Summaries

Tomasz Ambroziak, Roland Jachimowski: **Some Aspects of Time Windows in the Vehicle Routing Problem** • Automatyka 2011, t. 15, z. 2

The article presents selected aspects of the vehicle routing problem. Detailed analysis was given to the hard and soft time windows that appear in the vehicle routing problem with time windows. Authors presented main similarities and differences between hard and soft time windows. Also the bicriteria vehicle routing optimization tasks were formulated for both types of time windows.

Keywords: *vehicle routing problem, hard time windows, soft time windows, penalty costs*

Mariusz Balawajder, Bartosz Czerwiński, Adam Kudła, Jarosław Koźlak, Małgorzata Żabińska: **Agent-oriented SOA System Applying Auction Methods to Assign Tasks** • Automatyka 2011, t. 15, z. 2

In this paper the concept of a multi-agent system based on SOA is presented. It was applied to the management of complex rescue actions, during which the resources offered by public services of different types are used. For the sake of an efficient decision process performance related to resources connected with the services required, various types of auctions were used.

Keywords: *multi-agent systems, Service Oriented Architecture, auctions, integrated rescue action*

Lev Belava: **Algorithm for the Conversion of Service Composition Directed Graph into BPEL Service Composition Plans** • Automatyka 2011, t. 15, z. 2

The paper describes the data structure of the Service Composition Directed Graph and the algorithm of its conversion into BPEL service composition plans. The proposed concept allows to use the Service Composition Directed Graph as a better form for machine operations on composition plans and to generate BPEL from such graphs.

Keywords: *SOA, Web Services, BPEL, service composition*

Grzegorz Bocewicz, Wojciech Muszyński, Zbigniew Banaszak: **Declarative Model of Mobile Robots System for Indoor Inspection Tasks** • Automatyka 2011, t. 15, z. 2

Declarative modeling provides attractive perspective for integrated approach to selection, docking and routing planning of multi mobile robot inspection system problem formulation. For given set of decision variables describing indoor environment (ncluding stationary and movable obstacles) and acting robots as well as the set of constraints limiting these variables robots' navigation strategy is sought out. The solution should respond to the question: what kind and how many and in which way initially docked robots enable to inspect a given indoor environment within a given time horizon? The approach proposed is illustrated on an example attached.

Keywords: *multi mobile robot system, indoor inspection, constraints programming*

Wojciech Bożejko, Mariusz Uchroński, Mieczysław Wodecki: **Parallel Estimation of the Cost Function for the Flexible Scheduling Problem** • Automatyka 2011, t. 15, z. 2

The aim of this paper is to show how to determine the neighborhood of the complex discrete optimization problem and how to search it in the parallel environment, this being illustrated by an example of the hybrid scheduling, more precisely a flexible job shop problem. We present a parallel single-walk approach in this respect. A theoretical analysis based on PRAM model of parallel computing has been made. We propose a cost-optimal method of neighborhood generation parallelization.

Keywords: *flexible job shop problem, scheduling, parallel algorithm, GPU*

Wojciech Bożejko, Mieczysław Wodecki: **Data Broadcasting Problems in Networks** • Automatyka 2011, t. 15, z. 2

In this paper we consider strongly NP-hard problem of data broadcasting in networks. We consider a data set and a set of output streams in this problem. For each stream a subset of the data set has to be assigned and a sequence of sending has to be determined to optimize a criterion chosen. We present an algorithm which is based on the tabu search approach.

Keywords: *data broadcasting, networks, tabu search*

Zbigniew Buchalski: **Decision Taking Assistance Procedures Application in the Commercial Firm** • Automatyka 2011, t. 15, z. 2

This paper presents certain concept of expert system, called LOGISTER, which supports work organization in logistic company. Fundamental establishments of systems construction and functional description of that system is presented. Knowledge gathered in systems knowledge base is formed as rules and facts and its acquisition is ad hoc operation. Implementation of presented LOGISTER system was accomplished and course of reasonning process was considered.

