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An Optimised Implementation of MWC Pseudo-Random Number Generator Analyzed with the NIST Statistical Test Suite for Randomness
Marian Crețu



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This paper aims to analyze the efficiency of a personalized implementation of the multiply with carry (MWC) pseudo-random number generator (PRNG) created by George Marsaglia. The algorithm was modified to accept two MWC generators working in parallel and an XOR function applied to the individual outputs of the generators to obtain the final pseudo-random output. This implementation aims to demonstrate that applying the bitwise XOR function on two pseudo-random values the resulted value is also pseudo-random. For statistical tests I used the statistical test battery created by U.S. National Institute of Standards and Technology (NIST) to analyze the pseudo-random number generators randomness.

Key words: NIST; MWC; PRNG; statistical analyze; entropy; p-value.

2010 Mathematics Subject Classification: 54C70, 46N30, 65C10

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Optical Character Recognition System Using Support Vector Machines *Eugen-Dumitru Tăutu and Florin Leon*



[Full text](#)

Handwriting recognition systems have been developed out of a need to automate the process of converting data into electronic format, which otherwise would have been lengthy and error-prone. Beside a series of preprocessing techniques, this paper proposes a segmentation algorithm designed to reduce the processing time of the image which contains the handwritten characters. For character recognition, support vector machines are used, which are known for their high degree of accuracy, a result which can also be observed from the test scenarios.

Keywords: optical character recognition, support vector machines, image segmentation

2000 Mathematics Subject Classification: 68T10

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Designing a PV/FC Hybrid System Considering Sale Electricity *Saber Arabi Nowdeh, Abbas Rajabi-Ghahnavieh And Amin Bazzazi*



[Full text](#)

Development of renewable energy sources has shown perfect potential as a form of contribution to conventional power generation systems. This paper presents the design of a hybrid system based on photovoltaic module and a proton exchange membrane fuel cell with the aim of selling electricity to distribution network, while improving its reliability. In this paper the proposed hybrid system supplies load electricity to system and it is capable of selling electricity to the distribution network. The revenue from selling electricity network is considered as the system profit. An optimization to maximize the system profit is performed by using GAMS software. Hourly rate of sold electricity to the distribution network are determined based on changes in solar irradiance, the rate of proton exchange membrane fuel cell hydrogen consumption and stored hydrogen in the tank. This study shows that electricity can be sold to the distribution network by the proposed hybrid system, and injecting electricity to distribution network in peak time can compensate system costs.

Key words: Photovoltaic Cell, Fuel Cell, Sale Electricity, Distribution Network, GAMS

2010 Mathematics Subject Classification: 78M50

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Availability Evaluation of CcPc-MAC Protocol *Nicolae Alexandru Botezatu*



[Full text](#)

One drawback of wireless networks is the vulnerability to DoS attacks. Due to the use of an unsecure communication medium, the disruption of communication services can be achieved even with standard off-the-shelf equipment. Because such attacks take place at the physical or MAC layer, MAC protocols must be evaluated in order to see how they cope with DoS threats. In this paper CcPc-MAC, a protocol designed for WSNs, is evaluated alongside the Max-Min protocol and the standard IEEE 802.11 MAC.

Key words: IEEE 802.11 MAC, Denial-of-Service, transmit power control, wireless security

2000 Mathematics Subject Classification: 53B25, 53C15

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A Behavior-Based Visual Predictive Control Strategy

Adrian Burlacu and Corneliu Lazar



[Full text](#)

In this paper we analyze the design principles for visual predictive architectures. Any visual predictive strategy is composed from: a visual predictor, a reference trajectory, a cost function and a minimization technique. An analytical study over the properties of a local model based predictor and its open loop behavior is detailed. Constraint-based reference trajectory generator and unconstrained optimization block are components of a new visual predictive control strategy. A Matlab simulator is built using the proposed design for visual predictive architectures. Simulations are employed to validate the predictive technique and also to reveal the performance of the servoing system.

Key words: visual servoing systems, predictive control, Matlab simulator.

2000 Mathematics Subject Classification: 68M99, 68W35.

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A New Deadlock Prevention Method for a Petri Net Modeling the Functionality of a Hospital

Timotei Asaftei



[Full text](#)

In Resource Allocation Systems (RAS), a very common problem is the apparition of deadlock states. This phenomenon is due to the shared resources from the system. A way to deal with the deadlock problem is to prevent the its occurrence in the system. In this article we use the properties of the minimal siphons of S3PR nets and the Pruning Graph to develop a new method for deadlock prevention. This method consists in the increasing of the number of copies of a given resource type, and in the splitting of the total copies of resources in two new types of resources that will be used in a private way for each one of the two disjoint groups in which the old holder places of the original resource type are divided. The selection of the original resource type to be split into two new resource types and the separation of the holder places into the two disjoint groups of private users of the new resource types is conducted by the pruning graph in order to destroy all original bad siphons that can cause a deadlock. The algorithm uses only structural information of the net and it is very economic in memory.

Key words: minimal siphons, deadlock prevention, S3PR nets, pruning relation, Pruning Graph.

2010 Mathematics Subject Classification: 90B30, 93C65.

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