

Adam Głowacz, Witold Głowacz, Andrzej Głowacz: **Sound Recognition of Musical Instruments with Application of FFT and K-NN Classifier with Cosine Distance** • Automatyka 2010, t. 14, z. 1

Paper presents a new implementation of methods of recognition of musical instruments based on FFT and K-NN classifier with cosine distance. Investigations were carried out for sounds of piano and sounds of bells. Results of investigations show that efficiency of the applied algorithms is very high.

*Keywords:* sound recognition, musical instrument, signal processing

Marcin Kołodziejczyk: **Applying of Security Mechanisms to Low Layers of OSI/ISO Network Model** • Automatyka 2010, t. 14, z. 1

This article describes security mechanisms used by Data Link and Network layers in OSI/ISO network model. Most of protocols for these layers were designed with assumption that there are no intruders, that every device in the network should trust to other devices. Some basic level of trust is necessary, but if this level is too high, standard protocols may be abused. Article classifies some vulnerabilities and network threads. This paper is also an attempt to create some basic rules and requirements which should be met by secure network protocols.

*Keywords:* AES, ARP, ARP poisoning, authentication, CCMP, checksum, cipher, collision domain, CRC32, DHCP, EAP, ESP, Ethernet, HMAC, IPsec, IPv4, IPv6, MAC address, OSI/ISO model, protocol, PSK, RADIUS, RC4, sniffing, spoofing, switch, TKIP, TTL, WEP, WiFi, wireless network, WPA, WPA2

Adam Kowalewski: **Optimization of Distributed Hyperbolic Systems with Multiple Time Delays given in the Integral Form** • Automatyka 2010, t. 14, z. 1

In this paper optimal control problems for hyperbolic systems in which different multiple time delays appear in the integral form both in the state equations and in the boundary conditions are considered. Necessary and sufficient conditions of optimality for the Neumann problem are derived. The optimal boundary control is obtained in the feedback form. Making use of the results of Schwartz, the representation of the optimal feedback boundary control is given.

*Keywords:* optimization, hyperbolic systems, multiple time delays, integral form

Robert Kuck, Mariusz Pauluk: **Designing Fuzzy Controller in LabVIEW for Tower Crane** • Automatyka 2010, t. 14, z. 1

The paper presents a fuzzy controller, designed and built in the labVIEW environment. The controller is dedicated for the tower crane laboratory model. Its aim is to transport a suspended payload in a save way. All oscillations of the payload (caused by the crane movement as well as disturbances) should be dumped. The controller is realized with the labVIEW toolkits: *Fuzzy Logic Toolkit, PID Control Toolkit*.

For construction purposes a typical Mamdani type fuzzy controller has been chosen. It is assumed, a structure of the controller is separated. So, the controller contains: three position fuzzy controllers type P, each for axes:  $x$ ,  $y$  and  $z$  and two ones type PD minimizing the payload fluctuation

**Keywords:** *3D Tower Crane, labVIEW, Fuzzy Logic, real time*

Łukasz Mazur: **Modeling Mutlidimensional Expressions in MDX Language** • Automatyka 2010, t. 14, z. 1

The article describes the technique of query modeling for analytical models, using the language of multidimensional expressions (MDX). It is the supporting tool to the all manner of complex query in data cubes. Article include also the description of functions which works on member sets and authors examples of each solutions. All talked aspects of language makes it very useful tool for support analysts in creating complicated reports on large constructional complexity.

**Keywords:** *CP/CLP, constraints, combinatorial problems, constraint satisfaction problem CSP, constraints programming, ILOG OPL environment*

Krzysztof Oprzędkiewicz: **An Aperiodic Stability of a Control System with an Interval 2nd Order Plant and PID Controller** • Automatyka 2010, t. 14, z. 1

In a paper a problem of calculation aperiodic stability areas inside area of permissible controller's parameters for closed – loop control system is presented. As a controller the ideal PID controller was assumed, as a control plant the second order interval object was considered. Inside the area of interval parameters a spectrum of the plant can be both real and complex. To the analysis of aperiodic

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stability the sufficient aperiodic stability condition for interval polynomials was applied. Theoretical results were with a numerical example depicted.

*Keywords:* dynamic internal systems, PID control

Marcin Piątek: **Identification of the Servo Motor Used in the Walking Robot** • Automatyka 2010, t. 14, z. 1

The paper describes the servo motor modelling and identification procedures. The hexapod – six-legged walking robot is presented. The Hitec servo motors are the robot actuators. The development environment where all experiments are performed is described in detail. The precise analysis of the servo motor static behaviour is done and the results are shown in numerical and graphical forms. An effort to identify the servo motor as a linear object has been taken. Finally, a non-linear model structure is assumed. The identification results are presented.

*Keywords:* identification, servo motor, hexapod, walking robot

Grzegorz Sieklucki, Tadeusz Orzechowski: **Discrete-Time Load Torque Observers in Electric Drives** • Automatyka 2010, t. 14, z. 1

Theory of state observers and mathematical model of electrical drive is studied. Two kind of load torque observers are presented. Parameters selection methods (pole placement, duality and LQ problem) and block diagrams useful for realization on Digital Signal Processors (DSP) are discussed. Comparison of algorithms from computational complexity point of view is made. Obtained results for separately excited motor are shown.

*Keywords:* DC drive, induction motor drive, state variable observer, load torque.

Jacek Śmietański, Ryszard Tadeusiewicz: **System for Automatic Detection and Localization of the Prostate Cancer on Images Registered by Means Perfusion Computed Tomography Technology** • Automatyka 2010, t. 14, z. 1

Detection and localization of the prostate cancer is difficult problem in general case. For this purpose the new method of medical imaging named perfusion computed tomography (p-CT) can be used. Nevertheless images registered by means of p-CT technology are difficult for interpretation, especially when interpretation must be earned by computer instead of experienced professional radiologist.

In paper new algorithms for p-CT images automatic interpretation are presented and discussed. Using proposed algorithms both detection and localization of the prostate cancer can be performed. After general description of proposed methods illustrative case study is presented. For proper solution of the problem under consideration the original method for region of interest (ROI) localization is proposed. Such method named “life belt method” can be assessed as simple and effective and therefore it can be recommended for analysis of perfusion computed tomography prostate cancer images.

**Keywords:** *medical images processing, automatic cancer detection, automatic cancer localization, prostate cancer, perfusion computed tomography*