Keywords: *logistical process control, expert systems, knowledge acquisition*

Wojciech Chmiel, Piotr Kadłuczka, Grzegorz Packanik: **Performance of Multi-population Evolutionary Algorithms for Permutation Problems** • Automatyka 2011, t. 15, z. 2

The objective of this paper is to examine the most important properties of a multi-population genetic algorithm. These elements include: connection topology, migration size, migration interval and a method for migrant selection. A short review of the existing papers on multi-population algorithms is presented. A new diversity measure that applies to permutation encoding is introduced. The proposed measure has proved effective in helping to retain balance between population diversity and convergence. A multi-population genetic algorithm, with different parameters like type of topology, migration interval, migration size and selection method was tested against several different test instances of traveling salesman problem, that belongs to the NP-hard permutational problem class.

Keywords: *permutation problem, travelling salesman problem, multi-population evolutionary algorithm, island model*

Mieczysław Drabowski, Edward Wantuch: **Methods of Artificial Intelligence in Synthesis of System of Type Complex of Resource and Operation** • Automatyka 2011, t. 15, z. 2

The goal of this synthesis is to find an optimum solution satisfying the requirements and constraints enforced by the given specification of the system. The partition of the functions between

hardware and software is the basic problem of synthesis. Such partition is significant, because every computer system must be realized as result of hardware implementation for its certain tasks. Due to the fact that synthesis problems and their optimizations are NP-complete we suggest meta-heuristic approaches.

Keywords: *resource, task scheduling, meta-heuristic, algorithms, simulated annealing, ant colony, tabu search*

Jan Tadeusz Duda, Anna Duda-Kękuś: **A Conceptual Mathematical Description of Green Certificates Price Formation on the Energy Stock Market in Poland** • Automatyka 2011, t. 15, z. 2

The paper discusses green certificates stock price formation mechanisms. Starting from rational prerequisites concerning the market position of coal-based power industry in Poland, it was shown that a difference between the stock prices of green certificates and the official charge for noncertificated energy sold, covers costs paid by the conventional power industry to held an additional power reserve due to uncertainty of energy supply from the wind power stations. The mathematical model, aimed at prediction of the green certificate prices is proposed that fits very well the actual data for 2008–2010. It suggests its applicability to prediction of these prices up to 2017, i.e. during implementation of EU climate policy in Poland according to present law regulations.

Keywords: *EU climate policy, green power industry, mathematical prediction of green certificate prices*

Bogusław Filipowicz, Wojciech Chmiel, Maciej Dudek, Piotr Kadłuczka: **Performance of Multi-population Evolutionary Algorithms for Permutation Problems** • Automatyka 2011, t. 15, z. 2

The objective of this study is to examine the most important traits of a multi-population genetic algorithm. These elements include: connection topology, migration size, migration interval and migrant selection method. A review of the existing papers on multi-population algorithms is presented. A new diversity measure that applies to permutation encoding is introduced. It has proved effective in helping to retain balance between population diversity and convergence. For each trait, several algorithm configurations

have been tested. Every configuration was tested against 25 different test instances, which were derived from the TSPLib95 library. Test results showed that, among the tested parameters, the most important was topology. Of the eleven topologies, a circular (ring) topology consisting of 16 islands obtained the best results. Varying of migration interval showed little correlation with the solution quality, but it did affect the convergence time. In comparison to other parameters, migration size exerts a relatively strong influence on performance. Moreover, a medium migration size proved to be reasonable. Among migrant selection methods, random selection outperformed these methods that exert selective pressure.

Keywords: *permutation problem, travelling salesman problem, multi-population evolutionary algorithm, island model*

Bogusław Filipowicz, Joanna Kwiecień: **Swarm Algorithms in Optimization of Quadratic Assignment Problem (QAP)** • Automatyka 2011, t. 15, z. 2

This paper presents three swarm algorithms: ant algorithms, particle swarm optimization and bee algorithms, used for solution of quadratic assignment problem, which is a NP-hard optimization problem. The results of experiments performed for selected test problems of quadratic assignment problems from QAPLIB library have been also presented.

Keywords: *bee algorithms, ant algorithms, particle swarm optimization, quadratic assignment problem*

Bogusław Filipowicz, Mirosław Zajdel: **Close Range Interactions in Crowd with Homogeneous Structure** • Automatyka 2011, t. 15, z. 2

Paper presents interactions of close range distance that occur in human crowd under dangerous and panic situations, assuming homogeneous structure of the crowd. Patterns of interactions base on processes taken from herd animals. Communication processes and information flow were taken into consideration. The discussion about control possibilities aimed at security improvement was carried out.

