process in the DVB-T2 receiver, when power imbalances between TV transmitters are considered at the interfering LTE signal. Jong-Ryul Yang in his paper entitled **Gate Driver Integrated Circuit with Breakdown Protection for Switch-mode Power Amplifiers** presents a gate driver integrated circuit to prevent breakdown of switching power amplifiers. The proposed circuit consists of a dead-time generator, level shifters, and a breakdown blocker and is designed using TowerJazz's 0.18 μm BCD process for a tightly coupled wireless power transfer system. The following paper, **A new connectionless routing algorithm using cross-layer design approach in MANETs**, by Elahe Ataee Bojd and Neda Moghim, presents a crossed-layer connectionless routing based on Dynamic Virtual Router with achieved higher packet delivery and lower delays. **Simulated artillery chamber pressure generator for special dynamic evaluation** by Wen-bin You et al. considers a simulated artillery chamber pressure generator in order to perform a dynamic evaluation of an internal electronic pressure gauge. Conducted simulation and test results show that the device can effectively simulate the artillery chamber environment, and can be used for the feasibility evaluation of the internal electronic pressure gauge. N. Kanthavelkumaran et al. in their paper **Exhaust Measurement and Emission Control – Biodiesel Involvement in Diesel Engine** study the application of biofuel emulsions as an alternate fuel. Diesel engine performance was compared using different fuels, namely Diesel, Jatropha Methyl Ester and Jatropha Methyl Ester Wood Pyrolysis Oil emulsion, by applying various loads. The authors assert that these kinds of biofuels are more concentrated and more environmentally safe. In the last paper, **3D Cardiac Electrical Activity Model**, Siniša Sovilj et al. present a study which aims to develop a new, computationally-efficient, anatomically-realistic 3D bidomain cardiac electrical activity model using widely available software and standard low-cost hardware. The model incorporates whole-heart embedded in a human torso, spontaneous activation of sinoatrial node and specialized conduction system with heterogeneous action potential morphologies.

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