

AUTOMATIC CONTROL and COMPUTER SCIENCE Section

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A New Specification Proposal for CORBA Based SCADA Applications by Adapting Classical OPC Specification
Elisabeta Tatulescu, Andrei Smolenic and Vasile Gaitan



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CORBA is a well-known standard used to create platform independent distributed applications. A good part of these distributed applications are based on the client-server paradigm and are being used to acquire data from different industrial devices and to monitor and control industrial processes. One of the most commonly used application type in the data acquisition area is the SCADA system. At the base of SCADA systems are specification sets defined by the OPC Foundation. This paper proposes a new specification, derived from the classical OPC but built according to the CORBA standard. The major advantage offered by this approach is that it is platform independent. To prove the functionality of the proposed solution, we developed a client-server distributed application that implements this new adapted specification.

Key words: CORBA; data acquisition; middleware; OPC; SCADA.

2010 Mathematics Subject Classification: 68M99, 68W35.

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A Dynamic Approach in Describing Acquisition Devices for SCADA Systems Based on EDS Files

Andrei Smolenic, Vasile Gaitan and Elisabeta Tatulescu



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A great part of SCADA systems use *.EDS files to describe the data acquisition devices they are comprised of. These files represent a simple yet robust way of describing various types of field devices. A major disadvantage of this approach is that EDS files can only provide static descriptions of devices. In other words, the EDS technology can be used to map a fixed number of device inputs/outputs to objects in SCADA systems. This paper proposes a new approach in using EDS technology in conjunction with SCADA systems by allowing dynamic field device descriptions necessary for devices with a dynamic number of inputs/outputs.

Key words: data acquisition, EDS; middleware; SCADA.

2010 Mathematics Subject Classification: 68M99, 68W35.

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Improvement of FSM Synthesis Using the Transition Matrix Representation

Alexandru Valachi, Mihai Timis, Alexandru Bărleanu and Andrei Stan



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In this paper, the authors propose an improvement method for FSM synthesis using the transition matrix representation and their implementation using classical circuits like SSI, MSI and PLD. It is also calculated the implementation costs emphasizing the most economical solutions. The modern design tools handle digital systems with many outputs and represent them by cubes, for reasons of efficiency. Synthesis of the sequential digital automata can be reduced to a combinational synthesis: synthesis using logic gates primitives and using floorplanning design. The digital logic network that generates the control signals in FSM system can be synthesized using transition matrix.

Key words: transition matrix, boolean functions, finite state machine, MSI, LSI multifunctional circuits.

2010 Mathematics Subject Classification: 06E30, 49M27, 94C05.

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Real-Time Simulation of a Network-Controlled Vehicle Drivetrain Based on Model Predictive Control

Constantin F. Caruntu



[Full text](#)

This paper proposes a real-time implementation of a networked predictive controller designed to damp driveline oscillations, which is crucial in improving drivability and passenger comfort, while compensating the time-varying delays that appear due to sending the control commands and the measurements from the sensors through Controller Area Network (CAN). Firstly, the designed real-time structure integrated with CAN test-bench is described and then the model of the drivetrain is derived. Secondly, considering that the CAN-induced timevarying delays are bounded, a method of modelling the physical plant (vehicle drivetrain) including the delays is proposed. Then, a predictive control strategy, which makes use of the previously developed model, is designed in order to damp the driveline oscillations. The proposed control scheme is tested using the designed test-bench and the experiments based on realistic scenarios show that the proposed controller can outperform classical controllers, e.g., PI.

Key words: real-time simulation, networked control systems, drivetrain oscillations damping, model predictive control.

2010 Mathematics Subject Classification: 93C10, 93D05, 00A72.

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Load Frequency Control Based on Optimized Type-1 Fuzzy Controller

Ehsan Gholampour



[Full text](#)

Load frequency control problem is considered as one of the most important issues in the design and operation of power systems. Due to lack of good efficiency in parameters variation conditions, working conditions of system and non-linear factors, a simple PI controller is not suitable in industrial applications. Instead, fuzzy controllers can be used in order to enhance the performances of the systems. In this paper, the use of the optimized type-1 fuzzy logic controller using Particle Swarm Optimization (PSO) algorithm is proposed to solve the loadfrequency control problem. To the best of our knowledge, the PSO optimization of fuzzy type-1 controller in order to solve load-frequency control problem, has not been investigated so far. The proposed controller has good performance and is capable to solve the load-frequency control problem in conditions of wide variations of system parameters and nonlinear factors such as generation rate constraint. Simulation results show that the optimized fuzzy controller proposed in this paper exhibits better performance compared to PI controller in damping of system deviations.

Key words: power system, load frequency control, type-1 fuzzy logic controller, PSO algorithm.

2010 Mathematics Subject Classification: 93C42, 94D05, 37M05.

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A Survey of Eye Tracking Methods and Applications

Robert Gabriel Lupu and Florina Ungureanu



[Full text](#)

In the last decade, the development of eye tracking (ET) systems represented a challenge for researchers and different companies in the area of IT, medical equipment or multimedia commercial devices. An eye tracking system is based on a device to track the movement of the eyes to know exactly where the person is looking and for how long. It also involves software algorithms for pupil detection, image processing, data filtering and recording eye movement by means of fixation point, fixation duration and saccade as well. A large variety of hardware and software approaches were implemented by research groups or companies according to technological progress. The suitable devices for eye movement acquiring and software algorithms are chosen in concordance with the application requirements. Some vendors (e.g. SensoMotoric Instruments, Tobii or MyGaze) have invested in eye tracking technology, but their solutions are focused on commercial remote camera-based eye-tracker systems for which the light source and camera are permanently affixed to a monitor. Because these commercial systems including software and support are expensive some mobile and low cost devices for eye tracking were developed by some research groups. The eye tracking applications covers human computer interaction, brain computer interaction, assistive technology, e-learning, psychology investigation, pilot training assistance, virtual and augmented reality and so on.

Key words: eye tracking algorithms, human computer interaction, eye tracking applications, eye tracking quality measurement..

2010 Mathematics Subject Classification: 68U35, 68N19, 94A12

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