Keywords: *crowd, panic, herd*

Marek Hryniewicz, Paweł Gara, Michał Bembenek: **Modeling of Unitary Pressure Distribution in Compacting Process** • Automatyka 2011, t. 15, z. 2

In the agglomeration system of fine-grained materials called dry granulation, material is consolidated after then crushed and selects the desired fraction. To consolidate materials in this process the most commonly are used roller presses with a smooth working surface. The product quality is largely dependent on distribution of the pressure on the compacted material. Therefore, work began on mathematical modeling of the distribution of pressure in the compacting process. The article presents the model and its verification. On the basis of the model will be developed a computer simulation program for compacting fine-grained material, which should develop the theory and construction roll presses.

Keywords: *dry granulation, compacting, unitary pressure*

Marianna Jacyna, Michał Kłodawski: **Mathematical Model for Order Picking Area Design** • Automatyka 2011, t. 15, z. 2

The paper presents one of the sub-problems of design and analyze order picking systems, which is designing order picking area layout. The research problem concerns the optimization model of order picking area layout construction. The main attention was paid to numbers and length of pick aisles, numbers of pick levels and depot localizations at which total time of order fulfilment was the shortest.

Keywords: *order picking, order picking area layout, time of order picking*

Jakub Jagnicki, Piotr Pałka: **Application of the Multi-commodity Trading Mechanisms to Airport Capacity Management** • Automatyka 2011, t. 15, z. 2

In the paper, we draw attention to problems arising from the dynamic development of the passenger aviation. The problems are mainly related to excess of the airport capacity limits. We propose the application of multi-commodity market-based mechanisms to airport congestion and capacity management. The aim of the study

is also to research if the multi-commodity market data model M^3 allows for description of the airport data.

Keywords: *airport congestion management, airport slots, combinatorial auction, M^3 multi-commodity market data model*

Łukasz Karbowski: **An Iterative Mechanism with Valuation Bounds for a Multi-commodity Exchange** • Automatyka 2011, t. 15, z. 2

This paper contains an analysis of the iterative auctions for a multi-commodity model. Two iterative algorithms are proposed. A research including market simulations shows that the proposed algorithms often encourage bidders to reveal true valuations of their offers. The preferred number of iterations should be rather lower then 5 or 6, then greater. This can be achieved by calibrating the parameters of the auction.

Keywords: *iterative auction, multi-commodity model*

Mirosław Kasper, Grzegorz Dobrowolski: **Proposal of Highly Scalable Data Replication Theta Method for Distributed Transactional Systems** • Automatyka 2011, t. 15, z. 2

The aim of this paper is a proposition of the new replication method for distributed systems with large number of nodes, which is suitable for systems in which demand on high level of scalability is a key issue. The approach is designed for systems working in heterogeneous environments with various platforms, operating systems or database vendors. The article contains presentation of Theta method, description of the communication layer and system components, and presentation of transaction management for the proposed method.

Keywords: *data replication, databases, distributed systems, replication approaches, agent system*

Piotr Kisiel, Bożena Zwolińska, Paweł Gara: **Systemic Approach to Waste Management** • Automatyka 2011, t. 15, z. 2

Waste produced by the industrial and consumer sector has a negative impact on the ecosystem. An effective solution of this problem would be to create an efficient and integrated system of

waste management, which would take into consideration not only economical but also ecological aspects. The complex nature of a model which tries to include all manufacturing branches requires systematization according to precisely defined classification criteria.

Keywords: *waste management systems, logistics of waste management*

Piotr Kisiel, Bożena Zwolińska, Paweł Gara: **Selected Computers Systems Used in Corporation Warehouse Management** • Automatyka 2011, t. 15, z. 2

This article elaborates on the computer systems used in warehouse management support. Based on commonly accessible materials, four computer systems have been presented.

