

Konrad Kułakowski: **Concurrent systems modeling with CCL** • Automatyka/ Automatics 2012, Vol. 16, No. 2

One of the challenges facing software engineering is to conduct research into new methods of modeling systems. The CCL notation shown in the article tries to follow in this direction. The solutions and methods presented here indicate its practical application to modeling complex computer systems using the structural, dataflow-centric approach. The basis for the proposed integration between CCL and structural methods is the newly defined externalization mechanism. It allows the details of inter-process communication to be abstracted away, thereby reducing the size of the sub-models which are subject to further verification. Thanks to the methods adopted here, the overall picture of the system becomes more readable for humans, and, due to the significant sub-model state space reduction, the effective use of formal methods for their analysis becomes possible.

Keywords: CCL, DFD, software engineering, formal methods, state explosion problem

Jerzy Martyna: **Partition of Real-Time Application over Multi-core Systems** • Automatyka/ Automatics 2012, Vol. 16, No. 2

In this paper, we present a model of parallel execution of a real-time application in a multicore system. Currently used modern architectures provide a mechanism to prevent reciprocal interference in the cause of critical activities. We propose an algorithm for obtaining the partitions of real-time applications and later for their allocation to a set of all accessible cores of a multicore processor. The algorithm takes into consideration all the constraints, such as precedence relations, timing dependencies, etc., and allows all partitions to access resources in order of their potential utility to the application. Some experimental results are provided.

Keywords: scheduling algorithm, real-time application, multicore parallel systems

Jerzy Martyna: **Runway Scheduling with Holding Pattern and Service Priority** • Automatyka/ Automatics 2012, Vol. 16, No. 2

In this paper, we have studied a scheduling problem associated with air-traffic control, in which a set of aircrafts are about to land on a single runway. The objectives are to maximize the minimum time elapsed between any two consecutive landings, minimize the

maximum number of times a plane enters a holding time, likewise including the priority of aircraft landings. We use the mixed integer three dimensional problem formulation that allows us to solve large instances of the general problem. Our numerical results validated the effectiveness of the proposed method.

Keywords: *scheduling, runway scheduling with holding pattern, Lagrangian multipliers*

Krzysztof Oprzędkiewicz: **A Strejc model-based, semi-fractional (SSF) transfer function model** • Automatyka/ Automatics 2012, Vol. 16, No. 2

In paper the proposition of Strejc model based, transfer function, fractional model, (called SSF model) is presented. The model is dedicated to describe high-order control plants. Parameters of the model were calculated numerically with the use of the least square method and MATLAB/SIMULINK. Results of simulations show, that the proposed model assures very good accuracy associated to relatively low order in comparison to other models describing the considered exemplary control plant.

Keywords: *fractional order transfer function, least-square method, Oustaloup approximation*

Dariusz Rzońca, Andrzej Stec, Bartosz Trybus: **Secure Web Access to Mini Distributed Control System** • Automatyka/ Automatics 2012, Vol. 16, No. 2

Small distributed control systems with remote web access are becoming fairly common. Sooner or later, security of such systems will become a precondition for some critical applications. However, limited computational power will require some non-standard solutions. The paper describes secure web access to a prototype of small distributed control system programmed according to IEC 61131-3 standard. Security is provided by challenge-response authentication of web client and symmetric cryptographic primitives. Communication latency is analysed by means of a Timed Petri Net model.

Keywords: *networked control systems, communication security, Petri nets, distributed control systems*

Andrzej Sikorski: **Fiber Processing of Queries on Hierarchical Data** • Automatyka/ Automatics 2012, Vol. 16, No. 2

This paper is dealing with fiber processing of XPath queries. We make use of the Structural Join (SJ) method that we modify so as to achieve an improved number of page fetches containing input data. The fiber aggregation based composition, defined in this paper, allows local optimization of individual search steps taking advantage either of input low cardinality or high selectiveness of parent-child join.

Keywords: fiber processing, path query, structural join

Piotr Szwed, Grzegorz Rogus, Paweł Skrzyński, Michał Turek, Jan Werewka: **Towards an Ontology Approach to ATAM Based Assessment of Service Oriented Architectures** • Automatyka/ Automatics 2012, Vol. 16, No. 2

In this paper we describe SOAROAD (SOA Related Ontology of Architectural Decisions), which was developed to support evaluation of architectures of information systems using SOA technologies. The main goal of the ontology is to provide constructs for documenting service-oriented architectures, however, it is designed to support future reasoning. Building the ontology we focused on the requirements of Architecture Tradeoff Analysis Method (ATAM) which was chosen as reference methodology for architecture evaluation.

Keywords: ocena architektury, ATAM, ontologie

Igor Wojnicki, Adam Sędziwy, Leszek Kotulski: **Towards AI-based Distributed Lighting Control Systems** • Automatyka/ Automatics 2012, Vol. 16, No. 2

The paper discusses an approach which is targeted at obtaining maximal benefits of contemporary advanced lighting systems. The benefits are expressed in terms of improved energy efficiency (i.e. lower power consumption) or citizens quality of life. Applying proposed solution one could use intelligent control methods which functionality goes far beyond simple preset lighting scenarios as

it is present in existing commercial systems. The main problem tackled here is a high complexity of control algorithms related to a size of a state space compound of lighting profiles, fixtures' working parameters and varying environment conditions. The proposed method, designed for solving this issue, is using decomposable graph representations of the environment under control, and multiagent system deployed on it. An important component of the system is a rule-based engine, adapting lighting control parameters to actual environment needs.

Keywords: *lighting, LED, rules, rule-based, AI, graph, hypergraph*