Keywords: *warehouse, computer management*

Marcin Klimek, Piotr Łebkowski: **Resource Allocation for Project Scheduling Problem with Weighted Instability Costs** • Automatyka 2011, t. 15, z. 2

Article presents resource allocation problem for resource-constrained project scheduling problem with weighted instability costs of tasks. Rules of allocations which may have an influence on increase robustness of schedule were denoted. Measures of robustness of resource allocations which take into consideration the effect of the duration lengthening for individual activities on the stability of the schedule completed were proposed.

Keywords: *resource allocation, resource-constrained project scheduling, weighted instability costs*

Bogdan Kosturkiewicz: **Mathematical Model of Working Element of Screw Feeder** • Automatyka 2011, t. 15, z. 2

The theoretical analyse of the process of thickening of fine-grained material in a roll press screw feed system with vertical working element is presented. The model described makes it possible to evaluate the influence of both the kinematics and the design parameters of the agglomeration system upon qualitative and quantitative course of the load of working element of the screw feeder

with torque. The results of some consider of this subassembly are presented also.

Keywords: *screw feeder, roll press, mathematical model*

Jarosław Koźlak, Sebastian Pisarski, Małgorzata Żabińska: **Transportation Problem Solving Using Situation Pattern Identification Methods** • Automatyka 2011, t. 15, z. 2

The goal of the work is to design algorithms to solve transportation problem – pickup and delivery problem with time windows. The import element of the solution is to calculate measures which describe the current situation from the point of view of vehicle position as well as the spatial and temporal locations of transportation requests and the choice of the suitable version and configuration of the optimisation algorithm taking into consideration values of these measures. It makes it possible to use the algorithm which offers the best solution for the given kind of the data and to limit the computation time.

Keywords: *transportation problems, pickup and delivery problem with time windows, multi-agent systems, identification of situation patterns*

Jarosław Koźlak, Anna Zygmunt: **Identification of Patterns in Road Traffic** • Automatyka 2011, t. 15, z. 2

The paper concerns the analysis of data about road traffic. We are focusing our analysis on the frequent sequences. The analysed data was obtained using multi-agent simulator for modelling and optimisation of road traffic.

Keywords: *road traffic, patterns, frequent sequences*

Jarosław Koźlak, Małgorzata Żabińska: **A Concept of a Holonic System for Supply Chain Management** • Automatyka 2011, t. 15, z. 2

In the paper, the concept of a holonic multi-agent system for modelling and optimising market strategies for a company and management of supply chains is presented. The measures which describe the situation of the company in the market, used for the choice of activity strategies, and especially decisions of assigning

long-term contracts and holon formation consisting of cooperated companies are discussed.

Keywords: *multi-agent systems, holons, supply chains*

Lech Kruś, Jan Skorupiński, Eugeniusz Toczyłowski: **Analysis of Incentive Compatible Decisions in a Multicriteria Auction** • Automatyka 2011, t. 15, z. 2

In the paper an iterative multicriteria closed-bidding auction conducted with the use of a multi-agent computer-based system is analyzed. The system supports submission of tenders, multicriteria analysis made by an organizer of bidding, simulation, and analysis of bidding competitors' behavior. Analysis of incentive compatible decisions is the main subject of the research. A mathematical formulation of the decision problems and selected results of bidding sessions conducted with use of the system are presented and analyzed.

Keywords: *incentive compatible decision mechanisms, multiagent systems, multicriteria optimization*

Roger Książek: **Presentation of Genetic Algorithm Results for the Capacitated Lot Sizing Problem (CLSP)** • Automatyka 2011, t. 15, z. 2

This paper presents the results obtained using a genetic algorithm to solve mixed integer programming task for the capacitated lot sizing problem. CLSP model was chosen from among many models with different variants of this problem as a basic for development of genetic algorithm. In this paper is summarized a comparison between the results of a genetic algorithm with the results of mixed integer programming for solving the same problem.

Keywords: *genetic algorithm, production, lots sizing and scheduling, mixed integer programming, CLSP*

Antoni Ligęza, Tomasz Maślanka, Krzysztof Kluza, Grzegorz Jacek Nalepa: **Modeling BPMN Diagrams within XTT2 Framework. A Critical Analysis** • Automatyka 2011, t. 15, z. 2

This paper presents preliminary results of the research concerning integration of Business Processes designed with BPMN mo-

dels with Business Rules represented with the use of an expressive rule language XTT2. The presented solution allows for translation of BPMN diagram restricted to main control flow objects to XTT2. Business Rules. The translated rules can be executed using HeaRT, a rule engine for XTT2. The main goal of the research is to build a logical declarative model of BPMN-modeled process suitable for formal analysis.

Keywords: *Business Process Modeling Notation, BPMN, Business Rules, Rule-Based Systems, eXtended Tabular Trees, XTT, XTT2, System Verification, Formal Analysis, Declarative Model*

Marek Magiera: **Method of Selection of Suppliers and Transport Means for Supply Network** • Automatyka 2011, t. 15, z. 2

The network for multilevel method consists of among others the manufactures of component parts, the manufactures of composite products. The first level is used for suppliers selection. It's selection of manufactures of component parts. The second level is created for selection of transport firms and transport means. The linear mathematical models of mixed integer programming with cost criterions are constructed for each levels. Results of computational experiments with the proposed method are presented.

Keywords: *supply chain, supply network, scheduling, integer programming*

Mariusz Makuchowski: **Algorithm Tabu for the Central Spanning Tree Problem** • Automatyka 2011, t. 15, z. 2

In this paper the central spanning tree problem is considered. The problem consists in finding a spanning tree in a graph, that minimizes the maximum distance to all other spanning trees. The distance between two trees is measured by means of the symmetric difference of their edge sets. The problem is known to be NP-hard. The algorithm based on the tabu search approach is proposed. Computational experiments are conducted and compared with results obtained by a branch and bound algorithm.

Keywords: *central spanning tree problem, spanning tree, tabu search algorithm, robust optimization*

Marcin Matuszak: **Measurement Systems for Micromilling Dynamic Parameters Investigation** • Automatyka 2011, t. 15, z. 2

Milling process and especially micromilling process is characterised by parameters that have significant impact on its quality. The paper presents micromilling process and technical system that is used for its implementation. Measurement system diagram is presented. The system can measure simultaneously parameters of micromilling process such as cutting forces, accelerations and acoustics. Results of preliminary research are presented. System was build in Mechatronics Centre of West Pomeranian University of Technology in Szczecin. Conclusions arising from performed experiments and further research plans are presented.

Keywords: *measurement systems, micromilling dynamics, cutting forces, accelerations, acoustics*

Zbigniew Matuszak: **Examples of the Description of Up Time Distributions Compositions of Devices and Technical Systems Damage** • Automatyka 2011, t. 15, z. 2

Complex devices and technical systems are characterized by damage of mechanical, electrical, electronic elements... These components have different up time distributions, such as exponential, Weibull, normal, log-normal, power law and gamma... In case of the summation of many different streams of damages one can use the mixtures (compositions) of up time and fault time distributions of devices and technical systems by combining the selected distributions.

Keywords: *complex technical system, up time distributions; mixtures (compositions) of up time distributions*

Edward Michlowicz, Andrzej Świątoniowski: **Improvement of Flow Continuity by Mapping Method VSM** • Automatyka 2011, t. 15, z. 2

An important task of production logistics is to ensure continuity and appropriate intensity of production in the field of material flow, resulting from technological processes. One method to refine the mapping of flows is VSM (Value Stream Mapping). The paper presents the problem as an example mounting ISO standard chairs.

Keywords: *production logistics, material flow, mapping*

Wojciech Mitkowski, Krzysztof Oprzędkiewicz: **A Minimum--Energy Controller for 2nd Order Uncertain Parameter Plant** • Automatyka 2011, t. 15, z. 2

In the paper an example of synthesis an optimal P controller for second order uncertain-parameter plant is presented. The plant under consideration describes a huge class of real industrial control plants, for example servomechanisms. The controller is expected to move the system from initial to final state with minimal consumption energy and simultaneously with shortest possible settling time in the whole considered uncertain-parameter area. As const functions the following were considered: the first one was "the worst case" function, the other one the "center of gravity" function was applied. The synthesis of controller was done with the use of MATLAB. Results of calculations show, that the use of both considered cost functions give very similar results.

Keywords: *uncertain-parameter systems, minimal-energy control, optimal control*

Edward Nawarecki, Stanisława Kluska-Nawarecka, Joanna Dziaduś-Rudnicka, Dorota Wilk-Kołodziejczyk: **Technological and System-related Aspects of Information Acquisition from Open Sources** • Automatyka 2011, t. 15, z. 2

The paper considers problems related with searching for technological information in Internet. The results of initial experiments in data mining about casting technologies from WWW pages are presented. A functional diagram and some numerical procedures (algorithms) of computer system for automatic creation of problem-oriented components of the technological knowledge are included.

Keywords: *data mining, WWW pages, casting technologies*

Krzysztof M. Ocetkiewicz, Marek Kubale: **How to Put out a Fire Fast: a Case of Time-Dependent Scheduling** • Automatyka 2011, t. 15, z. 2

The article is devoted to scheduling jobs of fire fighting squads dealing with forest fire. Time-dependent scheduling is employed as a mathematical model. The complexity of two optimization criteria was discussed: the makespan and the total completion time. It is

shown that, in general case, there are no ideal schedules that guarantee minimization of both of these goals simultaneously.

Keywords: *computational complexity, fire fighting, time-dependent scheduling*

Krzysztof Oprzędkiewicz, Janusz Teneta: **Problems of Optimal Control for Oriented Photovoltaic Systems** • Automatyka 2011, t. 15, z. 2

In the paper problems of optimal control for oriented photovoltaic systems are presented. A structure of hierarchical, two-level control system, control problems and algorithms for plant under consideration are shown. An energy consumption at the process-control level should be minimal, because energy used to plant control is produced by the solar system. The supervising and coordination of process control is done with the use of upper level. In the paper a proposition of a cost function describing an energy consumption by the process control level is also presented. This cost function is determined by a number of factors.

Keywords: *oriented photovoltaic systems, hierarchical control systems, optimal control*

Tomasz Pełech-Pilichowski, Jan T. Duda: **A Similarity Analysis of Diagnostic Signals with Distance-like Methods** • Automatyka 2011, t. 15, z. 2

The article focuses on the presentation of the concept of using distance measures for monitoring process variables, aimed at the identification the process similar situations. The paper describes the problems of diagnostic signal processing. The idea of the use of distance measures for process situations similarity monitoring is described. Sample results obtained for retrospective analysis with the dedicated similarity method, including the input data transformation, are shown and discussed.

Keywords: *event detection, time series similarity, distance measures*

Jarosław Pempera: **Parallel Tabu Search for the Vehicle Routing Problem with Components Inspired by Nature** • Automatyka 2011, t. 15, z. 2

The paper deals with the vehicle routing problem with constraints imposed on the working time of drivers. For this problem, there has been proposed a parallel tabu search algorithm. The algo-

rithm uses a number of independent searching threads, managed by certain evolution mechanism. Results of computational experiments are also provided and discussed.

Keywords: *vehicle routing problem, parallel computing, tabu search*

Piotr Potiopa: **Methods and Tools for the Automatic Processing of Textual Information and Its Use in the Process of Knowledge Management** • Automatyka 2011, t. 15, z. 2

The theme of this article is to review methods and tools for representing and processing information, which is currently one of the principal means of building and management in any organization. The smooth functioning of any institution is dependent on access to knowledge stored in it, as well as the possibility of an efficient search, structuring and making the new decisions based on it.

Keywords: *knowledge management, ontologies, case-based reasoning, information retrieval, information extraction, document similarity, natural language processing, text-mining*

Łukasz Rojek, Konrad Wala: **Bees Metaheuristic for Vertex Graph Colouring** • Automatyka 2011, t. 15, z. 2

Bees metaheuristic is one of the most recently introduce swarm-based procedure. It simulates the intelligent foraging behavior of a honey bee swarm. In this work, the bees metaheuristic is used for work out some population-based algorithm for permutation optimization problems. A numerical test results obtained for optimizing vertex graph coloring problem are presented.

Keywords: *bees metaheuristic, bees algorithm, vertex graph coloring*

Bartosz Sawik: **Conditional Value-at-Risk and Value-at-Risk for Portfolio Optimization Model with Weighting Approach** • Automatyka 2011, t. 15, z. 2

This paper presents a multi-objective portfolio models with the expected return as a performance measure and the expected worst-case return as a risk measure. The problem objective is to allocate the wealth on different securities to optimize the portfolio expected return. This portfolio approach has allowed the two popular in financial engineering percentile measures of risk, value-at-risk (VaR) and conditional value-at-risk (CVaR) to be applied. Numerical examples based on historical daily input data from the Warsaw

Stock Exchange are presented and selected computational results are provided.

Keywords: *Multi-Criteria Decision Making, Portfolio Optimization, Conditional Value-at-Risk, Mathematical Programming*

Marcin Szpyrka, Piotr Matyasik, Rafał Mrówka, Wojciech Witalec, Jarosław Baniewicz, Leszek Kotulski: **Introduction to Modelling Embedded Systems with Alvis** • Automatyka 2011, t. 15, z. 2

Alvis is a modelling language for concurrent and real-time systems. It combines hierarchical graphical modelling with a Haskell-based high level programming language. The graphical layer is used to define data and control flow among agents. The code layer is used to describe the behaviour of individual agents. An Alvis model is transformed into a labelled transition system (LTS) that is used for formal verification of the model. The paper discusses some aspects of modelling embedded systems with Alvis.

Keywords: *Alvis, embedded systems modelling and verification, formal methods*

Magdalena Szymczyk, Piotr Szymczyk: **Reliability Embedded Systems Based on Modern Microcontrollers** • Automatyka 2011, t. 15, z. 2

Modern CMOS microprocessors produced in a great scale of integrity are vulnerable to transient hardware faults, hard faults and defects in production. Implementation of special mechanisms to improve reliability is a key of challenge also in microprocessors of general usage. Through decades different methods to improve reliability were designed such as parity code, hardware and software redundancy. In this article main focus is on redundant thread execution on modern superscalar processor (with possibility execution of different threads in one cycle of clock).

Keywords: *reliability, embedded systems*

Piotr Szymczyk, Magdalena Szymczyk: **Low Power Algorithms in Embedded Systems** • Automatyka 2011, t. 15, z. 2

Article presents different programming techniques used in embedded systems which ensures low power consuming.

Keywords: *embedded systems, low power algorithms*

Andrzej Świątoniowski, Wszebor Boksa, Ryszard Gregorczyk: **Implementation of the Six Sigma Methodology to the Operation Processes between Customers and Server** • Automatyka 2011, t. 15, z. 2

Information transfer today have greater and greater weigh for corporations activities, particularly when its global range has to be taken into consideration. Putting information transfer ("Server Enrollment" for example) – as a specific kind of manufacturing process, Six Sigma methodology has been used for its quality valuation. The obtaining results of investigations fully confirm, that – irrespective of specific difficulties referred to the measuring phase of DMAIC process – also in such case the above mentioned methodology make it possible to significant improve quality.

Keywords: *key word information transfer, quality, Six Sigma*

Andrzej Świątoniowski, Ryszard Gregorczyk, Stanisław Rabiasz: **Improvement of the Effective Efficiency of Windscreen Wipers Automated Assembly Line by Applying Total Productive Maintenance (TPM) Method** • Automatyka 2011, t. 15, z. 2

Progress in running of maintenance works have become today one of the fundamental conditions leading to improvement of production quality, as well as to reduce production costs. At the aim of this Total Productive Maintenance (TPM) method has been most often applied. In this work investigation results regarded to the implementation of TPM methodology in the maintenance of automated assembly line of windscreen wipers has been presented. It has been proved that obtained results may be multiplicated by simultaneous applying Computerised Maintenance Management System (CMMS).

Keywords: *assembly, quality, TPM (Total Productive Maintenance)*

Grzegorz Wąchocki: **Concept of an Automatic Broker System for Distribution of Ads in Various Environments** • Automatyka 2011, t. 15, z. 2

The article presents an idea of an automatic ads broker system for planning and executing advertising campaigns. The system

provides low cost tools for making business transactions between ad sponsors and publishers, enabling small business entities, with limited founds, to access professional advertising-campaign-related services. The article also describes a mechanism of automatic composition of web services based on ontological descriptions of ad publishing services and data fetched from social networks.

Keywords: *SOA, advertising, advertising campaign, web services composition, ontology, social networks*